The Relationship Between Financial Aid and Graduation Rates for Rural Community College Students

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Abstract

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The Relationship Between Financial Aid and Graduation Rates for Rural Community College Students

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This study was designed to examine the relationship between financial aid and graduation rates for rural community college students. The main purpose of this study is to help fill the large gap in research that currently exists about rural community college students, and, more specifically, financial aid and rural community college students. This study uses data collected for the 2004/2009 Beginning Postsecondary Student Longitudinal Study (BPS:04/09), as well as data from the Integrated Postsecondary Education Data System (IPEDS). Two research questions focused on the descriptive statistics. Four additional questions used logistic regression for the findings. Two of these questions focused on all community college students, and two questions focused solely on rural community college students. All of the data for the six research questions were analyzed using STATA.

The findings from this study are that there is a relationship between financial aid and graduation rates for both all community college students and rural community college students separately. Rural community college students showed the highest graduation rates through six-years for associate degree graduates, and rural community college students had the highest graduation rates through three- and six-years for associate degree and certificate graduates. In terms of financial aid, the Federal
Unsubsidized Loan was found to be negatively related to graduation rates for both groups of students. The Pell Grant was found to have a positive association with graduation rates for rural community college students through three-years for associate degree and certificate graduates.
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Chapter 1: Introduction

Since the inception of a formal system for federal student financial aid in the Higher Education Act of 1965, students have had access to financial resources to assist with funding their education. Dependence on federal financial aid programs is high for community college students. This dependence is even higher for rural community college students. Rural community colleges serve 35% of all community college students (Hardy & Katsinas, 2008). In addition, rural community college students account for 44% of all community college Pell Grant disbursements and 64% of all rural community college students receive some form of aid. Thus, financial aid is a necessity for rural community college students.

Researching financial aid for rural community college students is important to help identify factors that affect graduation rates. Financial aid is strongly related to persistence and success among all community college attendees. It is especially important to rural community college students who are most likely to attend community colleges because it allows them to stay at home and it is affordable; however, less than 50% of rural students attend college and more than half of the students who do go to college attend a community college or vocational school (Kennamer, Katsinas, & Schumacker, 2010).

Problem Statement

Rural community college students are often overlooked among students in financial aid research. Despite differences in community college student populations and their financial aid patterns, existing research mostly assumes homogeneity between rural
and non-rural community colleges and applies findings to both types (e.g., Fike & Fike, 2008; McKinney & Novak, 2013). Indeed these studies do not differentiate by location of the institution (rural, urban, town, and suburban) and ignore the differences among the respective students who attend these different types.

Since the inception of a federal financial aid program in 1965, financial aid would grow from a single loan program to a program with multiple grant and loan offerings. One of the greatest changes to federal financial aid was the expansion of loans during the presidency of Ronald Reagan. Through the Reauthorization of the Higher Education Act in 1980, Reagan made cuts to federal financial aid programs which forced students to rely more heavily on loans to fund their education. As federal dollars continued to be reduced during the 1980s, colleges and universities were forced to increase tuition. Consequently, tuition increases far exceeded inflation during the 1980s (Gladieux & Hauptman, 1995). To respond, the federal government increased individual student borrowing limits, and this increase led to even more student loan borrowing.

The 1990s did not bring about positive financial or financial aid reforms to institutions or to students. Instead of making the Pell Grant program one that allows all students who are eligible to receive the funds eligible, also known as an entitlement program, borrowing limits were again increased. Thus, borrowing of loans continued to increase. While in 1990, 43% of borrowers borrowed the maximum loan amount, by 1998, 51% were borrowing the maximum loan amount (Fuller, 2014). This increase in borrowing also had consequences. By the end of the 1990s, over 22% of all borrowers had defaulted on their loans (Fuller, 2014). Tuition also continued to increase at
institutions. During the beginning of the 1990s, tuition was increasing at community colleges by nearly 14% per year (Choy, 2004). By the beginning of the 2000s, tuition was increasing by roughly 7%.

As tuition and access to loans have increased, rural community college students are using more financial aid to help cover the increased costs of tuition, books, housing, and transportation. In general, high usage of the Pell Grant indicates lower socioeconomic status, and in terms of loans, over 63% of rural community college have student loan debt (Hardy & Katsinas, 2008). In comparison, the national average for community college borrowing is 41% (Ma, & Baum, 2016). Because rural community college students are using financial aid at high rates, it is important to study the relationship between financial aid and such students.

Additionally, there is a large gap in research as it pertains to how financial aid affects graduation rates for rural community college students. Since Carnegie classified rural community colleges as making up 43% of all community college students, it is an important sector of community colleges to study. Many examples in financial aid research support the idea that financial aid may affect students’ academic pursuits (e.g., Alon, 2005; Bettinger, 2004; Cofer & Somers, 1999; DesJardins, Ahlburg, & McCall, 2002; Dowd & Coury, 2006; Herzog, 2005; Pascarella & Terenzini, 2005; St. John, Paulsen, & Carter, 2005; Singell & Stater, 2006).

This study will use the 2004-09 Beginning Postsecondary Student Longitudinal Study (BPS:04/09) data to show the relationship between financial aid and graduation rates for rural community college students. This study will test the hypothesis that
financial aid is predictive of graduation for rural community college students. In addition, this study relates the role of federal student aid to rural community college student graduation rates, controlling for gender, race/ethnicity, and age.

**Research Questions**

The main focus of this study is community college students in rural areas. There are two dichotomous dependent variables: (1) whether or not a student graduated with an associate degree and (2) whether or not a student graduated with an associate degree or certificate. In BPS:04/09, a student can graduate with only an associate degree or a certificate. The first variable includes only the associate degree graduates, and the second variable combines both associate degree and certificate graduates. The latter variable cannot have the same students graduating with both a certificate and an associate degree. Community colleges offer both associate degrees and certificate programs; however, this study is also including graduating with a certificate as a measure of success. Graduation with a certificate has increased in importance within the 21st century. Within 10 years, from 2000 to 2010, the number of students earning a certificate increased by 151% and now account for 25% of all sub-baccalaureate credentials earned (Dadgar & Trimble, 2015, p. 399).

This study’s focus on rural community college students is limited to students who attend Associate-degree granting institutions that primarily serve rural students at all fringe, distant, and remotely located institutions based on the Integrated Postsecondary Education Data System locale definitions. To determine the relationship between graduation rates and financial aid, the independent variables used in this study are the
Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan. These three variables fall under federal student aid which is defined as “the programs authorized under Title IV of the Higher Education Act of 1965 that provide grants, loans and work-study funds from the federal government to eligible students enrolled in college or career school” (U.S. Department of Education, Federal Student Aid [FSA], 2014, para. 2). Other selected control characteristics include race/ethnicity, gender, family income, marital status, number of children, single parent status, first generation, and age. Using these additional characteristics will allow the researcher to determine the effects of financial aid on graduation for specific groups of students with varying socioeconomic statuses.

The research questions that will guide this dissertation are:

1. What are the differences in the amount of financial aid, student demographics and family status as well as student academic performance and institutional characteristics across rural, suburban, urban, and town community colleges?

2. What are the three-year and six-year graduation rates for associate degrees earned by rural community college students, compared with suburban, urban, and town community colleges? What are the three-year and six-year graduation rates for associate degrees and certificates earned by rural community college students, compared with suburban, urban, and town community colleges?

3. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for all community college students?
4. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for all community college students?

5. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for rural community college students?

6. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for rural community college students?

The theoretical framework used for this dissertation is a synthesized model of Rong Chen’s (2008) theory which uses five different theoretical perspectives: psychological, sociological, organizational, interactional, and economic. This model is synthesized because the original theoretical framework was applied to 4-year institutions, but this dissertation will apply this synthesized model to community colleges. Unlike Chen’s (2008) model, the sample for this dissertation is from the Beginning Postsecondary Student Longitudinal Study 2004/2009 (BPS:04/09). This is the most recent available dataset from the U.S. Department of Education. This longitudinal study comprises six years starting with the 2003-2004 academic year and finished with the 2008-2009 academic year. This longitudinal dataset allows for the study to use logistic regression to study graduation rates for rural community college students.
Purpose of this Study

The purpose of this study is to help fill the research gap that currently exists in regards to rural community college students. The research gap exists because there is very little research in regards to rural community college students and financial aid. The author hopes to improve understanding about rural community college students and the relationship between financial aid and graduation rates. Research has shown that rural community college students comprise the majority of all community college attendees. Since such students use the largest percentage of financial aid among community college students, this dissertation will highlight the need for further research of this population. Understanding their financial aid patterns as they work towards graduation can only help rural community colleges better understand their students.

Significance of this Study

Since there is a significant gap in current research, this study can lead to further understanding and open up potential debate on implications for future practice, policy, and research about rural community college students. Findings may lead to a focus on rural community college students and how to help improve their graduation rates through the use of financial aid. At the end of the study, the researcher will offer policy recommendations on how to better assist rural community college students and increase graduation rates. By using descriptive statistics that will include race/ethnicity, gender, and socioeconomic status, the author will identify groups of rural community college students who may benefit from increased financial aid offerings. Furthermore, this
research will inform policymakers and practitioners about how to better assist rural community college students who will use financial aid.

Definitions

The following is a list of commonly used words in this dissertation. This list is intended to create uniformity and provide a clearer understanding of these terms. Any terms that do not have direct quotes or citations were developed by the author of this study.


Academic Performance and Institutional Characteristics: This block of variables is the third block introduced into the hierarchical regression model. The variables included in this block are: Grade Point Average (GPA), Academic Major, Vocational Major, Highest Degree Expected, Social Integration Index, Academic Integration Index, Part-time/Mixed Attendance Pattern, Enrollment Size, East Region, Midwest Region, West Region, and South Region.

Certificate: This is program that leads to a degree below an associate degree (Sykes, 2012).

Community college institution types: The institutions in this dissertation are identified using the National Center for Education Statistics (NCES) locale codes: City (Urban), Suburban, Town, and Rural. The National Center for Education Statistics urban-centric locale codes:
1. City
   a. Large – Territory inside an urbanized area and inside a principal city with a population of 250,000 or more
   b. Midsize - Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000
   c. Small - Territory inside an urbanized area and inside a principal city with population less than 100,000

2. Suburb
   a. Large - Territory outside a principal city and inside an urbanized area with population of 250,000 or more
   b. Midsize - Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000
   c. Small - Territory outside a principal city and inside an urbanized area with population less than 100,000

3. Town
   a. Fringe - Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area
   b. Distant - Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area
   c. Remote - Territory inside an urban cluster that is more than 35 miles from an urbanized area
4. Rural

   a. Fringe - Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster

   b. Distant - Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster

   c. Remote - Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster (National Center for Education Statistics, 2006, para. 1).

   *Federal Subsidized Loan*: A need-based federal student loan that the United States Department of Education pays the interest on while a student is enrolled half-time, while a student is in their grace period, or the loan is in deferment (Federal Student Aid, 2016).

   *Federal Unsubsidized Loan*: A need-based federal student loan that the United States Department of Education pays the interest on during the time that a student is enrolled half-time, while a student is in their grace period, or as long as the loan is in deferment (Federal Student Aid, 2016).

   *Financial Aid Variables*: This group of variables are the first variables entered into the hierarchical regression. The variables in this group include: cumulative amounts of the Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan through both 2006 and 2009.
*Free Application for Federal Student Aid (FAFSA):* Students and families complete this federal form to determine a student’s eligibility for financial aid.

*Pell Grant:* A federal grant program that is awarded is awarded to undergraduate students based on need. This federal aid does not need to be repaid (Federal Student Aid, 2016).

*Student Demographics and Family Status:* This group of variables is used as the second block of variables added into the hierarchical regression. The variables included in this block are: Women, Age, Minority, Maintained Married from 2003-2006 or 2003-2009, Student as Single Parent, Number of Children, Parental Education, Family AGI, Dependent on FAFSA, and Number of Hours Worked through 2006 or 2009.

**Limitations**

This study has a few limitations. The 2004-2009 Beginning Postsecondary Students data is a secondary dataset. The researcher is limited to only the data and variables that are available within the dataset. Another limitation is the ability to prove causal inference. Graduation and graduation rates may be due to other factors such as circular causation or other variables that were not included in this study. A third limitation in this study is that multicollinearity exists between the tuition and fees variable and the financial aid variables. Because tuition and fees is much lower at community colleges and financial aid hopes to decrease these costs, the outcomes were duplicated in the regressions. Thus, the tuition and fees variable was removed from the regressions. Expanded data and method limitations can be found in Chapter 3.
Delimitations

This study will solely focus on the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan. The researcher recognizes that there are many different types of financial aid. Some of these types include state grants, scholarships, institutional funding, and private loans. While these are very important funding options for students, this study will only focus on the three main types of financial aid. Additionally, this study does not examine the effects of financial aid for any post-associate degree attainment such as a bachelor’s degree or advanced degrees.

Organization of the Dissertation

This dissertation consists of five chapters. Chapter Two presents a combined theoretical framework and previous research review. Limitations of the research are also presented. Chapter Three will present the data set, the sample, and the research design that guided the study. Chapter Four will present the findings from the data analysis. Chapter Five will close the dissertation with the limitations, conclusions, and recommendations for policy and future research.
Chapter 2: Literature Review

The importance of researching the financial aid patterns of rural community college students is to identify patterns for success and graduation. Financial aid is a significant component for persistence and graduation among all community college attendees. It is especially important for rural community college students. Rural students are most likely to attend community colleges because it allows them to stay at home and it is affordable. In point of fact, less than 50% of rural students attend college and, of these, more than half of the students who do go to college attend a community college or vocational school (Kennamer, Katsinas, & Schumacker, 2010).

Theoretical Framework

A theoretical framework from student financial aid research and relevant previous research on student demographics and family status and student academic performance and status can help explain how various financial factors may impact graduation in rural community college students. Relevant research about financial aid and rural community college students is scant, and an exact theory for evaluating rural community college graduation does not exist. Therefore, this study constructs a synthesized theoretical model similar to Rong Chen’s (2008) that is used for dropout risk research for 4-year institutions. However, the model for this study is tailored to community colleges only. Chen (2008) argues that persistence and dropouts should be looked at in a holistic manner. Chen’s (2008) model has five areas of consideration, and this study utilizes all five: psychological, sociological, organizational, interactionist, and economic factors (Braxton, & Hirschy, 2005; Chen, 2008; Tinto, 1992).
**Psychological.** The first area of consideration for both models is the psychological state of students. Psychological attributes include “personal characteristics such as intellectual attributes or level of maturity” (Chen, 2008, p. 212). The use of psychological types to predict retention has not yielded successful results (Bean & Eaton, 2000). Psychological processes that lead to social and academic integration have been studied with much better results. Within the psychological realm, there are four persistence sub-theories that have emerged: attitude-behavior, coping behavioral (approach-avoidance), self-efficacy, and attribution (locus of control) (Bean & Eaton, 2000).

Attitude behavior theory begins with the idea that a student’s psychological attributes shape the interaction one has with his or her institution. The most important factors considered are self-efficacy assessments, normative beliefs, and past behavior (Bean & Eaton, 2000). A student interacts with the institution in three ways: bureaucratically, academically, and socially. The bureaucratic interactions happen with such areas as financial aid, disability services, or academic advising. Academically, students interact with faculty, fellow students, and other academic personnel. Any interaction with a person at the institution is considered part of the student’s social interaction. The most significant social interactions are with faculty, other students, and staff (Bean & Eaton, 2000). Such interactions do not, in and of themselves, create academic and/or social integration for the student. A student must conduct self-assessments to process all of these institutional interactions which may lead to positive or
negative feelings about an institution. Emotional responses to the institution will encourage or deter a student from integrating into the institution.

The idea of self-efficacy was originally developed by Albert Bandura. Self-efficacy theory is defined as an “individual’s perception of his or her ability to act in a certain way to assure certain outcomes” (Bean & Eaton, 2001, p. 75). This perception is specific to one idea or task and is non-transferrable to other ideas or tasks. For example, a student may have the belief that they are proficient in playing the bassoon; however, this skill is not transferrable to quantum physics. Bean and Eaton (2000) assert that as students become more competent, their self-confidence builds and their academic and social integration will increase.

By using coping methods and identifying that they belong, students’ academic and social integration will also likely increase (Bean & Eaton, 2000). Coping behavioral theory is a process where, after conducting a self-efficacy assessment, a student will determine whether or not she or he belongs. Students will use their coping abilities learned from past behaviors prior to coming to an institution to adapt to a new environment (e.g., community college).

The major focus of the attribution theory is the locus of control. The locus of control is “the extent to which an individual views their past outcomes and experiences to be caused by internal or external forces” (Bean & Eaton, 2000, p. 77). A person who has an internal locus of control believes that they are the driving force behind personal successes or failures. A person who has an external locus of control believes that fate or destiny is in control of successes and failures. Students who have an internal locus of
control will know that they determine their academic success. With an internal locus of control, they would understand that completing assignments on time or studying for tests will help them be successful.

Although the six-year completion rate for a certificate, degree, or transfer to a four-year institution is only 45% at community colleges, higher education aspirations do have a positive effect on persistence (Bailey, Jenkins, & Leinbach, 2006; Pascarella, Pierson, Wolniak & Terenzini, 2004). Students who have high hopes for graduation at community colleges are more likely to persist on to a bachelor’s degree than those at community colleges with low educational aspirations. Students who have high hopes for graduation generally would have an internal locus of control. Thus, academic motivation helps students be successful not only in the community college setting but through bachelor’s degree attainment.

**Sociological.** The second area of consideration is the sociological impact on students. Sociological factors include, “socio-economic status, race/ethnicity, and opportunity structure that describe the individual’s and the institution’s place in the broader hierarchy of society” (Chen, 2008, p. 213). When one examines student financial aid patterns, one often consider the make-up of our population. These factors include the students’ socioeconomic status (SES), gender, and race/ethnicity. Such factors can greatly contribute to the types of aid available to students, their attitudes towards financial aid, their student loan borrowing patterns, overmatching or undermatching with institutions, and their attitudes towards college in general (Chen, 2008). In addition, although this is not directly part of this study except as it relates to family, a parent’s
SES, gender, race/ethnicity and place in society can also predict a student’s attitude towards college and financial aid.

Community colleges offer open access for a diverse student body in all aspects – minority students, varying socioeconomic backgrounds, and ages. Community college students make up the majority of all undergraduate students at 46% of the undergraduate population (American Association of Community Colleges, 2015; Horn & Nevill, 2006). Students in the lowest SES are the most likely to attend community colleges. The average age of a community college student is 28 years old (American Association of Community Colleges, 2015). Of the over 7.5 million degree-seeking community college students, 57% are women and 43% are men. When considering ethnic minorities who attend college, 59% of Native American, 56% of Hispanic, 48% of Black, and 44% of Asian/Pacific Islander students choose community colleges (American Association of Community Colleges, 2015). Sociological factors do play an important role in student graduation rates as does socioeconomic status.

Rural families often have lower socioeconomic status than their urban counterparts and community colleges have a need to address this issue. On average, rural students in work positions similar to their urban counterparts make, on average, 13% less (Horn, Li, & Weko, 2009). This drives rural students to work more hours, and students who work more hours are less likely to persist (Horn, Li, & Weko, 2009). In addition, those who work full time are much more likely to drop out than those who do not work or only work part time (Lanni, 1997; Swager, Campbell, & Orlowski, 1995; Windham, 1995). One way that rural community colleges are trying to meet this challenge is
through the Federal Work Study program (FWS). The FWS program allows students to work on campus to gain job-related experience for students who exhibit need. Indeed, studies such as Astin (1975) and Dundes and Marx (2006), have found that on-campus employment has a positive effect on persistence.

The age that a student starts at a community college also greatly impacts persistence. For first time attendees, persistence is negatively impacted by the greater amount of time between high school and the start of community college (Horn, Li, & Weko, 2009; Horn & Nevill, 2006; McKinney & Novak, 2013). Younger students have higher persistence and graduation rates than older students, and this age gap starts when students enroll at age 22 years or older. Often, younger students do not have the same responsibilities as their older counterparts. Adult students often have additional responsibilities outside of school that deter them from completing their degrees. Such responsibilities may include children, full time jobs, or aging parents. Because of these responsibilities, adult students often attend part-time and it takes longer for them to complete a degree, if they are able to complete a degree at all.

The following variables in the make-up of a student’s family may also be considered factors that could impact graduation rates for rural students, particularly women. Adults (over age 25) who are enrolling or reenrolling often are juggling additional responsibilities such as children, marriage, divorce, aging parents, and careers. All of these factors can impact graduation as they are all competing with school time. Jacobs and King (2002) found that in women over 25, these factors were a deterrent to
completion. They found that part-time enrollment for these women was one of the most significant reasons why they did not complete a degree.

Finally, rural students often choose community colleges because they want to stay closer to home; thus, the location of the institution may also be a factor. In a qualitative study, Wright (2012) found that rural students in Central Appalachia want to stay close to home to enrich the local community and contribute back to the society in which they grew up. The study results showed that the reason rural students chose to stay close to home is their connections to their families and communities. In addition, community colleges are generally more affordable than four-year institutions; therefore, many rural students choose to attend community colleges because it is a local affordable option. In summary, the “opportunity structure that describe the individual’s and the institution’s place in the broader hierarchy of society” and other sociological factors such as gender, SES, race/ethnicity, and age are important variables when studying the relationship between graduation rates and financial aid (Chen, 2008, p. 213).

**Organizational.** The third area of consideration is organizational theory. Organizational theories focus on the higher education institutions and their impact on students. Organization attributes include “structure, size, faculty-student ratios, and institutional resources”, and such attributes shape and mold a student’s experience at the institution (Chen, 2008, p. 213). However, this set of theories only looks at the actual institution and its resources. Thus, there is no consideration for the personal effects such as faculty-student interactions or a student’s feelings about a college policy. The belief is that the organization itself can promote persistence, or the lack thereof. Graduation rates
are impacted by organizations; nevertheless, other factors beyond persistence must be considered because students can persist yet never graduate.

Community colleges are generally funded from four sources: state funding, tuition and fees, local tax appropriations, and workforce development (Katsinas, Alexander, & Opp, 2003). Rural community colleges rely heavily on state funding because rural locations often do not yield large tax revenues. Because of a continuous decline in state funding since the mid-1990s, rural community colleges have had to continue to do more with less. A reliance on tuition has driven the costs of community colleges upward. To make up for cuts in state funding, many colleges have reacted with tuition increases. For example, Arizona has cut funding to their largest community college districts starting in the 2016 fiscal year (Chen, 2016; Smith, 2015). In response, Pima Community College raised in-state tuition rates to offset the damages from the cuts in funding. In Louisiana, over $250 million in funding has been cut which has led to tuition increases between 8%-10% across community college campuses (Chen, 2016).

Community colleges receive only 20% of all local, state, and federal tax appropriations for higher education nationwide (Mullin, 2010), and the average operating budget for rural community colleges is $16 million—less than half of the average for suburban and urban community colleges (Katsinas et al., 2003). Although the role of workforce development in a community college is unclear, its place in a community college is ever changing. Workforce development has seen a decline for community colleges for three reasons: changes in demand from employers, state funding, and outside competition (Jacobs & Dougherty, 2006).
The composition of staff in financial aid offices has an impact on persistence. In a study of California community colleges, MacCallum (2008) found that data systems, staff training, staffing levels, and interactions with students all have an effect on student persistence. In terms of staffing levels, as the number of Institutional Student Information Records (ISIRs) per staff member increased, the rate of persistence decreased. In offices where study participants felt that staffing levels were too low and needed to be increased, persistence decreased.

In addition to finances, other organizational factors such as data systems and staff can impact students. The choice of data system can impact persistence patterns for community college students. At the time of the study, Datatel, PeopleSoft and Banner are considered the largest systems employed by colleges (MacCallum, 2008). However, having one of these three systems was found to negatively impact student persistence because the data systems are large complex systems that require strong technical support (MacCallum, 2008). The time that needs to be invested in the system plus the complexity can lead to poor student service (MacCallum, 2008). In addition to choice of data system, staff training is important for all financial aid professionals because the rules and regulations are ever-changing. In MacCallum’s (2008) study, more than one-quarter of the California community colleges reported the need for additional training. Of those colleges who indicated a training need, persistence rates were lower than for those who did not indicate a need for training.

Staff training directly impacts students and their persistence. Interactions with students at community colleges play an important role in student persistence. For
example, MacCallum (2008) found that financial aid staff with business or accounting degrees negatively impacted persistence while a staff member with a social sciences degree had a positive impact on persistence. In addition, the shorter time it takes to process a financial aid file, the higher the persistence rate. Offices with higher rates of student workers or work-study students have higher rates of persistence (MacCallum, 2008).

Rural community colleges that have poorly trained financial aid staff negatively impact persistence for rural students (Kennemer, Katsinas, & Schumacker, 2010). Another study, conducted in community colleges in Texas, California and Florida found that two-thirds of employees who worked in a financial aid office did not know what the term “financial aid” means (McKinney & Roberts, 2012). If financial aid professionals do not know what financial aid is, the likelihood that they will be helpful is quite small. A way financial aid offices can make a positive impact on persistence is to quickly process financial aid. There is a direct relationship between the fast processing of the FAFSA and other necessary forms and student persistence across years (Kennemer, Katsinas, & Schumacker, 2010).

Academic advising in community colleges is imperative for persistence. Students who receive academic advising within their first semester are more likely to persist to the second semester during their first year (McKinney & Novak, 2013). Community colleges need to have opportunities for first year students to receive academic advising to ensure success. Advising offers advisers and students the chance to map out a degree program and have a clear path towards graduation.
The enrollment size of an institution has a relationship with graduation and transfer rates for community college students. In one study, Porchea, Allen, Robbins, and Phelps (2010) found that as enrollment size increased, students who completed a degree were less likely to continue on for a bachelor’s degree. They also found that as enrollment size increased, students who did not complete a degree were more likely to continue on to a four-year institution. In another study, Bailey, Calcagno, Jenkins, Leinbach, and Kienzl (2006) students at smaller community colleges graduate at rates 9-13% higher than those who attend institutions that are more than 2500 full time enrolled students. This is consistent with previous findings that enrollment size does matter in outcomes (Pascarella & Terenzini, 1991, 2005). The authors suggest that it could be due to the fact that smaller institutions need to have a limited number of programs because of the financial constraints of being a smaller institution. Thus, it limits the students’ options in classes and majors and encourages students to complete.

Regional location differences and faculty ideas and beliefs are important considerations for community colleges. Each area of the country may have different economic markets and needs for employers. It is the role of the community college to help fill the gap in skills and education for employers. These economic differences drive students towards or away from enrolling in community colleges (Betts & McFarland, 1996). Regional differences also have an effect on faculty ideas and beliefs. In a study that broke down community colleges by regional accreditation, Berry, Hammons and Denny (2001) found that depending on where the institution was located, faculty members had differing opinions on teaching and retirement. For example, faculty in the
Southern accrediting region were less likely to participate in early retirement and faculty in the Middle States accrediting agency were more interested in using distance technology to teach classes (Berry, Hammons, & Denny, 2001).

**Interactionalist.** Interactionalist theory combines psychological, sociological, and organizational theories. An example of interactionalist theory is Tinto’s (1987) theory of persistence. This theory posits that academic and social integration are drivers for student persistence. A student becomes academically integrated by attending class, earning good grades, or developing faculty-student relationships. One becomes socially integrated by joining student clubs or participating in sports or student government. By looking at the effects of the institutional resources and institutional relationships with the student, one finds a give and take relationship for both parties. The student gives and contributes to the higher education institution, and the student also takes away knowledge and experience. One of the most widely known persistence theories, Tinto’s (1987) theory of persistence, falls into the interactionalist category.

Often Tinto’s (1987) persistence model is not applied to community colleges due to the short duration that community college students spend completing their degrees. In general, community colleges have difficulty in creating experiences for students that can provide a connection to the institution. More recently, however, research has found that some of Tinto’s theory may be applicable when the social integration includes peer-to-peer and peer-to-instructor experiences within the classroom. Tinto’s model suggests that students are more likely to persist when they are socially and/or academically integrated into their postsecondary institution. For example, students who belong to sororities or
fraternities or students who participate in the institution’s government are more likely to persist to the next year and eventually complete.

Some findings on institutional impact on persistence in urban community colleges may also have implications on rural community colleges. In a study conducted by Karp, Hughes and O’Gara (2008), Tinto’s theory was studied among urban community colleges, and their findings offered support for the theory. Of the 44 students who were eligible and willing to participate in the study, 70% of students found a connection to the institution. Of the students who were integrated into the institution, 90% persisted to their second year. Integration, for the purpose of this study, was defined as “having a sense of belonging on campus” (Karp et al., 2008, p. 7). During the course of their study, the authors found information networks as one of the strongest avenues for student connection to the institution. They define an information network as, “social ties that facilitate the transfer of institutional knowledge and procedures” (Karp et al., 2008, p. 8). Additionally, the relationships developed did need to be just fellow students. Faculty and staff members could be part of the formed relationships. Such relationships needed to transfer some sort of institutional information such as information on professors, class schedules, tutoring services or where the library was located. Informal or casual relationships where no institutional knowledge was transferred were not counted as information networks.

In addition to persistence, another element of academic integration, student grades, are a predictor of degree completion (Chen, 2008). In the community college setting, students who achieve a higher grade point average persist at higher rates than
those who do not (Zhao, 1999) and also are more likely to achieve associate degrees (Dowd & Coury, 2006). In a study of four-year students, McGrath and Braunstein (1997) found that for both within-year and year-to-year persistence, the first semester GPA was the most important variable for persistence. Additionally, Pascarella and Terenzini (2005) found in their study that college GPA was the strongest predictor of both persistence and graduation.

In addition to higher rates of persistence and graduation, GPA has been tied to higher transfer rates to four-year institutions. In a study of recent high school graduates aged 17 to 20 years old, Driscoll (2007) found that students who eventually wanted to transfer from a community college to a four-year institution persisted at much higher rates when they earned higher grades in transfer-eligible classes. Moreover, the more classes they took that were transfer eligible, the higher the grades they earned. In terms of transferability, another study of community college students and GPA conducted by Hawley & Harris (2005) found that one reason why students do well and graduate or transfer to a four-year institution is that they are using the community college to boost their GPA prior to admittance to a four-year institution.

Community college students are likely to have varying attendance patterns (full-time, part-time, or mixed) during the course of their education. Students who graduate or transfer to a four-year institution are highly likely to have had varying attendance patterns (Crosta, 2013). In his study, Crosta (2013) analyzed longitudinal data for over 14,000 students over 18 terms. He found 4,594 different enrollment patterns. In the analysis, Crosta (2013) found that 28% of students only attended one term. Of this group of
students, only 15% completed a short term certificate or transferred to a four-year institution. Among all of the sample, only 1% of students followed a traditional attendance pattern of two fall and spring semesters with summers off. For students who attended more than one term, 43% changed their enrollment pattern at least once. For full time students, 69% also attended at least one part-time term. Because of this, it is very difficult for students to complete a degree within two years. Community college students who attend part-time, in addition to varying attendance patterns, are significantly less likely to graduate than those who attend full-time (Feldman, 1993).

There are many reasons why students may have varying attendance patterns. One reason cited for a change in enrollment is work or family obligations that may necessitate a reduction in credit hours. On the one hand, a student’s poor academic performance may lead a student to reduce credit hours or become discouraged and drop out of college. On the other hand, students who have been successful may find a sense of confidence and want to increase their credit hours. Another reason cited for a change in enrollment patterns is the lack of structure that community colleges offer. Community colleges may do well in bringing students in but then lack the resources and program facilitation necessary for success (Jenkins & Weiss, 2011). Structured and cohort programs (e.g. nursing) often result in higher completion rates and have more consistent attendance patterns.

In terms of factors that can impact completion rates, retention, and persistence, in a study of a Texas community college, Fike and Fike (2008) studied predictors of first-year retention for first-time-in-college (FTIC) students. Using four years of FTIC
students, the researchers wanted to see what impacted within-year and year-to-year persistence. The majority of sample students were White (66.4%), took a developmental math class (65.3%), were female (56.1%), and received financial aid (60.2%). The independent variables they used were gender, age, ethnicity; student completion status for developmental math and reading and writing; participation in TRIO programs; receipt of any financial aid; online class enrollment; number of credit hours enrolled and—for some—dropped within the first semester; as well as parental education attainment. The researchers found that roughly one-third of students in any given year did not have within-year persistence and that more than half of all of the students did not have year-to-year persistence (Fike & Fike, 2008). By using multiple regression, the researchers hoped to find reasons why these students returned for the spring semester or the following fall term. The greatest predictor of retention was passing developmental coursework (Fike & Fike, 2008). In this study, the greatest predictor of success was passing a developmental reading class. The researchers suggest that this success is because reading is fundamental for success in all classes. Other positive predictors of persistence were students who received financial aid (though the authors do not specify which types of aid were studied), students who participated in TRIO programs, and students who enrolled in online classes.

**Economic.** The final area for consideration for the theoretical framework is economic theory. Paulsen and Toutkoushian (2008) write that economics are frameworks “that are designed to analyze how incentives affect the behavior of decision makers who are in pursuit of goals” (p. 3). In general, financial aid researchers want to understand
how financial aid affects graduation rates or persistence for various groups of students. Because students have finite financial resources to apply towards college expenses, economic theory helps explain why students make the decisions they do.

To help explain economic theory, Paulsen and Toutkoushian (2008) examined one example of why White and Black students attend or do not attend college. In their 2004 sample, the researchers found that White students had higher college-going rates than Black students. They posited that there may be three reasons for this happening: White students versus Black students have a higher preference for attending college, White students versus Black students have more financial resources to attend college, and the relative price of college is cheaper for White students in comparison to Black students. Although this is one study and there may be other socioeconomic and political reasons why there is this disparity, policy makers and economists may seek to change the behaviors of such potential college students based on any, or all, of these three identified factors.

Another consideration within economic theory is human capital theory. Capital could be social relationships, knowledge, a passion for chess, etc. Quiggin (1999) writes that one of the goals of educating students is to help them with knowledge and skills that will be useful later in life. For some who choose to attend higher education, they may be foregoing current income in order to make more money in the future. He does note that learning may not always contribute to higher earnings but may offer students other non-monetary benefits. To help develop both human social and economic capital, students
may choose to go to a community college to gain skills and a degree with the hope to increase their earnings.

In examining potential economic capital for community college students, Dadgar and Trimble (2015) found that different types of majors for different degree types can lead to increases in earnings. Dadgar and Trimble (2015) found that across all types of associate degrees, there was an increase in wages in comparison to students who never completed a credential. Such earnings increases varied by field and gender. For example, women who graduated with an associate degree in nursing increased their earnings by more than 37%. For men who graduated with an associate degree in nursing, the salary increase was 27%.

In terms of certificates, Dadgar and Trimble (2015) broke down certificates into short-term and long-term certificates. Short-term certificates can last from a few weeks to a few months while long-term certificates last for many months to over a year. For students who completed a short-term certificate, the researchers found no salary increases with one notable exception. The one notable exception to this was men who completed a protective services degree. These students saw wage returns of 22% (Dadgar & Trimble, 2015). Long-term certificates saw more wage returns. The researchers found that women especially benefitted from long-term certificates. The majority of the long-term certificates are in allied health fields and women are more likely to pursue this field (Dadgar & Trimble, 2015). This is consistent with previous research on wage returns for community college students (e.g., Jepsen, Troske, & Coomes, 2014).
The majority of rural students who choose to go on for postsecondary education choose community colleges or vocational schools. The reasons for this are simple: it is close to home, the schools are affordable, and it keeps the students within their own community (Wright, 2012). Wright (2012) uses the phrase “becoming to remain” (p. 1) which is the idea that rural students want to develop and grow so that they can remain in their community as a productive, contributing member. As a rule, most rural community college students are very financial aid dependent. Nearly two-thirds of rural students receive some form of financial aid, with the majority receiving the Pell Grant. Among community colleges, rural students account for 44% of all financial aid disbursed and 43% of all Pell Grants (Hardy & Katsinas, 2008).

The Free Application for Federal Student Aid (FAFSA) is often considered the “gatekeeper” for financial aid (McKinney & Novak, 2013). Students who do not complete the FAFSA are often times not considered for federal, state, or institutional aid. Students and families of high school students may not be aware of this. Socioeconomic and education status may play a role in whether or not a student completes a FAFSA and, thus, becomes an invisible gatekeeper. Low-income students generally have fewer resources to assist them in competing the FAFSA. Low socioeconomic status (SES) students generally come from backgrounds where parents have not attended college and have high school counselors that do not have the time or the resources necessary to advise about college. Parents and counselors alike may not even have a basic grasp of the process for applying (Hardy & Katsinas, 2008; McCracken & Barcinas, 1991; McKinney & Novak, 2013).
Community college students are the least likely among all college students to complete their FAFSA. Students who do not know or understand the FAFSA process have a disadvantage in their ability to afford and complete college. King (2004) found that 67% of community college students did not file their FAFSA. In comparison, at public four-year colleges, 42% of students did not file their FAFSA and at private not-for-profit colleges, 33% of students did not file. In terms of persistence rates, students who filed their FAFSA had 122% higher within-year persistence rates than those who did not file (Novak & McKinney, 2011). McKinney and Novak (2013) also found lower income community college students who file the FAFSA have “higher within year persistence rates” (p. 64). Thus, the lowest income community college students were the least likely to file the FAFSA, and this group of students is the most likely to qualify for federal grants. Additionally, in terms of attendance patterns, community college students who attended full-time were less likely than part-time attendees to file (King, 2004).

Another economic factor that impacts rural community college students differently is student loans. Rural community college students often have higher student loan debt than other types of community college students. In a study by Hardy and Katsinas (2008), over 63% of the study’s rural community college student participants had student loan debt. The national average for all college students is 29% (TICAS, 2009). The researchers present three possible considerations why rural students have higher debt loads. One reason for the higher debt load for rural community college students is higher transportation costs to and from campus. Mass transit is generally not readily available in rural areas. A second reason for higher costs is the limited availability
of housing options within rural communities. A third reason, as cited earlier, is that rural students often make less than their urban counterparts. Thus, since rural community college students live further away with fewer transportation options, have limited housing options, and make less money, these students are forced to borrow to help meet their necessary expenses.

For all community college students, racial barriers to federal student loans are another economic issue that could potentially impact graduation rates. Nationwide, roughly 90% of community college students have access to federal student loans (TICAS, 2011). However, for community colleges that do not offer federal student loans, this contributes to a racial gap in access. The two populations that are most hurt by the restricted access to loans are African American and Native American students. On average, 16.4% of African American and 18.5% of Native American students do not have access to student loans. In comparison, 8.5% of Latino students, 8.6% of White students and 4.2% of Asian students do not have access to federal loans (TICAS, 2011). In a state-to-state comparison, a wide discrepancy is found in racial barriers to federal loans. For example, in Alabama, 67.8% of African American students do not have access to federal loans while 41.3% of their White counterparts do not have access (TICAS, 2011). Additionally, in New Jersey, 22.3% of African American students do not have access versus 1.6% of White students. Finally, in Montana, 85.4% of Native American students do not have access while only 4% of White students do not.

One of the most frequent reasons that community colleges have chosen not to offer federal student loans is the risk of defaults. Schools are responsible for the number
of students who default on their loans through their cohort default rate (CDR). The CDR is “the percentage of a school's borrowers who enter repayment on certain Federal Family Education Loan (FFEL) Program or William D. Ford Federal Direct Loan (Direct Loan) Program loans in a given fiscal year and then default within the next two fiscal years” (TG, 2014, n.p.). The implications of a high CDR can have consequences for an institution. A school’s CDR determines whether a school can offer Title IV aid or not. A school who has a CDR over 30% for three consecutive years loses their eligibility to offer Title IV funding for that fiscal year and the following two fiscal years, and a school that has a CDR over 40% in one year loses their ability to offer federal student loans for that fiscal year and the following two fiscal years. Such sanctions would essentially force community colleges to close their doors because they would lose their eligibility for Title IV funding.

There are implications for students who default on their federal student loans, and community college students do default on their student loans at higher rates than four-year college students. The differences in the CDR for different institution types is stark. Based on the 2011 fiscal year, the public two-year CDR nationwide is 20.6% (Federal Student Aid, 2014). The national average for public four-year schools is 8.9%, for private two-year schools is 12.0% and for private four-year institutions it is 7.0%. The only schools with a higher default rate than community colleges are less than two-year private schools at 25%. Another implication that is tied to the CDR is that community college students will borrow excessive amounts of money and not be able to pay those funds back. With two-thirds of all college students borrowing student loans, most students do
have student loan debt. The average student loan debt for community college students is $7,000. In comparison, the average debt for a bachelor’s degree graduate is over $29,000 (Denhart, 2013).

In addition, there are serious implications for students who default on their student loans. Students who are in default may face the garnishment of wages, Social Security, and tax returns. Additional issues defaulters may face is the lack of employment due to a ruined credit history, debt that cannot be discharged in bankruptcy, and debt collectors who continue to harass the borrower until payments are caught up or the debt is satisfied. Ironically, if students cannot obtain jobs or are facing wage garnishment, this will limit the defaulters’ ability to repay on the defaulted loans. Students who are in default on their loans are ineligible to receive additional Title IV funds, and this will thus directly impact their ability to persist pursuing a degree unless they are able to pay out of pocket for their classes.

Need-based aid, such as the Pell Grant, has been found to positively affect graduation rates for community college students (McKinney & Novak, 2013). This is especially true if a student receives a Pell Grant during their first two years of college (Bettinger, 2004). Since grants do not need to be repaid, there is a direct reduction in college costs for recipients. The reduction in college costs may encourage low income students to persist, and eventually graduate, because they do not have to pay much money out of pocket, if at all.

Dowd and Coury (2006) studied the effects of financial aid on community college persistence and degree attainment and found that federal student loans have mixed results
on persistence. Using longitudinal 1990 National Postsecondary Student Aid Study (NPSAS:90) and 1990/1994 Beginning Postsecondary Student Longitudinal Study (BPS:90/94) data, Dowd and Coury (2006) hypothesized that higher tuition had a negative effect on persistence and associate degree attainment, that grants and work study would yield positive results, and that loans would have a positive effect but would be less positive than grants and work study. However, their findings did not prove their hypotheses. Dowd and Coury (2006) found that grants did not have any significant impact on graduation or persistence. They found that loans had a negative impact on persistence and, furthermore, that loans borrowed in the first year had no significant effect on degree attainment. The authors offered some explanations for their findings. First, there has been a major shift since the 1980s in the reliance on student loans. This may impact the initial enrollment of a student, but may not impact the re-enrollment or continuing enrollment that their study examined. Secondly, the authors rationalize the insignificance of grants by using the rational choice theory. A student who receives higher grant amounts will have a lower out of pocket expense for college, but higher grant amounts generally means that a student is from a lower socioeconomic background; therefore, being from a low SES is tied to lower persistence and graduation rates.

In addition to Dowd and Coury’s 2006 study, Cofer and Somers (2001) found grants had a positive effect on persistence for community college students when looking at National Postsecondary Student Aid Study (NPSAS) data from 1993 and 1996. Negative persistence was found in both years for different student loan debt levels: in 1993, students with high levels of debt (over $7,000) persisted less, and in 1996, students
with low levels of debt (under $3,000) were less likely to persist. Rural community college students often have higher student loan debt loads. As stated earlier, though the national average for all students with student loan debt is 29%, over 63% of rural community college students have student loan debt (Hardy & Katsinas, 2008; TICAS, 2009).

It is important to note that none of the previous research reviewed provided insight on how various financial aid factors may impact rural community college students longitudinally.

**Relevant Research on Financial Aid Policy for Community Colleges**

**Advancement of financial aid.** On November 8, 1965, President Lyndon Johnson signed the Higher Education Act (HEA) of 1965. This important piece of legislation includes nine titles to provide structure for the many higher education programs. Title IV governs federal financial aid. The Higher Education Act of 1965 created a student loan program where the government would back the loans, but the students borrowed the funds from private lenders. If a student defaulted on this loan, the government would pay the lender on behalf of the student.

Here it is important to highlight some of the major changes to the federal financial aid programs that have directly impacted the current state of community colleges. Over the course of the past five decades, the federal financial aid program would grow from a single loan program to a program that has multiple grant and loan offerings. One of the greatest changes to federal financial aid was the increased need for students to rely on student loans during the presidency of Ronald Reagan. Though the Reauthorization of the
Higher Education Act was passed in 1980, throughout his presidency Reagan made drastic cuts to federal financial aid programs. Loan origination fees were introduced for the first time, and grant funding was cut drastically (Gladieux, 1995). This forced students to rely more heavily on loans, not grants, to fund their education. Simultaneously, as federal dollars continued to be reduced during the 1980s, colleges and universities were forced to increase tuition. Tuition increases far exceeded inflation during the 1980s (Gladieux, 1995). To respond, the federal government increased borrowing limits. Thus, the combined change of increased tuition and increased borrowing limits led to even more increases in student loan borrowing.

The 1990s did not offer any financial relief to institutions or to students. Instead of making the Pell Grant program an entitlement program, the borrowing limits were again increased. Also during this same time, the unsubsidized loan program was introduced. Such a loan program has no financial need component, but it was intended to reach more middle income families. Not surprisingly, borrowing of loans continued to increase. In 1990, 43% of borrowers borrowed the maximum loan amount, and by 1998, 51% borrowed the maximum loan amount. This increase in student loan borrowing also had unintended consequences: over 22% of borrowers had defaulted on their student loans (Fuller, 2014). In addition, tuition also continued to increase at institutions. During the beginning of the 1990s, tuition was increasing at community colleges by nearly 14% per year, and although tuition increases slowed down by the beginning of the 2000s, they were still increasing annually by roughly 7% (Choy, 2004).
In the 2000s, the Higher Education Act was reauthorized and was called The Higher Education Opportunity Act of 2008. While borrowing continued to increase, many positive changes did happen. One important change is that new repayment options and forgiveness options were introduced. Another important change was to shift some of the focus to costs and affordability. The federal government introduced the net-price calculator requirement to help students better understand the actual costs of college and student financial aid.

Another factor that contributed to the increased usage of financial aid over the course of five decades is that college enrollments have consistently been increasing. In 1967, just over six million students aged 18 to 34 attended college; however, by 2009, this number swelled to over 16 million (Baime & Mullin, 2011). In addition, low income students have also seen a sharp increase in attendance. In 1975, only 31.2% of low income high school graduates enrolled in college, but by 2009, this number had sharply increased to 54.1% (Baime & Mullin, 2011).

**Policy changes since 2000 and community colleges.** In 2005, Margaret Spellings, the United States Department of Education Secretary, formed The Commission on the Future of Higher Education to examine and make recommendations about the current state of higher education. In 2006, the 19 member Spellings Commission report was released. The main recommendations of the Spellings Commission were to improve accountability, access, and affordability to higher education. As part of the report, the Commission recommended increasing Pell Grants for students to cover higher costs of tuition. Additional proposals included shortening the confusing FAFSA form and holding
institutions accountable for increasing college costs. To date, these measures have not been adopted federally.

Since many community colleges have an “open door” policy for admissions and low tuition rates, community colleges serve many students including a disproportionate number of low income and minority students. Because of such factors, community colleges have struggled with accountability and assessment. Thus, in response to the Spellings Commission report, in 2009 the Voluntary Framework of Accountability (VFA) was formed by the American Association of Community Colleges (AACC), the American Association of Community College Trustees (ACCT), and the College Board (Mullin, 2010). The VFA collects assessment and accountability information from voluntary member schools such as “pre-collegiate preparation (such as developmental education and Adult Basic Education), academic progress and momentum points, completion and transfer measures, and workforce outcomes for career and technical education” (AACC, 2015, n.p.). By measuring these metrics, and many others, the hope is that community colleges will be able to show how they are being accountable to students.

Community colleges are constantly fighting for the limited financial resources from states and the federal government. Though President Barack Obama has called for an additional five million graduates from community colleges by 2020, this national goal was not met with additional congressional or state appropriations for community colleges. Instead, since community colleges serve 43% of all undergraduates but receive only 27% of all funding, community colleges have attempted to do more with less.
(Mullin, 2010). For some community colleges, the only choice was to do less. Some examples of cuts include course reductions, terminating low enrollment programs, and capping enrollments (Mullin, 2010).

In addition to more limited funding for community colleges, community college students have borrowed more and paid back less. As mentioned in the previous section, student loan borrowing soared beginning in the 1980s, and this trend has continued through today. The number of community college borrowers entering repayment in 2010 was 599,467; in 2011 was 767,073; and in 2012 was 905,058 borrowers or increased over 50% in two years (National Center of Education Statistics, 2015). In addition, nationally, the number of college students who have defaulted on student loans in the 2012 cohort is 11.8%. However, for community college students, this number is much higher at 19.1%. This rate is the highest rate among all public institutions and the second highest overall behind private, less than two-year institutions.

Furthermore, because of a shift in financial aid policies beginning with the 2014-2015 year, institutions are being held even more accountable for student loan defaults. Because the look back period for the cohort default rate (CDR) increased from two years to three years, more students are included in the CDR percentages. In addition, if more students have defaulted, an institution has a higher chance of losing the ability to offer Title IV funding. In response, community colleges have attempted to combat this issue in a few ways. One way is to stop offering federal student loans; however, these policies disproportionately affect minorities and are discussed in greater length in the previous research review. Another response is that institutions may limit the amount students can
borrow. Thus, because of limited financial resources, community colleges do not have the option to increase institutional funding to help offset student loan borrowing.

**Research Gap**

Because they serve a large percentage of those who choose to attend community colleges, rural community colleges serve a pivotal role in higher education. Initially community colleges expanded in higher education to help fill the training needs of local communities and as more affordable stepping stones to four-year institutions. However, to make community college a more affordable option, rural students have become highly dependent on financial aid. Moreover, this group of students uses the largest percentage of Pell Grants, accrues the highest amounts of debt in comparison to their urban and suburban counterparts, and are much less likely to be able to pay back their student loans (Hardy & Katsinas, 2008). Additionally, though financial aid research has expanded over the past few decades, limited research has been conducted that considers any or all of these factors for community colleges, and rural community college research is even more scant. In point of fact, rural community colleges serve the majority of community college students and disburse the majority of federal financial aid to these students, yet there are very few studies that target this population. Even though some researchers—such as Hardy and Katsinas (2008)—have studied rural community college students but with limited applications, such studies have focused on Integrated Postsecondary Education Data System (IPEDS) data which offers a limited view of students. Since IPEDS is a single year snapshot, it does not allow researchers to examine the longitudinal data or
effects. Thus, there is a significant gap in research about rural community college students.
Chapter 3: Method

The purpose of this study is to examine the relationship between financial aid and graduation rates for rural community college students. The research design of this study is based on Rong Chen’s theoretical framework which includes five different student areas: sociological, psychological, organizational, interactionalist, and economic. The relationship between financial aid and rural community college students can be clarified by building on the previously published research about rural community college students and by utilizing Rong Chen’s (2008) theoretical framework. This study will use logistic regression to analyze the 2004/2009 Beginning Postsecondary Student Longitudinal Study (BPS:04/09) data to examine the relationship between financial aid and rural community college students.

Research Model

The statistical model used for this study is hierarchical logistic regression. Because this study uses hierarchical logistic regression, the order of the variables differs from the order of Rong Chen’s theoretical framework. The model will be framed in the following figure:
**Theoretical Framework**

**Economic**
- Financial Aid (cumulative)
  - Pell Grant
  - Federal Subsidized Loan
  - Federal Unsubsidized Loan

**Demographics and Family Status**
- Gender, Age, Race
- Parental Education
- Marital Status
- Being Single Parent
- Number of Children
- Dependent on FAFSA
- Family AGI

**Academic Status and Institutional Characteristics**
- GPA
- Work hours
- Academic/Social Integration
- Part-Time/Mixed Attendance Pattern

**Sociological**
- Educational Aspiration
- Academic/Vocational Major

**Interactionalist**
- Regional Differences
- Enrollment Size

**Psychological**
- Whether graduated from community college with associate degree or graduated with associate degree or certificate

Figure 1. Statistical Model for the Relationship Between Graduation Rates and Rural Community College Students.
Research Questions

The primary research question guiding this study is: what is the relationship between financial aid and graduation rates for rural community college students? This study examines the relationship between these five factors: (a) different types of financial aid (Federal Pell Grant, and Federal Subsidized and Unsubsidized Loans), (b) age, (c) gender, (d) race/ethnicity, and (e) socioeconomic status and graduation rates for rural community college students. Data was drawn from the secondary dataset 2004/2009 Beginning Postsecondary Student Longitudinal Study (BPS:04/09). The United States Department of Education National Center for Education Statistics (NCES) collects and holds the data.

The following questions guided the research:

1. What are the differences in the amount of financial aid, student demographics and family status as well as student academic performance and institutional characteristics across rural, suburban, urban, and town community colleges?

2. What are the three-year and six-year graduation rates for associate degrees earned by rural community college students, compared with suburban, urban, and town community colleges? What are the three-year and six-year graduation rates for associate degrees and certificates earned by rural community college students, compared with suburban, urban, and town community colleges?
3. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for all community college students?

4. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for all community college students?

5. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for rural community college students?

6. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for rural community college students?

Financial aid information was collected annually from the Department of Education but student collected data was collected in three year intervals. Student collected data includes, but is not limited to, whether a student is married, average hours worked, and grade point average (GPA). Data does not exist for each individual year because the data collection period extends from the 2003-2004 academic year through the 2008-2009 academic year. The NCES collected the data in three year intervals—through the 2005-2006 academic year and through the 2008-2009 academic year. The NCES data researchers sent the students the data collection surveys three times: in the original year, 2003-2004, three years later during the 2005-2006 academic year, and six years later in the 2008-2009 academic year. Thus, based on the dataset and the periods of data
collection, for the purpose of this study, three- and six-year intervals are used to examine the graduation rates and cumulative variables.

**Hypotheses**

By utilizing BPS:04/09 data, two hypotheses will be tested to examine how financial aid variables affect different types of community colleges.

Hypothesis I: Different types of financial aid and amounts have a positive relationship with graduation rates for rural community college students.

According to prior research rural community college students have a lower SES in comparison to urban and suburban students, incur more debt, and receive the majority of Pell Grant disbursements among community colleges (e.g., Hardy & Katsinas, 2008; King, 2004; McKinney & Novak, 2013). Given the high amount of need, rural community college students will likely benefit from entitlement aid such as the Pell Grant. Since the subsidized loan is also need-based, students should benefit from this loan to meet educational costs related to attending college. I hypothesize that the Pell Grant and the subsidized loan will increase student graduation rates. Given that the unsubsidized loan is non-need based, and anyone can borrow the funds, I hypothesize that borrowing these funds impacts graduation rates.

Hypothesis II: Students who attend rural community colleges are less likely to graduate in comparison to their urban, suburban, and town counterparts.

Based on the limited prior research available, rural community college students are highly financial aid dependent and fall into the low SES status. These two risk factors have been linked negatively to graduation rates (e.g., King, 2004; McKinney & Novak,
2013). I hypothesize that rural community college students have high risk factors which prevent them from graduating at similar or higher rates than urban, suburban, and town community college students.

**Data Source and Sample**

This study uses the most recent, restricted-use data from the 2004/2009 Beginning Postsecondary Students Longitudinal Study (BPS:04/09) sponsored by the National Center for Education Statistics (NCES). The BPS:04/09 is a nationally representative sample of students who began postsecondary education for the first time in the 2003-2004 academic year and then, after this initial entry into postsecondary education, received invitations to participate in follow-up surveys at the end of their third (2005-2006) and sixth (2008-2009) years. This record-level data is based on student interviews and other administrative data sources and allows researchers to examine topics related to graduation rates and degree attainment over six academic years, from 2003-2004 to 2008-2009. Additional information such as financial aid, family background and status, and academic performance and institutional characteristics were also collected. BPS data is drawn from the 2004 National Postsecondary Student Aid Study (NPSAS:04) which is explained in more detail in the subsequent NPSAS Sampling Frame paragraphs.

**Sample design.** The BPS:04/09 study covers a six-year period based on the school years 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2007-2008, and 2008-2009. This survey only collects data from first time beginners (FTBs) in college. All students are FTBs that were eligible to participate in the 2004 National Postsecondary Student Aid Study (NPSAS:04) (Wine, Janson, & Wheeless, 2011). Their eligibility was confirmed
with the first interview during the BPS:04/06 data collection (Wine et al., 2011). The original FTBs group that was identified consisted of 18,640 students.

**Sample selection.** The sample selection was largely determined by how the original NPSAS:04 students were selected and then how the FTBs were identified.

**NPSAS sampling frame.** The target population for the NPSAS:04 study includes all students who were enrolled between July 1, 2003 and June 30, 2004. Institutions were identified using the 2000-2001 Integrated Postsecondary Education Data System - Institutional Characteristics (IPEDS-IC) and header files. In order to be eligible for NPSAS:04 institutions needed to meet the following eligibility requirements:

1. offer an educational program designed for persons who had completed secondary education;
2. offer at least one academic, occupational, or vocational program of study lasting at least 3 months or 300 clock hours;
3. offer courses that were open to more than the employees or members of the company or group (e.g., union) that administered the institution;
4. be located in the 50 states, the District of Columbia, or Puerto Rico;
5. be other than a U.S. Service Academy; and
6. have a signed Title IV participation agreement with the U.S. Department of Education (Wine et al., 2011).

Based on the 2000-2001 IPEDS-IC file, 9,000 potential “institutions” were identified. When the institutions that did not meet the above criteria were removed, this number was reduced to 6,430. The data collectors then applied probabilities proportional to size (pps),
and the sample was further reduced to 1,630 eligible institutions across all institution types (public, private not-for-profit, for-profit, less than two-year, two-year, four-year, Master’s, and doctoral institutions). Of the 1,630 eligible institutions, 1,360 provided student enrollment lists.

These institutions were then broken down into 58 different strata. There were 22 national strata and 36 state strata (Cominole, Siegel, Dudley, Roe, & Gilligan, 2006). These strata included a breakdown by institutional control, highest level of degree offering, Carnegie Classification, and various state groupings. Based on the enrollment lists that were provided by the institutions, eight student sampling strata were used including in-state first-time beginner students and out-of-state first-time beginner students. Of the 58 original strata, the in-state and out-of-state first time beginner students determined the BPS sample.

First-time beginner students are oversampled in NPSAS:04 to allow for a sufficient number of students for the BPS:04/09 study. The original target sample size for NPSAS:04 was 121,680 students. Because of lower than expected institutional participation by the National Center for Education Statistics, the sample size resulted in 109,210 potentially eligible students. In order to be considered an eligible student who attended an eligible institution, the student needed to meet the following criteria:

1. enrolled in either (1) an academic program; (2) at least one course for credit that could be applied toward fulfilling the requirements for an academic degree; or (3) an occupational or vocational program that required at least 3
months or 300 clock hours of instruction to receive a degree, certification, or other formal award;

2. not concurrently enrolled in high school; and

3. not enrolled solely in a GED or other high school completion program (Cominole et al., 2006).

The potentially eligible students were then vetted through various sources to determine their true eligibility. These sources included an institution record abstraction (computer-assisted data entry [CADE]), the NPSAS:04 student interview, and also several databases such as the Department of Education’s Central Processing System (CPS) and the National Student Loan Data System (NSLDS) (Cominole et al., 2006). Of the students who met these criteria and attended an eligible institution, 49,410 were considered potential FTBs. This group included students at public and private less-than-2-year, 2- to 3-year and 4-year institutions. These students were held to be potentially eligible for the BPS study.

**BPS student sample.** In order to verify the First Time Beginners (FTBs) status, the researchers cross-checked the students’ statuses with the National Student Loan Data System (NSLDS), Central Processing System (CPS) and the National Student Clearinghouse (NCS). By using the high school graduation date and date of birth, the researchers were able to remove some students who did not meet the high school graduation requirement. After removing over 4,700 ineligible students, the researchers were left with 44,670 eligible students. At this point, the researchers needed to have a sample group for the first follow-up survey (BPS:04/06). The previously identified
eligible students were again vetted through multiple sources to confirm their likely FTBs status. These sources included

1. the base-year student interview (NPSAS:04);
2. student-level data obtained from institutional records via CADE;
3. the CPS, which contains data provided to the U.S. Department of Education by students and their families when they complete the Free Application for Federal Student Aid (FAFSA); and
4. the U.S. Department of Education National Student Loan Data System (NSLDS), which contains Pell Grant and Stafford Loan information (Cominole et al., 2004).

The final BPS:04/06 sample included 23,090 First Time Beginners who were eligible for the first follow-up survey.

Further examination of the sample found that 4,450 cases were not eligible for the follow-up study. Such cases were removed based on one of three reasons: the eligibility questions on the first follow-up study, logistic modeling using NSLDS and CPS to determine eligibility, and determining eligibility using the National Student Clearinghouse (Wine et al., 2011). This process left 18,640 eligible students for the second follow-up study. Researchers then sent the second follow-up study for BPS:04/09 to the eligible students.

**Institutional sample.** Institutions for the current study for this dissertation were identified using data from the Institutional Postsecondary Education Data System (IPEDS). The researcher used the IPEDS Data Center, which is owned by the National
Center for Education Statistics (NCES), to download selected institutions. Two variables were used to identify institutions to be downloaded: first, institutions were selected by “Sector of institution” and only “Public, 2-year” institutions were eligible for this study, and second, “Degree of urbanization” was the other variable included. Once the researcher downloaded this information, the community colleges were divided by their locale codes into four main categories: city (urban), suburb, town, and rural. There was a total of 1,553 institutions downloaded. Of the 1,553 institutions, 626 were located in the city locale, 349 were located in the suburb locale, 224 were located in the town locale, and 354 were located in the rural locale. Enrollment size of the institutions were not taken into consideration; rather, strictly the IPEDS locale codes were considered. Refer to Appendix B for a breakdown of the institutional locale numbers and percentages.

**Weighting.** Weighting is used in large datasets to account for nationally representative samples (Thomas & Heck, 2001). When collecting data for a large national dataset, it is imperative that weighting occurs for certain groups of students. Since NPSAS:04 represents all students across many strata which includes First Time Beginners (FTBs), weighting is important to ensure that the larger national audience is also represented in the smaller FTBs population. The sampling frame for BPS:04/09 is derived from the NPSAS:04 study.

Many weights were already created and included in BPS:04/09. However, in this dissertation, only the panel weight WTB000 from BPS:04/09 was applied to the data for the data analysis. The panel weight is used because it is developed in the first panel and it is applied across all panels and the weight is already adjusted for non-response or a loss
of participants between panels. A single year panel is not appropriate at it only looks at one panel of the survey. The National Center for Education Statistics (NCES) originally created and developed the panel weights included in BPS:04/09. These panel weights have been widely used in previous research that has utilized BPS:04/09 as the primary dataset. The NCES has recognized WTB000 as already “response-adjusted [and] calibrated” (Wine, Janson, & Wheeless, 2011).

For the current study, the researcher selected only those students in the BPS:04/09 study who were enrolled in community colleges in the 2003-2004 academic year. For the descriptive statistics, all community college students are included regardless of whether they were reported as graduating with an associate degree or certificate by 2006 or 2009. For the logistic regression, only students who have graduated with an associate degree or certificate are included in these models. The sample size for all community college students is approximately 6,450 (rounded to the nearest ten per NCES guidelines), which represents 1,569,100 respondents after the researcher applied the panel weight WTB000 using STATA. When examining only rural community college students, the sample size reduces to 1,140 students which represented a weighted total of 289,340 respondents.

**Variables**

In this study, rural community colleges refer to the public two-year institutions located in rural areas based on the Integrated Postsecondary Education Data System (IPEDS) classifications.
**Dependent variables.** In this study, four dichotomous outcome variables are used. The first is whether or not a community college student earned an associate degree within three years of starting postsecondary education at any community college, not necessarily the same community college a student started at. The second dependent variable expands the attainment period to six years. The third dependent variable is whether a student graduated with an associate degree or certificate within three years. The fourth dependent variable expands the attainment period to six years. Since BPS:04/09 is a longitudinal study, the dataset contains variables concerning whether a student has graduated within three or six years. Coding for these variables is divided into two parts. For the first and second dichotomous dependent variables, the condition that students who attained an associate degree is coded as 1, and the condition that students who did not graduate with an associate degree or certificate have been coded as 0. For the third and fourth dependent variables, those who earned an associate degree or certificate are coded as 1, and those who did not are coded as 0.

**Independent variables.** Three financial aid variables—the Pell Grant, the Federal Subsidized Loan, and the Federal Unsubsidized Loan—are the key independent variables for this study. These variables were calculated in BPS:04/09 in cumulative amounts in two time periods within the same study: from 2003-2004 through 2005-2006 and from 2003-2004 through 2008-2009.

**Control variables.** Based on the previous research review as outlined in Chapter 2, this study includes in the statistical models the two groups of the most commonly used
control variables: student demographics and family status as well as academic performance and institutional characteristics.

**Student demographics and family status.**

1. Gender: In BPS:04/09, gender is a categorical variable which has been dummy coded into a dichotomous variable where female is the reference group. The original variable in BPS:04/09, GENDER, was coded as 1 = Male and 2 = Female. The variable was recoded so that 0 = Men and 1 = Women. Community college students are primarily female (American Association of Community Colleges, 2014).

2. Age: Age is a continuous variable. It is assumed that age impacts graduation rates for community college students. Community college students are older, on average, than students at four-year institutions, and as such students age, they, unlike their younger counterparts, often face additional responsibilities which can negatively impact graduation rates (American Association of Community Colleges, 2014; Jacobs & King, 2002).

3. Minority status: This categorical variable has been dummy coded into a dichotomous variable where minority, the reference group, means Black, Hispanic or Latino, Asian, American Indian or Alaska Native, Native Hawaiian/other Pacific Islander, other, or more than one race. In higher education, community colleges serve a disproportionate number of minority students (American Association of Community Colleges, 2014).
4. **Marital status**: Marital status has been dummy coded into a dichotomous variable where the reference group is whether a student was married through the entire three-year period and through the entire six-year period. Jacobs and King (2002) found that women over 25 who are balancing children and a marriage were less likely to graduate.

5. **Single parent**: This variable has been dummy coded into a dichotomous categorical variable where the reference group is where the student is a single parent. Women are more likely to be single parent students, and being a single parent has been found to negatively impact persistence for students (Jacobs & King, 2002).

6. **Number of children**: This continuous variable indicates the number of children that a student has regardless of marital status.

7. **Dependent on FAFSA**: Dependent student has been recoded into a dichotomous categorical variable that indicates whether a student is dependent or independent on the filed FAFSA form. This variable was recoded from 1 = Dependent and 2 = Independent to 0 = Dependent and 1 = Independent. A student who is a dependent on the FAFSA is one who uses this parental information to determine their need for financial aid. Generally students who use their parental information are under the age of 24, are not married, do not have children, and/or are not veterans of the armed forces.

8. **Parental education**: This is a categorical variable that has been dummy coded into a dichotomous variable: a parent has earned a bachelor’s degree or higher
and a parent who has earned an associate degree or less. For this variable, 0 = associate degree or less and 1 = bachelor’s degree or higher. Parental education determines the first generation status of a student. A first generation student is the first student in one’s family to attend college where neither parent has achieved a bachelor’s degree or higher. Students who are first generation are less likely to understand the college-going process or know how to apply for financial aid. Additionally, first generation students are more likely to drop out of college than students who are not first generation (Engle & Tinto, 2008).

9. Family adjusted gross income: Family adjusted gross income (AGI) is a continuous variable and is one of the elements that determines socioeconomic status (SES). For dependent students, what is considered is the AGI for the parents; for independent students, the AGI for the student or student and spouse is considered. Low socioeconomic status (SES) students are less likely to graduate, they are more likely to be first generation, and they are the least likely to file the FAFSA (King, 2004; McKinney & Novak, 2013).

**Academic performance and institutional characteristics.**

1. Grade point average: This is a continuous variable which is based on a 4.0 scale, and the first year GPA is used for all models. GPA has been found to be a strong predictor of persistence and graduation (e.g., Dowd & Coury, 2006; Driscoll, 2007; McGrath and Braunstein, 1997; Pascarella & Terenzini, 2005; Zhao, 1999).
2. Academic major: This is a categorical variable that has been recoded into a dichotomous variable: a student who is in an academic major and a student who is not. For this variable, 0 = not in an academic major and 1 = academic major. Students who are undeclared majors or are not in a degree program are excluded. Students included in academic majors are all students who are in humanities, social/behavioral sciences, life sciences, physical sciences, math, computer/information systems, engineering, education, business management, or health majors. Research has shown that the choice of a college major in either an associate degree or certificate program may lead to differences in earnings upon graduation (Dadgar & Trimble, 2015).

3. Vocational major: Vocational major is a categorical variable that has been recoded into a dichotomous variable: a student who is in a vocational major and a student who is not in a vocational major. For this variable, 0 = not in a vocational major and 1 = vocational major. Undeclared majors and students who are not in a degree program are excluded. Students in a vocational major are students who are listed in vocational/technical or other technical/professional majors.

4. Highest degree expected: This is a categorical variable which has been dummy coded into a dichotomous variable: a student who expects to obtain a bachelor’s degree or higher and a student who expects to obtain an associate degree or lower. For this variable, 0 = does not expect to earn a bachelor’s degree or higher and 1 = expects to earn a bachelor’s degree or higher. The
variable in this study is drawn from the data collected during the first survey, in 2003-2004. Previous research has shown that educational aspirations have been found to have a positive effect on persistence (e.g., Chen, 2008).

5. Social Integration Index: Social Integration Index is a self-reported continuous variable on a scale with a maximum value of 200. Students who are more socially integrated may participate in student organizations such as clubs, fraternities or sororities, sports, or government. Prior research has shown that the more socially integrated students are, the more likely they are to persist. (e.g., Bean & Eaton, 2000; Tinto, 1987, 1992).

6. Academic Integration Index: Academic Integration Index is a self-reported continuous variable on a scale with a maximum value of 200. Students who have higher levels of interactions with faculty are more academically integrated. These interactions may lead to students having higher grades, and, thus, they likely self-report as being more academically integrated. Students who are more academically integrated often persist at higher rates than those who are not (Bean & Eaton, 2000; Tinto, 1987, 1992).

7. Attendance pattern: Attendance pattern is a categorical variable which has been recoded into a dichotomous variable: one pattern is a student who has a part-time or mixed attendance pattern (which is a mix of part-time and full-time attendance patterns) and the second pattern is a student who has a full-time attendance pattern. For this variable, 0 = full-time attendance pattern and 1 = part-time or mixed attendance pattern. A student’s attendance pattern is
based on the first-year attendance pattern only. Since community college students often have varying attendance patterns, it may be difficult to complete a degree within a two-year period as they would not accrue the minimum credits needed to graduate. Over time, students who attend part-time are less likely to graduate with an associate degree (Crosta, 2013).

8. Average hours worked: Average hours worked is a continuous variable which is the average number of hours worked during the first three-year period and through the entire six-year period. Prior studies have found that students who work more hours are less likely to persist and, subsequently, graduate with a degree or certificate (Horn, Li, & Weko, 2009; Lanni, 1997; Swager, Campbell, & Orlowski, 1995; Windham, 1995).

9. Regional differences: Regional differences is a categorical variable that has been recoded into four variables: East, Midwest, South, and West Regions. (Refer to Appendix A for a list of which states are in each region.) Previous research has shown that regional economic differences may promote or deter attendance at a community college (Betts & McFarland, 1996). This, coupled with differences in faculty attitudes, may impact students and their graduation rates (Berry, Hammons, & Denny, 2001).

10. Enrollment size: Enrollment size is a continuous variable. Prior research has found that the enrollment size of an institution may impact persistence and graduation rates (Bailey, Calcagno, Jenkins, Leinbach, & Kienzl, 2006; Pascarella & Terenzini, 1991, 2005).
Statistical Models

Logistic regression is an appropriate statistical model for longitudinal data that has dichotomous outcome variables and there are independent variables that are continuous or categorical (DesJardins, 2001). Eight sets of logistic regression models were employed to address the aforementioned research questions. Models 1-4 use all community college students as the sample and examine how various financial aid variables may contribute to a student earning a certificate or an associate degree after controlling for other variables. This is represented by the following formula for logistic regression:

$$\log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_1 \text{CC Types} + \beta_2 \text{Financial Aid} + \beta_3 \text{Demographics/Family} + \beta_4 \text{Academic Performance/Institutional Characteristics} + \epsilon$$

Models 5-8 focus only on rural community college students and examine the same questions. This is represented by the following formula:

$$\log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_1 \text{Financial Aid} + \beta_2 \text{Demographics/Family} + \beta_3 \text{Academic Performance/Institutional Characteristics} + \epsilon$$

In these equations, $\pi_i$ is the probability that $y_i=1$ (in Models 1 and 5: a student graduated with an associate degree in three years=1, and not graduated=0; and in Models 2 and 6: a student graduated with an associate degree within six years=1, and not graduated=0). Similarly, for Models 3 and 7, $y_i=1$ where a student graduated with an associate degree or certificate =1 and not graduated=0 within three years. For Models 4 and 8, a student who graduated with an associate degree or certificate=1 and not graduated=0 within six years.
This is a generalized linear model with a link function of the log odds or logit. The maximum likelihood approach is used to estimate the parameters (Yang & Webber, 2015). If an independent variable has \( l \) levels, only \( l - 1 \) levels were used in the model. The effects of the \( l - 1 \) levels were measured from the effect of the omitted or reference level of the variable. The estimated \( \beta \) (\( \beta \)) was the difference in logit between the level in the model and the omitted level, that is, the natural log of odds ratios of the level in the model over the level omitted. The results of logistic regression were summarized and interpreted as odds ratios (\( e^\beta \)).

Similar sets of independent variables were constructed in these models. The three blocks of independent variables were added into the regression analysis in a hierarchical order. Additionally, the financial aid and income variables were all transformed with a logarithm function to model a linear relationship with the independent variables. All the models were weighted using the panel weight variable to control for the stratified sampling design.

**Why logistic regression?** In this study, there are four dichotomous outcome variables (or two sets of two) applied to all community colleges (Models 1-4) and rural community colleges (Models 5-8). The first set of two is whether or not a student graduated with an associate degree through 2006 and through 2009; the second set of two outcome variables is whether or not a student graduated with associate degree or certificate through 2006 and through 2009.

Logistic regression uses the maximum likelihood estimation instead of the least squares estimation. There are many benefits to using logistic regression. The first is that
there are no assumptions about the predictors. They do not need to be normally distributed, linearly related, or have equal variances within each group (O’Halleran, 2011). Logistic regression helps to find whether there is an interaction between the variables and what the strength is between the variables. A researcher needs to identify the least amount of variables necessary to answer their research questions. All extraneous variables need to be excluded.

The researcher will weight all of the models using the panel weight variable to control for the stratified sampling design. Panel weight WTB000 will be used on the logit model. According to Thomas and Heck (2001), one of the data problems with large complex surveys is that we may not have enough respondents with the characteristics we would need for our target sample. By oversampling, we may face a disproportionate and unrealistic sample for real world application. In order to achieve a realistic sample, researchers use weights to increase or decrease the characteristics desired in the sample.

**Data Analysis**

Both logistic regression and descriptive statistics were used to analyze the data. The logistic regression models and descriptive statistics were all generated using Stata. Stata was used because of its ability to handle complex survey design. The data analysis was conducted in multiple stages. First, the dataset was opened on a non-networked computer. A review of variables occurred to ensure the necessary variables to align with the theoretical framework were available. The researcher examined various variables to determine the number and percentages for the sample of students. Based on the information in step one, the researcher identified the variables that were needed for the
Since some of the data was missing, incomplete, or insufficient, the number of variables originally being considered for the model were reduced (high school GPA). The BPS:04/09 scaled variables were already coded with the lowest number as the negative outcome and the largest number being the most positive outcome. For variables that were not coded as 0 and 1, the researcher dummy coded the variable to 0 and 1. Categorical variables were dummy coded into dichotomous outcome variables. The continuous variables were not recoded. The expansive list of variables and the identification of recoded variables is found earlier in Chapter Three.

At the start of the third step, it was found that the BPS:04/09 data for the community colleges’ locale was insufficient. The researcher found that the institution data needed was insufficient and identified IPEDS data as solution for this issue. The process of obtaining the IPEDS data is described earlier in this chapter. IPEDS data was downloaded and imported into Stata in order to create a full dataset for the analysis. Once the data was in Stata, the researcher divided the community colleges into four levels of urbanicity to complete the dataset.

For the fourth step, which is explained in next section, the researcher analyzed the descriptive statistics. The table of results is found in Chapter 4. Additionally, logistic regression was conducted to answer the remaining four primary research questions. The hierarchical logistic regression tables are also found in Chapter 4.

**Descriptive data analysis.** The numbers, mean, estimates, and standard deviation for graduation rates, financial aid, demographic and family status, and academic performance and institutional characteristic variables are included in Chapter 4.
discussed previously, the financial aid variables included the Federal Pell Grant and Federal Subsidized and Unsubsidized Loans, and some of the additional variables included in this model are college GPA, parental education, family AGI, and regional differences. The following primary research questions are related to the descriptive statistics:

1. What are the differences in the amount of financial aid, student demographics and family status as well as student academic performance and institutional characteristics across rural, suburban, urban, and town community colleges?

2. What are the three-year and six-year graduation rates for associate degrees earned by rural community college students, compared with suburban, urban, and town community colleges? What are the 3-year and 6-year graduation rates for associate degrees and certificates earned by rural community college students, compared with suburban, urban, and town community colleges?

**Hierarchical logistic regression data analysis.** Logistic regression was conducted to determine the relationship between financial aid and graduation rates. The primary research questions and analyses are presented below. The expansive findings are presented in Chapter Four.

**Question three.** What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for all community college students?

Models 1 and 2 answer this question where Model 1 examines the relationship between financial aid and graduation rates through three years, and Model 2 expands the
attainment period to six years. In all models, the dependent variable is whether or not a student graduated with an associate degree. In Models 1A and 2A, the independent variable blocks include institutional urbanicity (rural, suburban, and town) and the financial aid variables (Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan). In Models 1B and 2B, the independent variable blocks include the institutional urbanicity, financial aid variables, and Demographics and Family Status variable block (Women, Age, Minority, Maintained Married from 03-06 or 03-09, Student as Single Parent, Number of Children, Parental Education, Family AGI, Dependent on FAFSA, and Number of Hours Worked through 2006 or 2009 [in order of input]). Finally, Models 1C and 2C include the institutional urbanicity, financial aid variables, demographics and family status, and academic performance and institutional characteristics (Grade Point Average (GPA), Academic Major, Vocational Major, Highest Degree Expected, Social Integration Index, Academic Integration Index, Part-time/Mixed Attendance Pattern, Enrollment Size, East Region, Midwest Region, West Region, and South Region [in order of input]).

**Question four.** What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for all community college students?

Models 3 and 4 answer this question where Model 3 examines the relationship between financial aid and graduation rates through three years, and Model 4 expands the attainment period to six years. In all models, the dependent variable is whether or not a student graduated with an associate degree or certificate. In Models 3A and 4A, the
independent variable blocks include institutional urbanicity (rural, suburban, and town) and the financial aid variables (Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan). In Models 3B and 4B, the independent variable blocks include the institutional urbanicity, financial aid variables, and Demographics and Family Status variable block (Women, Age, Minority, Maintained Married from 03-06 or 03-09, Student as Single Parent, Number of Children, Parental Education, Family AGI, Dependent on FAFSA, and Number of Hours Worked through 2006 or 2009 [in order of input]). Finally, Models 3C and 4C include the institutional urbanicity, financial aid variables, demographics and family status, as well as academic performance and institutional characteristics (Grade Point Average (GPA), Academic Major, Vocational Major, Highest Degree Expected, Social Integration Index, Academic Integration Index, Part-time/Mixed Attendance Pattern, Enrollment Size, East Region, Midwest Region, West Region, and South Region [in order of input]).

**Question five.** What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for rural community college students?

Models 5 and 6 answer this question where Model 5 examines the relationship between financial aid and graduation rates for rural community college students through three-years, and Model 6 expands the attainment period to six-years. In all models, the dependent variable is whether or not a student graduated with an associate degree. In Models 5A and 6A, the independent variable blocks include the financial aid variables (Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan). In
Models 5B and 6B, the independent variable blocks include the institutional urbanicity, financial aid variables, and Demographics and Family Status variable block (Women, Age, Minority, Maintained Married from 03-06 or 03-09, Student as Single Parent, Number of Children, Parental Education, Family AGI, Dependent on FAFSA, and Number of Hours Worked through 2006 or 2009 [in order of input]). Finally, Models 5C and 6C include the institutional urbanicity, financial aid variables, demographics and family status, as well as academic performance and institutional characteristics (Grade Point Average (GPA), Academic Major, Vocational Major, Highest Degree Expected, Social Integration Index, Academic Integration Index, Part-time/Mixed Attendance Pattern, Enrollment Size, East Region, Midwest Region, West Region, and South Region [in order of input]).

**Question six.** What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for rural community college students?

Models 7 and 8 answer this question where Model 7 examines the relationship between financial aid and graduation rates for rural community college students through three-years, and Model 8 expands the attainment period to six-years. In all models, the dependent variable is whether or not a student graduated with an associate degree or certificate. In Models 7A and 8A, the independent variable blocks include the financial aid variables (Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan). In Models 7B and 8B, the independent variable blocks include the institutional urbanicity, financial aid variables, and Demographics and Family Status variable block.
(Women, Age, Minority, Maintained Married from 03-06 or 03-09, Student as Single Parent, Number of Children, Parental Education, Family AGI, Dependent on FAFSA, and Number of Hours Worked through 2006 or 2009 [in order of input]). Finally, Models 7C and 8C include the institutional urbanicity, financial aid variables, demographics and family status, as well as academic performance and institutional characteristics (Grade Point Average (GPA), Academic Major, Vocational Major, Highest Degree Expected, Social Integration Index, Academic Integration Index, Part-time/Mixed Attendance Pattern, Enrollment Size, East Region, Midwest Region, West Region, and South Region [in order of input]).

**Limitations**

This study has some limitations to consider. The first limitation is that this study cannot prove causal inference. Lewis (1973) writes of causation:

> We think of a cause as something that makes a difference, and the difference it makes must be a difference from what would have happened without it. Had it been absent, its effects — some of them, at least, and usually all — would have been absent as well. (p.161)

In order to show causal inference, a researcher must show that the independent variables are the only plausible causes for an intended outcome. In this study, the financial aid variables cannot be proven to be the only causes for graduation rates. Other factors, such as college GPA, parental education, academic integration, or other variables not included in this study may also contribute to graduation rates.
A second limitation is the timing of the data collection. With an economic downturn that started in 2008, the peak of community college enrollment occurred in 2010-2011. Community colleges had an influx of students that created an increase of 21.8% in full-time students from fall 2007 to fall 2010 (Mullin & Phillippe, 2011). Community college enrollment has declined since the 2010-2011 year as the economy has improved. Given the economic downturn, students would have relied heavily on financial aid to be able to afford college. Since the BPS:04/09 study is the most recent longitudinal data set that has as much information as is necessary for this study, this is the best option to research the relationship between financial aid and graduation rates for rural community college students longitudinally.

A third data limitation is missing data. Because of the large scale nature of this study, missing data was inevitable. Individual cumulative data was not available for work-study and Federal Supplemental Education Opportunity Grant (FSEOG) in BPS:04/09. Although these are important federally funded programs, the missing data made them unusable; thus, these variables were not included in this study. In addition, an important variable that was excluded from this study is the high school GPA. The high school GPA has been found to be a predictor of college GPA (Pascarella & Terenzini, 2005). The dataset had too many missing values for high school GPA based on the age of the students. Because there were so many missing values, this variable was unviable in the model. All missing data was excluded from the data analysis, but the missing data did not pose any issues with the sample size for this study: 6,450 (rounded) students.
A fourth limitation for this study is multicollinearity. The tuition and fees variable and the financial aid variables were found to have multicollinearity in the hierarchical logistic regressions. Since community colleges are inexpensive and financial aid is intended to reduce the costs of tuition, the outcomes were duplicating each other. Thus, the tuition and fees variable was removed from the models.

A fifth limitation the 2004-09 Beginning Postsecondary Students data set. The BPS:04/09 data collection started in the 2003-04 academic year, which is more than ten years earlier than the writing of this dissertation. However, this is the most complete longitudinal dataset currently available. Another limitation of this dataset is that it is a secondary dataset. This means that the data and variables available were not collected by this dissertation’s researcher. The types of information collected and the surveys sent out were designed by the National Center for Education Statistics and were out of the control of this dissertation’s researcher. Despite these dataset limitations, BPS:04/09 is a comprehensive, nationally representative, and longitudinal study and makes it the appropriate dataset for this study.
Chapter 4: Results

The purpose of this study was to examine the role financial aid plays in helping rural community college students graduate. This chapter presents the results from the research, has four sections that correspond to the six research questions, and includes a summary of the data. The data for this dissertation was collected by the National Center for Education Statistics (NCES) for the Beginning Postsecondary Students Longitudinal Study 2004/2009 (BPS:04/09). This nationally representative study was used to examine the relationship between financial aid and graduation rates for rural community college students. Additional data was drawn from the Integrated Postsecondary Education Data System (IPEDS). The data will be disseminated in the order of the research questions.

Six questions guided the research for this dissertation: two are descriptive and four are logistic regression analysis. The first two questions examined the make-up of community college students. These community college students were broken down by selected characteristics including level of urbanicity; graduation rates; age; gender; and additional demographical, academic, and institutional characteristics. For the next four questions, logistic regression was used to examine the relationship between the selected characteristics and the graduation rates. Graduation was divided into two dichotomous outcome variables: students who graduated with an associate degree and students who graduated with an associate degree or certificate through both a three-year and six-year timeframe. The first two logistic regression analysis questions address all community college students, and the second two logistic regression analysis questions address only rural community college students.
Descriptive Statistical Analysis

Descriptive statistics were used in this study to answer the first two questions. Each question is posed and is followed by the results of the descriptive statistics.

Research question one. What are the differences in the amount of financial aid, student demographics and family status, and student academic performance and institutional characteristics across rural, suburban, urban, and town community colleges?

The sample used for this study was all first-time beginning students at community colleges in the 2003-2004 academic year as identified in the BPS:04/09 study. The descriptive statistics are provided here.

The majority of rural community college attendees were women (59%). Suburban and urban community colleges had similar percentages, 55% and 58% respectively. This is consistent with prior research that women comprise the majority of attendees at community colleges (e.g., AACC, 2015). Rural community college students were older (23) than all other types of community colleges. They were also most likely to remain married through the six-year time period (11%). Minority students make up 18% of rural community college attendees while they comprise 31%, 42%, and 14% for suburban, urban, and town community colleges. This is consistent with prior research that rural community college students are quite homogenous and primarily White (Hardy & Katsinas, 2011).
Table 1

Percentage of Selected Characteristics of Demographics and Family Status by Institution Type (Sample n=6,450 (rounded), Population represented=1,569,100)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>59.35</td>
<td>0.49</td>
</tr>
<tr>
<td>Suburban</td>
<td>55.44</td>
<td>0.50</td>
</tr>
<tr>
<td>Urban</td>
<td>57.95</td>
<td>0.50</td>
</tr>
<tr>
<td>Town</td>
<td>49.38</td>
<td>0.50</td>
</tr>
<tr>
<td>Minority(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>17.87</td>
<td>0.38</td>
</tr>
<tr>
<td>Suburban</td>
<td>30.90</td>
<td>0.46</td>
</tr>
<tr>
<td>Urban</td>
<td>42.22</td>
<td>0.49</td>
</tr>
<tr>
<td>Town</td>
<td>14.34</td>
<td>0.35</td>
</tr>
<tr>
<td>Maintained Married from 03-06(^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>2.05</td>
<td>0.14</td>
</tr>
<tr>
<td>Suburban</td>
<td>2.27</td>
<td>0.15</td>
</tr>
<tr>
<td>Urban</td>
<td>1.54</td>
<td>0.12</td>
</tr>
<tr>
<td>Town</td>
<td>1.17</td>
<td>0.11</td>
</tr>
<tr>
<td>Maintained Married from 03-09(^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1.75</td>
<td>0.13</td>
</tr>
<tr>
<td>Suburban</td>
<td>1.45</td>
<td>0.12</td>
</tr>
<tr>
<td>Urban</td>
<td>1.41</td>
<td>0.12</td>
</tr>
<tr>
<td>Town</td>
<td>0.99</td>
<td>0.10</td>
</tr>
<tr>
<td>Student as Single Parent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>3.93</td>
<td>0.19</td>
</tr>
<tr>
<td>Suburban</td>
<td>2.27</td>
<td>0.15</td>
</tr>
<tr>
<td>Urban</td>
<td>5.01</td>
<td>0.22</td>
</tr>
<tr>
<td>Town</td>
<td>3.64</td>
<td>0.19</td>
</tr>
<tr>
<td>Dependent on FAFSA(^c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>90.77</td>
<td>0.29</td>
</tr>
<tr>
<td>Suburban</td>
<td>94.32</td>
<td>0.23</td>
</tr>
<tr>
<td>Urban</td>
<td>89.77</td>
<td>0.30</td>
</tr>
<tr>
<td>Town</td>
<td>94.56</td>
<td>0.23</td>
</tr>
</tbody>
</table>
Table 1 Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental Education(^d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>57.91</td>
<td>0.49</td>
</tr>
<tr>
<td>Suburban</td>
<td>57.22</td>
<td>0.49</td>
</tr>
<tr>
<td>Urban</td>
<td>58.56</td>
<td>0.49</td>
</tr>
<tr>
<td>Town</td>
<td>51.74</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Notes: a. Minority means Black, Hispanic or Latino, Asian, American Indian or Alaska Native, Native Hawaiian / other Pacific Islander, other, and more than one race students. b. Does not include respondents who were separated or divorced at any time point during these years. c. Students who are considered dependent by federal financial aid guidelines. d. Dichotomous variable where 0 means a student’s parent has an associate degree or lower and 1 means a student’s parent has a bachelor’s degree or higher. The percentage represents students with at least one parent’s education of bachelor’s degree or higher.

Table 2

Average of Selected Characteristics of Demographics and Family Status by Institution Type (Sample n=6,450 (rounded), Population represented=1,569,100)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>22.95</td>
<td>9.06</td>
</tr>
<tr>
<td>Suburban</td>
<td>20.90</td>
<td>6.57</td>
</tr>
<tr>
<td>Urban</td>
<td>21.75</td>
<td>7.08</td>
</tr>
<tr>
<td>Town</td>
<td>22.08</td>
<td>8.55</td>
</tr>
<tr>
<td>Number of Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>0.50</td>
<td>1.00</td>
</tr>
<tr>
<td>Suburban</td>
<td>0.29</td>
<td>0.79</td>
</tr>
<tr>
<td>Urban</td>
<td>0.38</td>
<td>0.88</td>
</tr>
<tr>
<td>Town</td>
<td>0.35</td>
<td>0.85</td>
</tr>
<tr>
<td>Family Adjusted Gross Income ($)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>51,778</td>
<td>49,518</td>
</tr>
<tr>
<td>Suburban</td>
<td>58,140</td>
<td>45,909</td>
</tr>
<tr>
<td>Urban</td>
<td>47,042</td>
<td>45,874</td>
</tr>
<tr>
<td>Town</td>
<td>52,097</td>
<td>36,085</td>
</tr>
</tbody>
</table>
Academic performance and institutional characteristics for the students at rural, suburban, urban, and town community colleges. The results of the study provided the following academic characteristics. Rural community college students had the highest grade point average (GPA) among all types of community colleges at 3.04. In comparison, 2.91, 2.85, and 2.88 GPAs were found for suburban, urban, and town respectively. Urban community college students were the most likely (37%) to attend part-time or have a mixed attendance pattern during their first year. Rural students were more likely to attend full time (70%). Rural community college students were also the most likely to be majoring in a vocational or professional major (13%). They had the second highest percentage of students pursuing academic majors (57%) while town students led all community colleges (65%). In terms of highest degree expected, rural students had the lowest percentage of students who expected to earn a bachelor’s degree or higher (86%).

The results of the institutional characteristics break down into regions in the following manner. Rural community colleges were most likely to be found in the Midwest (39%) and the South (39%), followed by the West (15%), and the East (7%). Suburban institutions were found relatively equally among all regions (28% East, 27% Midwest, 26% South, and 20% West). Urban institutions were found predominantly in the South (40%) and the West (33%). Town community colleges were predominantly located in the Midwest (41%) and the South (30%).
Table 3

Percentage of Selected Characteristics of Academic Performance and Institutional Characteristics by Institution Type (Sample n=6,450 (rounded), Population represented=1,569,100)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highest Degree Expected</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>86.14</td>
<td>0.35</td>
</tr>
<tr>
<td>Suburban</td>
<td>89.53</td>
<td>0.31</td>
</tr>
<tr>
<td>Urban</td>
<td>91.01</td>
<td>0.29</td>
</tr>
<tr>
<td>Town</td>
<td>91.18</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Part Time/Mixed Attendance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>29.61</td>
<td>0.46</td>
</tr>
<tr>
<td>Suburban</td>
<td>30.47</td>
<td>0.46</td>
</tr>
<tr>
<td>Urban</td>
<td>36.66</td>
<td>0.48</td>
</tr>
<tr>
<td>Town</td>
<td>17.54</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>Academic Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>56.90</td>
<td>0.50</td>
</tr>
<tr>
<td>Suburban</td>
<td>53.88</td>
<td>0.50</td>
</tr>
<tr>
<td>Urban</td>
<td>53.97</td>
<td>0.50</td>
</tr>
<tr>
<td>Town</td>
<td>64.67</td>
<td>0.48</td>
</tr>
<tr>
<td><strong>Vocational Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>12.73</td>
<td>0.33</td>
</tr>
<tr>
<td>Suburban</td>
<td>10.38</td>
<td>0.31</td>
</tr>
<tr>
<td>Urban</td>
<td>11.14</td>
<td>0.31</td>
</tr>
<tr>
<td>Town</td>
<td>10.18</td>
<td>0.30</td>
</tr>
<tr>
<td><strong>East Region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>6.85</td>
<td>0.25</td>
</tr>
<tr>
<td>Suburban</td>
<td>27.86</td>
<td>0.45</td>
</tr>
<tr>
<td>Urban</td>
<td>10.18</td>
<td>0.30</td>
</tr>
<tr>
<td>Town</td>
<td>19.83</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>Midwest Region</strong></td>
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</tr>
<tr>
<td>Rural</td>
<td>38.98</td>
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</tr>
<tr>
<td>Suburban</td>
<td>27.06</td>
<td>0.44</td>
</tr>
<tr>
<td>Urban</td>
<td>16.53</td>
<td>0.37</td>
</tr>
<tr>
<td>Town</td>
<td>41.03</td>
<td>0.49</td>
</tr>
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Table 3 Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Region&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>39.42</td>
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</tr>
<tr>
<td>Suburban</td>
<td>25.60</td>
<td>0.43</td>
</tr>
<tr>
<td>Urban</td>
<td>40.14</td>
<td>0.49</td>
</tr>
<tr>
<td>Town</td>
<td>30.42</td>
<td>0.46</td>
</tr>
<tr>
<td>West Region&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>14.75</td>
<td>0.35</td>
</tr>
<tr>
<td>Suburban</td>
<td>20.49</td>
<td>0.40</td>
</tr>
<tr>
<td>Urban</td>
<td>33.15</td>
<td>0.47</td>
</tr>
<tr>
<td>Town</td>
<td>8.71</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Notes: a. Dichotomous variable where 0 is associate degree or lower and 1 is bachelor’s degree or higher. The percentage represented is the number of students who sought a bachelor’s degree or higher. b. Part-time and mixed attendance is based on first year attendance only. c. Academic majors are all students who are in humanities, social/behavioral sciences, life sciences, physical sciences, math, computer/information systems, engineering, education, business management, or health majors. Students who are undeclared majors are excluded. d. Students in a vocational major are students who listed in vocational/technical or other technical/professional majors. Undeclared majors are excluded. e. East region includes New England and Mid East (CT ME MA NH RI VT DE DC MD NJ NY PA). Midwest includes Great Lakes and Plains (IL IN MI OH WI IA KS MN MO NE ND SD). South includes Southeast and Southwest (AL AR FL GA KY LA MS NC SC TN VA WV AZ NM OK TX) West includes Rocky Mountains and Far West (CO ID MT UT WY AK CA HI NV OR WA). These variables were derived from OBEREG in BPS:04/09. Puerto Rico and missing regional location were excluded.
Table 4

Average of Selected Characteristics of Academic Performance and Institutional Characteristics by Institution Type (Sample n=6,450 (rounded), Population represented=1,569,100)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Integration&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>78.79</td>
<td>46.83</td>
</tr>
<tr>
<td>Suburban</td>
<td>79.65</td>
<td>45.46</td>
</tr>
<tr>
<td>Urban</td>
<td>79.48</td>
<td>48.14</td>
</tr>
<tr>
<td>Town</td>
<td>77.49</td>
<td>44.63</td>
</tr>
<tr>
<td>Social Integration&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>34.87</td>
<td>47.76</td>
</tr>
<tr>
<td>Suburban</td>
<td>33.09</td>
<td>46.78</td>
</tr>
<tr>
<td>Urban</td>
<td>33.85</td>
<td>45.65</td>
</tr>
<tr>
<td>Town</td>
<td>35.75</td>
<td>47.63</td>
</tr>
<tr>
<td>Grade Point Average&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>3.04</td>
<td>0.79</td>
</tr>
<tr>
<td>Suburban</td>
<td>2.91</td>
<td>0.83</td>
</tr>
<tr>
<td>Urban</td>
<td>2.85</td>
<td>0.83</td>
</tr>
<tr>
<td>Town</td>
<td>2.88</td>
<td>0.86</td>
</tr>
<tr>
<td>Average Hours Worked 03-06</td>
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<td></td>
</tr>
<tr>
<td>Rural</td>
<td>21.99</td>
<td>16.44</td>
</tr>
<tr>
<td>Suburban</td>
<td>20.78</td>
<td>15.78</td>
</tr>
<tr>
<td>Urban</td>
<td>22.14</td>
<td>16.26</td>
</tr>
<tr>
<td>Town</td>
<td>23.22</td>
<td>15.41</td>
</tr>
<tr>
<td>Average Hours Worked 03-09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>16.59</td>
<td>17.80</td>
</tr>
<tr>
<td>Suburban</td>
<td>18.67</td>
<td>17.14</td>
</tr>
<tr>
<td>Urban</td>
<td>18.23</td>
<td>17.35</td>
</tr>
<tr>
<td>Town</td>
<td>17.45</td>
<td>17.67</td>
</tr>
<tr>
<td>Enrollment Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>6,171</td>
<td>7,329</td>
</tr>
<tr>
<td>Suburban</td>
<td>11,646</td>
<td>9,009</td>
</tr>
<tr>
<td>Urban</td>
<td>12,684</td>
<td>9,983</td>
</tr>
<tr>
<td>Town</td>
<td>4,700</td>
<td>5,422</td>
</tr>
</tbody>
</table>

Notes:  
a. Both academic and social integration are self-reported continuous variables on a scale up to 200.  
b. This is the first year GPA only and is based on a 4.0 scale.
Financial aid descriptive statistics. Between the 2003-2004 and 2005-2006 academic years, urban community college students received the highest amount of cumulative Pell Grant ($2,169). Rural community college students received $1,906, town community college students received $1,654, and suburban community college students received $1,621. This is consistent with research that shows that urban and rural community college students have a lower adjusted gross income (AGI) and have a higher financial need than their suburban counterparts (e.g., Hardy & Katsinas, 2008). In terms of loans through three years, rural community college students borrowed the highest amount of subsidized loans ($1,557) while suburban community college students borrowed the highest amounts of unsubsidized loans ($1,152). Based on this information, on the one hand, rural community college students have borrowed the highest amounts of the subsidized loan, a need-based loan. However, on the other hand, suburban community college students have the highest amount of the unsubsidized loan, a non-need based loan. Thus, in the three-year period, rural community college students showed a higher utilization of funds that are designated for financially needier students.

For the six-year financial aid descriptive statistics, the results showed that urban community college students aggregated the highest amount of Pell Grant ($3,423) followed by rural community college students ($2,891). During this same time period, suburban community college students borrowed the highest amounts of subsidized and unsubsidized loans ($3,418 and $2,649, respectively), and rural community college students borrowed the second highest amounts of unsubsidized loans ($2,126). In comparison to the results of three-year period, over the six-year period, rural community
Table 5

*Average Amount of Financial Aid in Cumulative Amounts by Institution Type through 3- and 6-Years (Sample n=6,450 (rounded), Population represented=1,569,100)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Amount</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pell Grant through 2006</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1,906</td>
<td>3,030</td>
</tr>
<tr>
<td>Suburban</td>
<td>1,621</td>
<td>2,982</td>
</tr>
<tr>
<td>Urban</td>
<td>2,169</td>
<td>3,271</td>
</tr>
<tr>
<td>Town</td>
<td>1,656</td>
<td>2,833</td>
</tr>
<tr>
<td><strong>Federal Subsidized Loan Through 2006</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1,557</td>
<td>2,766</td>
</tr>
<tr>
<td>Suburban</td>
<td>1,541</td>
<td>2,812</td>
</tr>
<tr>
<td>Urban</td>
<td>1,439</td>
<td>2,627</td>
</tr>
<tr>
<td>Town</td>
<td>1,530</td>
<td>2,754</td>
</tr>
<tr>
<td><strong>Federal Unsubsidized Loan through 2006</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1,006</td>
<td>2,440</td>
</tr>
<tr>
<td>Suburban</td>
<td>1,152</td>
<td>2,582</td>
</tr>
<tr>
<td>Urban</td>
<td>932</td>
<td>2,211</td>
</tr>
<tr>
<td>Town</td>
<td>863</td>
<td>2,223</td>
</tr>
<tr>
<td><strong>Pell Grant through 2009</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>2,891</td>
<td>4,643</td>
</tr>
<tr>
<td>Suburban</td>
<td>2,646</td>
<td>4,641</td>
</tr>
<tr>
<td>Urban</td>
<td>3,423</td>
<td>5,103</td>
</tr>
<tr>
<td>Town</td>
<td>2,597</td>
<td>4,280</td>
</tr>
<tr>
<td><strong>Federal Subsidized Loan through 2009</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>3,135</td>
<td>5,079</td>
</tr>
<tr>
<td>Suburban</td>
<td>3,418</td>
<td>5,274</td>
</tr>
<tr>
<td>Urban</td>
<td>3,055</td>
<td>3,272</td>
</tr>
<tr>
<td>Town</td>
<td>3,272</td>
<td>5,430</td>
</tr>
<tr>
<td><strong>Federal Subsidized Loan through 2009</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>2,126</td>
<td>4,372</td>
</tr>
<tr>
<td>Suburban</td>
<td>2,649</td>
<td>4,915</td>
</tr>
<tr>
<td>Urban</td>
<td>2,102</td>
<td>4,116</td>
</tr>
<tr>
<td>Town</td>
<td>2,013</td>
<td>4,157</td>
</tr>
</tbody>
</table>

*Notes: Cumulative dollar amounts of aid that include students who did not receive or borrow financial aid.*
college students still showed a strong reliance on the Pell Grant, but their use of the non-need based unsubsidized loan increased. This may be due to the fact that the rural community college students have gained eligibility for additional unsubsidized loan funding due to age, marriage, or obtaining better paying jobs. Higher paying jobs may reduce their need for other types of aid.

**Research question two.** What are the three-year and six-year graduation rates for associate degrees of rural community college students, compared with suburban, urban, and town community colleges? What are the three-year and six-year graduation rates for associate degrees and certificates of rural community college students, compared with suburban, urban, and town community colleges?

This research question uses a sample that includes all community college students who graduated in BPS:04/09. Two types of graduation will be examined: students who graduated with an associate degree and students who graduated with an associate degree or certificate.

For students who graduated with an associate degree through the three-year BPS cycle (BPS:04/06), town community college students graduate at the highest rate (16%) followed by rural (15%), suburban (9%), and urban (6%). Through the six-year BPS cycle (BPS:04/09), associate degree attainment is highest at rural community colleges (21%). This is significantly higher than the next closest type of community college which is town at 17%. Interestingly, through both three- and six-year periods, students at rural community colleges who graduated with an associate degree or certificate had considerably higher graduation rates than all other students: 18% at three-years and 23%
at six-years. Over the six years, suburban community colleges students graduated at 15%, urban community college students graduated at 13%, and town community college students graduated at 19%. Thus, over the six-year period, rural community college students graduated at rates that are 4%-10% higher than all other community college students.
Table 6

Percentage of Graduates by Degree Type and Institutional Locale (Sample $n=6,450$ (rounded), Population represented=$1,569,100$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3-Year Associate Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>14.73</td>
<td>0.35</td>
</tr>
<tr>
<td>Suburban</td>
<td>9.02</td>
<td>0.29</td>
</tr>
<tr>
<td>Urban</td>
<td>6.17</td>
<td>0.24</td>
</tr>
<tr>
<td>Town</td>
<td>15.63</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>6-Year Associate Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>20.75</td>
<td>0.41</td>
</tr>
<tr>
<td>Suburban</td>
<td>14.00</td>
<td>0.35</td>
</tr>
<tr>
<td>Urban</td>
<td>11.04</td>
<td>0.31</td>
</tr>
<tr>
<td>Town</td>
<td>17.08</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>3-Year Associate Degree or Certificate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>18.18</td>
<td>0.39</td>
</tr>
<tr>
<td>Suburban</td>
<td>9.83</td>
<td>0.30</td>
</tr>
<tr>
<td>Urban</td>
<td>8.15</td>
<td>0.27</td>
</tr>
<tr>
<td>Town</td>
<td>17.02</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>6-Year Associate Degree or Certificate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>23.36</td>
<td>0.42</td>
</tr>
<tr>
<td>Suburban</td>
<td>14.78</td>
<td>0.36</td>
</tr>
<tr>
<td>Urban</td>
<td>12.79</td>
<td>0.33</td>
</tr>
<tr>
<td>Town</td>
<td>18.62</td>
<td>0.39</td>
</tr>
</tbody>
</table>
Hierarchical Logistic Regression Analysis

The following section addresses the final four research questions. Logistic regression was used to answer these questions.

Research question three. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for all community college students?

The sample used for this question included all community college students. Students who graduated with an associate degree were coded as 1, and students who did not graduate were coded as 0. Two sets of logistic regression were conducted: one for three-year graduation rates and one for six-year graduation rates. These models were run with three key independent variables: Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan. Models 1A-4A include the institutional locales (urban, suburban, town, and rural) and the financial aid variables (Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan). Models 5A-8A include the financial aid variables but only consider rural community college students. All B models (Models 1B-8B) include the financial aid variables and the Demographics and Family Status variables. All C models (Models 1C-8C) include the financial aid variables, demographics and family status variables as well as the academic status and institutional characteristics variables. Additionally, for all regression models, the odds ratio interpretation is the same. All odds ratios (OR) greater than 1 are interpreted as positive, and all odds ratios less than 1 are interpreted as negative. These models were run while controlling for other variables.
For all models (Models 1-8), logistic regression with variable blocks entered into the model in a hierarchical order was used. Three models were performed. A new block of variables was added into each model that aligns with the five theoretical framework theory developed by Rong Chen (2008). In Models 1A-8A, the financial aid variables (Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan) were analyzed. In Models 1A-4A, institutional locale (urban, suburban, town, and rural) were also included in the model. For Models 5A-8A, only rural community college students were included. In all B models, Demographics and Family Status variables (Women, Age, Minority, Maintained Married, Student as Single Parent, Number of Children, Parental Education, Family AGI, Dependent on FAFSA, and Number of Hours Worked) are added to the financial aid variables. In all C models, the academic status and institutional characteristics variables (GPA, Academic Major, Vocational Major, Highest Degree Expected, Social Integration Index, Academic Integration Index, Part-Time/Mixed Attendance Pattern, Enrollment Size, East Region, Midwest Region, and West Region) are included. All of the variables were entered into the hierarchical regression in the order listed above.

In Model 1A, among the institutional location and financial aid variables, attending rural and town community colleges were more predictive of graduation than any of the financial aid variables. The results show that the odds of rural and town students graduating are nearly 1.562 times higher than urban students, and suburban students are 58.2% more likely to graduate than urban students (OR=2.562, p<.001; OR=2.579, p<.001; OR=1.582, p<.01). For financial aid variables, as the Federal
Unsubsidized Loan increases, the odds of students graduating decreases by 4% (OR=0.960; p<.05). The Pell Grant had a positive odds ratio and the Federal Subsidized Loan had a negative odds ratio, but neither variable had significance in this model.
Table 7.

**Logistic Regression Analysis for Variables Predicting Associate Degree Graduation Rates for All Community College Students through 2006 (Sample n=6,450 (rounded), Population represented=1,569,100)**

<table>
<thead>
<tr>
<th></th>
<th>Model 1A</th>
<th>Model 1B</th>
<th>Model 1C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
</tr>
<tr>
<td>Rural Community College</td>
<td>2.562</td>
<td>0.359</td>
<td>2.365</td>
</tr>
<tr>
<td>Suburban Community College</td>
<td>1.582</td>
<td>0.237</td>
<td>1.420</td>
</tr>
<tr>
<td>Town Community College</td>
<td>2.579</td>
<td>0.454</td>
<td>2.272</td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.019</td>
<td>0.015</td>
<td>1.043</td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>0.970</td>
<td>0.017</td>
<td>0.953</td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.960</td>
<td>0.018</td>
<td>0.963</td>
</tr>
<tr>
<td>Women</td>
<td>1.182</td>
<td>0.143</td>
<td>1.138</td>
</tr>
<tr>
<td>Age</td>
<td>1.011</td>
<td>0.018</td>
<td>1.004</td>
</tr>
<tr>
<td>Minority</td>
<td>0.553</td>
<td>0.077</td>
<td>0.667</td>
</tr>
<tr>
<td>Maintained Married from 03-06</td>
<td>1.139</td>
<td>0.388</td>
<td>1.120</td>
</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.715</td>
<td>0.2000</td>
<td>0.763</td>
</tr>
<tr>
<td>Number of Children</td>
<td>0.753</td>
<td>0.068</td>
<td>0.722</td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.318</td>
<td>0.178</td>
<td>1.350</td>
</tr>
<tr>
<td>Family AGI</td>
<td>0.961</td>
<td>0.027</td>
<td>0.966</td>
</tr>
<tr>
<td>Dependent on FAFSA</td>
<td>1.694</td>
<td>0.401</td>
<td>1.804</td>
</tr>
<tr>
<td>Number of Hours Worked through 2006</td>
<td>0.870</td>
<td>0.042</td>
<td>0.886</td>
</tr>
<tr>
<td>GPA</td>
<td>1.006</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Academic Major</td>
<td>1.191</td>
<td>0.160</td>
<td></td>
</tr>
<tr>
<td>Vocational Major</td>
<td>1.482</td>
<td>0.291</td>
<td></td>
</tr>
<tr>
<td>Highest Degree Expected</td>
<td>1.037</td>
<td>0.184</td>
<td></td>
</tr>
<tr>
<td>Social Integration Index</td>
<td>1.000</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Academic Integration Index</td>
<td>1.006</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Part-Time/Mixed Attendance Pattern</td>
<td>0.958</td>
<td>0.130</td>
<td></td>
</tr>
</tbody>
</table>
Table 7 Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>SE</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment Size</td>
<td>0.848</td>
<td>0.038</td>
<td>***</td>
</tr>
<tr>
<td>East Region</td>
<td>2.704</td>
<td>0.444</td>
<td>***</td>
</tr>
<tr>
<td>Midwest Region</td>
<td>2.092</td>
<td>0.299</td>
<td>***</td>
</tr>
<tr>
<td>West Region</td>
<td>1.547</td>
<td>0.274</td>
<td>**</td>
</tr>
</tbody>
</table>

*p < .05  **p < .01  ***p < .001
Model 1B adds Demographics and Family Status into the model in addition to the financial aid variables. As found in Model 1A, Model 1B results find that attending rural and town community colleges were associated with higher graduation rates and their regression coefficients are both statistically significant. Additionally, parental education and being a dependent on the FAFSA are both positive and statistically significant predictors of graduation.

With the addition of Demographics and Family Status variables, rural students are 1.365 times more likely than their urban counterparts to graduate and town students are 1.272 times more likely to graduate (OR=2.365, p<.001; OR=2.272, p<.001); at the same time, suburban are 42% more likely to graduate than urban community college students through three-years (OR=1.420, p<.05). All of the financial aid variables are significant in this model. As the amount of Pell Grant increases, the odds of a student graduating also increases—but only by 4.3% (OR=1.043, p<.05). As the amount of Federal Subsidized Loan increases, students are 4.7% less likely to graduate and as the Federal Unsubsidized Loan increases, the odds of graduation decreases for all community college students by 3.7% (OR=0.953, p<.01; OR=0.963, p<.01, respectively).

In addition, in Model 1B, the more children a student has to care for, graduation rates decrease by 13% (OR=0.870, p<0.01), and for students who work, students who work more hours are 13% less likely to graduate (OR=0.870, p<0.01). For minority students, the odds of graduating decreases by 44.7% (OR=0.553, p<.001). Students who are single parents and students who have a higher adjusted gross income (AGI) were negatively associated with graduation, but these variables were not found to be
statistically significant. However, parental education and being a dependent on the FAFSA were both found to be positive predictors of graduation (OR=1.318, p<.05; OR=1.614, p<.05). Other positive variables with positive odds are women, age, and maintaining being married although these variables were not found to be significant.

Model 1C adds the academic status and institution characteristics variables into the hierarchical regression. This third block is in addition to the financial aid and Demographics and Family Status blocks of variables. The Pell Grant has a positive odds ratio, and the Federal Subsidized and Unsubsidized Loans have a negative odds ratio. Additionally, the financial aid variables all have statistical significance.

Rural community college students were found to have 96.2% higher odds of graduating than urban community college students (OR=1.962, p<.001). Town community college students also have 74.1% higher odds of graduating than their urban counterparts (OR=1.741, p<.01). In contrast, suburban community college students are not significant with the additional variable block. However, all of the financial aid variables are statistically significant. Of the three financial aid variables included in this study, all community college students who receive the Pell Grant are 4.3% more likely to graduate as the amount of the award increases (OR=1.043, p<.05), and this finding is consistent with prior research about the Pell Grant (e.g., Bettinger, 2004). The Federal Subsidized Loan is found to decrease the odds of graduating by 7% while the Federal Unsubsidized loan decreases graduation rates by 5% for all community college students (OR=0.930, p<.001; OR=0.950, p<.01).
The findings in Model 1C also include several negative predictors: minority students are 33.3% less likely to graduate and students who work more hours are 11.4% less likely to graduate (OR=0.667, p<.01; 0.886, p<.01). Additionally, students who have more children are 27.8% less likely to graduate (OR=0.722, p<.001). Positive predictors found for graduation in the Demographics and Family Status variable block in Model 1C include students whose parents have a bachelor’s degree or higher and students who are dependent on the FAFSA (OR=1.350, p<.05; OR=1.804, p<.05). Nevertheless, many variables—including women, age, marital status, single parent students, and AGI—are not significant in Model 1C.

In addition, the academic status and institutional characteristics block of variables has many variables that are statistically significant in Model 1C. College grade point average (GPA) is positively associated with graduation rates (OR=1.006, p<.001), and this finding aligns with previous research that GPA is a predictor of success for community college students (e.g., Dowd & Coury, 2006; Driscoll, 2007; Zhao, 1999). Also, students who were in a vocational major are 48.2% more likely to graduate (OR=1.482, p<.05). Other positive predictors for graduation for all community college students include students who are academically integrated and students whose institutions are located in the East, Midwest, or West regions. In contrast, students are 15.2% less likely to graduate as enrollment size increases at a community college (OR=0.848, p<.001). However, the academic major, highest degree expected, Social Integration Index, and Part-time/Mixed Attendance variables were not found to be statistically significant in the model. (AGI) were negatively associated with graduation, but these
variables were not found to be statistically significant. However, parental education and being a dependent on the FAFSA were both found to be positive predictors of graduation (OR=1.318, p<.05; OR=1.614, p<.05). Other positive variables were women, age, and maintaining being married although these variables were not found to be statistically significant.

Model 1C adds the academic status and institutional characteristics variables into the hierarchical regression. This third block is in addition to the financial aid and Demographics and Family Status blocks of variables. The Pell Grant has a positive odds ratio, and the Federal Subsidized and Unsubsidized Loans have a negative odds ratio. Additionally, the financial aid variables all have statistical significance.

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The findings in Model 1C also include several negative predictors: minority students are 33.3% less likely to graduate and students who work more hours are 11.4% less likely to graduate (OR=0.667, p<.01; 0.886, p<.01). Additionally, students who have more children are 27.8% less likely to graduate (OR=0.722, p<.001). Positive predictors found for graduation in the Demographics and Family Status variable block in Model 1C include students whose parents have a bachelor’s degree or higher and students who are dependent on the FAFSA (OR=1.350, p<.05; OR=1.804, p<.05). Nevertheless, many variables—including women, age, marital status, single parent students, and AGI—are not significant in Model 1C.

In addition, the academic status and institutional characteristics block of variables has many variables that are statistically significant in Model 1C. College grade point average (GPA) is positively associated with graduation rates (OR=1.006, p<.001), and this finding aligns with previous research that GPA is a predictor of success for community college students (e.g., Dowd & Coury, 2006; Driscoll, 2007; Zhao, 1999). Also, students who were in a vocational major are 48.2% more likely to graduate (OR=1.482, p<.05). Other positive predictors for graduation for all community college students include students who are academically integrated and students whose institutions are located in the East, Midwest, or West regions. In contrast, students are 15.2% less likely to graduate as enrollment size increases at a community college (OR=0.848, p<.001). However, the academic major, highest degree expected, Social Integration Index, and Part-time/Mixed Attendance variables were not found to be statistically significant in the model.
Over the six-years in the study, Model 2A findings show that the contrast is sharp between rural community college students’ graduation rates in comparison to urban students. Attending a rural community college is one of the most predictive or the most predictive variable among all three Model 2 hierarchical regressions. The odds of rural community college students graduating is 80% higher than urban students (OR=1.807, p<.001). Suburban and town students also have a positive association with graduation rates, but they are not statistically significant in this model. In addition, the Federal Pell Grant is positively associated with graduation, but the Federal Subsidized and Federal Unsubsidized Loans are both negatively associated with graduation. More importantly, none of the financial aid variables were found to be statistically significant.
Table 8

Logistic Regression Analysis for Variables Predicting Associate Degree Graduation Rates for All Community College Students through 2009 (Sample n=6,450 (rounded), Population represented = 1,569,100)

<table>
<thead>
<tr>
<th></th>
<th>Model 2A</th>
<th>Model 2B</th>
<th>Model 2C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
</tr>
<tr>
<td>Rural Community College</td>
<td>1.807</td>
<td>0.230</td>
<td>***</td>
</tr>
<tr>
<td>Suburban Community College</td>
<td>1.270</td>
<td>0.170</td>
<td></td>
</tr>
<tr>
<td>Town Community College</td>
<td>1.383</td>
<td>0.234</td>
<td></td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.007</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>0.991</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.981</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Age</td>
<td>0.992</td>
<td>0.013</td>
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</tr>
<tr>
<td>Minority</td>
<td>0.716</td>
<td>0.083</td>
<td>**</td>
</tr>
<tr>
<td>Maintained Married from 03-06</td>
<td>1.440</td>
<td>0.370</td>
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</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.588</td>
<td>0.141</td>
<td>*</td>
</tr>
<tr>
<td>Number of Children</td>
<td>0.922</td>
<td>0.051</td>
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<tr>
<td>Parental Education</td>
<td>1.506</td>
<td>0.181</td>
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<tr>
<td>Family AGI</td>
<td>1.038</td>
<td>0.030</td>
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<tr>
<td>Dependent on FAFSA</td>
<td>0.814</td>
<td>0.190</td>
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<tr>
<td>Number of Hours Worked</td>
<td>0.965</td>
<td>0.026</td>
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<tr>
<td>GPA</td>
<td></td>
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<tr>
<td>Academic Major</td>
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<tr>
<td>Vocational Major</td>
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<tr>
<td>Highest Degree Expected</td>
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</tr>
<tr>
<td>Social Integration Index</td>
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<td></td>
<td></td>
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<tr>
<td>Academic Integration Index</td>
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<td></td>
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</tr>
<tr>
<td>Part-Time/Mixed Attendance Pattern</td>
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<tr>
<td>Enrollment Size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Region</td>
<td>2.282</td>
<td>0.334</td>
<td>***</td>
</tr>
<tr>
<td>Midwest Region</td>
<td>1.749</td>
<td>0.227</td>
<td>***</td>
</tr>
<tr>
<td>West Region</td>
<td>1.329</td>
<td>0.210</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05 **p < .01 ***p < .001
Model 2B also includes the addition of the Demographics and Family Status variables in the multiple regression with both positive and negative findings. Attending a rural community college has the highest odds of graduating among all variables in Model 2B (OR=1.632, p<0.001). Suburban and town students also have a positive association with graduation in comparison to their urban counterparts, but neither variable is statistically significant in this model. This model also does not find any of the financial aid variables statistically significant, but the Pell Grant has a positive association with graduation rates and the Federal Subsidized and Unsubsidized Loans have a negative association. However, some of the Demographics and Family Status variables have statistical significance in Model 2B. Women are 34% more likely to graduate while those whose parents have a bachelor’s degree or higher are 51% more likely to graduate. Minority student students are 28% less likely to graduate and being a single parents are 41% less likely to graduate (OR=0.716, p<.01; OR=0.588, p<.05). In contrast, the variables age, marital status, number of children, AGI, being dependent on the FAFSA, and the number of hours worked did not have any statistical significance in Model 2B.

In Model 2C findings, the Pell Grant has a positive odds for graduation and the Federal Subsidized and Unsubsidized Loans have negative odds for graduation, but none of the financial aid variables are statistically significant. Rural community college students and students who attend institutions in the East and Midwest have the highest odds of graduation (OR=1.655, p<.001; OR=2.282, p<.001; OR=1.749, p<.001). Suburban and town students have positive odds for graduating, but these variables are not statistically significant. In addition, Model 2C findings are consistent with Model 2B
findings: minority students are less likely to graduate (OR=0.790, p<.05) while students whose parents have a bachelor’s degree or higher have a better odds of graduating (OR=1.537, p<.001). Additionally, age, marital status, number of children, AGI, being a dependent on the FAFSA, and number of hours worked do not have any statistical significance. However, the models differ in that women and single parents lose their significance in Model 2C.

In this model, among the variables, college GPA is a predictor of graduation (OR=1.003, p<.001), and students who are in an academic major and who are more academically integrated have higher odds of graduation (OR=1.280, p<.05; OR=1.005, p<.001). Interestingly, this model finds that as the enrollment size increases, students are more likely to graduate (OR=1.128, p<.05). However, those who are more socially integrated are less likely to graduate. The variables that are not statistically significant are vocational major, highest degree expected, part-time/mixed attendance, and West region.

Model 1 and Model 2 comparison. Through the three- and six-year time period (Models 1 and 2) covered in this study, the most significant finding is that rural community college students are more likely to graduate than all other institution types, and this highest statistical significance (p<.001) was found in all of the models. In terms of financial aid variables, there is significance for the Pell Grant and Federal Subsidized and Federal Unsubsidized Loans through the three-year period in Models 1B and 1C, but all significance is lost through the six-year period in all models. In terms of academic performance, in findings in all eight models included in this study, GPA is one of the most significant predictors for graduation for all types of community college students
represented in all eight models. This finding is consistent with previous research that identifies GPA as a strong predictor for graduation (Dowd & Coury, 2006; Hawley & Harris, 2005; Zhao, 1999).

**Research question four.** What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for all community college students?

Models 3A, 3B, and 3C all use multiple regression that includes three-year graduates with associate degrees and/or certificates. Model 3A findings indicate that rural community college students are 155% more likely to graduate and town community college students are 108% more likely to graduate than urban community college students (OR=2.549, p<.001; OR=1.081, p<.01). These two variables have higher odds ratios than any of the financial aid variables. During the three-year period, as the amount of Pell Grant increases, the odds of a student graduating increases by 4.4% (OR=1.044, p<.001). However, as the Federal Subsidized Loan increases, the odds of a student graduating decreases by 5% (OR=0.950, p<.001), and the Federal Unsubsidized Loan has a negative association with graduation rates but does not have statistical significance in this model. Model 3B includes the variables for Demographics and Family Status. With the addition of these variables, rural and town community college students continue to have highest odds ratios in the logistic regression (OR=2.194, p<.001; OR=1.761, p<.001). Suburban students have positive odds, but this particular variable is not statistically significant. However, all of the financial aid variables are found to be very statistically significant. For every $1,000 increase in the Pell Grant, the odds of graduating increases by 5%
(OR=1.052, p<.001), and as both the Federal Subsidized and Federal Unsubsidized Loans increase by $1,000 the odds of a student graduating decreases by 5% (OR=0.950, p<.001; OR=0.945, p<.001). Other variables show positive findings: as a student gets older, she/he has a positive association with graduation (OR=1.038, p<.001) and students whose parents have a bachelor’s degree or higher are 57% more likely to graduate. Minority students are 40% less likely to graduate (OR=0.602, p<.001). Nevertheless, several variables—women, marital status, student as single parent, number of children, AGI, being dependent on the FAFSA, and number of hours worked—are not statistically significant in this model.
Table 9

Logistic Regression Analysis for Variables Predicting Associate Degree or Certificate Graduation Rates for All Community College Students through 2006 (Sample n=6,450 (rounded), Population represented = 1,569,100)

<table>
<thead>
<tr>
<th></th>
<th>Model 3A</th>
<th>Model 3B</th>
<th>Model 3C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
</tr>
<tr>
<td>Rural Community College</td>
<td>2.549</td>
<td>0.336</td>
<td>**</td>
</tr>
<tr>
<td>Suburban Community College</td>
<td>1.227</td>
<td>0.167</td>
<td></td>
</tr>
<tr>
<td>Town Community College</td>
<td>2.081</td>
<td>0.346</td>
<td>**</td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.044</td>
<td>0.014</td>
<td>***</td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>0.950</td>
<td>0.015</td>
<td>***</td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.945</td>
<td>0.016</td>
<td>***</td>
</tr>
<tr>
<td>Women</td>
<td>1.120</td>
<td>0.137</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.038</td>
<td>0.011</td>
<td>***</td>
</tr>
<tr>
<td>Minority</td>
<td>0.602</td>
<td>0.074</td>
<td>***</td>
</tr>
<tr>
<td>Maintained Married from 03-06</td>
<td>0.994</td>
<td>0.292</td>
<td></td>
</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.835</td>
<td>0.243</td>
<td></td>
</tr>
<tr>
<td>Number of Children</td>
<td>0.900</td>
<td>0.076</td>
<td></td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.565</td>
<td>0.183</td>
<td>***</td>
</tr>
<tr>
<td>Family AGI</td>
<td>0.995</td>
<td>0.028</td>
<td></td>
</tr>
<tr>
<td>Dependent on FAFSA</td>
<td>0.125</td>
<td>0.303</td>
<td></td>
</tr>
<tr>
<td>Number of Hours Worked through 2006</td>
<td>0.922</td>
<td>0.041</td>
<td></td>
</tr>
<tr>
<td>GPA</td>
<td></td>
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<tr>
<td>Academic Major</td>
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<tr>
<td>Vocational Major</td>
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<tr>
<td>Highest Degree Expected</td>
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<tr>
<td>Social Integration Index</td>
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<tr>
<td>Academic Integration Index</td>
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<tr>
<td>Part-Time/Mixed Attendance Pattern</td>
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<tr>
<td>Enrollment Size</td>
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<tr>
<td>East Region</td>
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<tr>
<td>Midwest Region</td>
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<tr>
<td>West Region</td>
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</tr>
</tbody>
</table>

*p < .05 **p < .01 ***p < .001
In Model 3C, similar to Model 3B, all of the financial aid variables are statistically significant. As the amount of Pell Grant increases, the odds of a student graduating with an associate degree or certificate also increases (OR=1.048, p<.01). In contrast, as the amount of Federal Subsidized or Federal Unsubsidized Loan increases, students have lower odds of graduating (OR=0.931, p<.001; OR=0.930, p<.001). The financial aid variables do not have the highest odds ratios. Instead, students who attend institutions in the Midwest region and students who attend rural community colleges have the highest odds (OR=1.893, p<.001; OR=1.720, p<.001).

Also consistent with the previous model, older students and students who whose parents have a bachelor’s degree or higher have better odds of graduating (OR=1.023, p<.05; OR=1.582, p<.001). Additionally, minority students are 25% less likely to graduate (OR=0.746, p<.05), and as the number of children a student has to care for increases, he/she is 15% less likely to graduate (OR=0.850, p<.05). The variables women, marital status, student as single parent, AGI, being dependent on the FAFSA, and number of hours worked are, again, not statistically significant in Model 3C.

In this model, college GPA continues to be a predictor of graduation for all community college students. In addition, students enrolled in a vocational major, those who are more academically integrated, and those who attend institutions in the East and However, as enrollment size increases, the odds of a student graduating decreases by 13% (OR=0.870, p<.01), and students who expect to earn higher degrees are 43% less likely to graduate. The variables academic major, Social Integration Index, part-
time/mixed attendance, and students attending institutions in the West region are not found to be statistically significant in Model 3C.

Through the six-year period, Model 4A includes urbanicity and financial aid variables for students who have graduated with an associate degree or certificate. In this model only one financial aid variable is statistically significant: as the Federal Subsidized Loan increases, students are 4.5% less likely to graduate (OR=0.955, p<.001). Although the Pell Grant shows positive odds and the Federal Unsubsidized Loan shows negative odds, as previously stated, these two variables have no statistical significance. The findings indicate that the odds for rural community college students graduating is nearly 85% higher than for urban students (OR=1.853, p<.001). While suburban and town students also show higher odds than their urban counterparts, these two variables have no statistical significance in Model 4A.
Table 10

**Logistic Regression Analysis for Variables Predicting Associate Degree or Certificate Graduation Rates for All Community College Students through 2009 (Sample n=6,450 (rounded), Population represented = 1,569,100)**

| Variable                              | Model 4A   |    | Model 4B   |    | Model 4C   |    |
|---------------------------------------|------------|----|------------|    |------------|----|
| Rural Community College               | 1.853      | 0.227 | ***        |    | 1.581      | 0.193 | ***    |    | 1.490      | 0.219 | **    |
| Suburban Community College            | 1.154      | 0.144 |           |    | 1.088      | 0.134 |    |    | 1.026      | 0.130 |    |
| Town Community College                | 1.329      | 0.213 |           |    | 1.141      | 0.191 |    |    | 1.157      | 0.214 |    |
| Pell Grant                            | 1.020      | 0.014 |           |    | 1.022      | 0.015 |    |    | 1.032      | 0.015 | *    |
| Federal Subsidized Loan               | 0.955      | 0.013 | ***        |    | 0.962      | 0.013 | **    |    | 0.954      | 0.014 | ***  |
| Federal Unsubsidized Loan             | 0.978      | 0.013 |           |    | 0.976      | 0.013 |    |    | 0.975      | 0.013 |    |
| Women                                 |            |      |           |    | 1.256      | 0.134 | *    |    | 1.153      | 0.119 |    |
| Age                                   | 1.015      | 0.010 |           |    | 1.001      | 0.010 |    |    |            |      |      |
| Minority                              | 0.720      | 0.077 | **         |    | 0.815      | 0.089 |    |    |            |      |      |
| Maintained Married from 03-09         |            |      |           |    | 1.324      | 0.314 |    |    | 1.443      | 0.337 |    |
| Student as Single Parent              | 0.632      | 0.153 |           |    | 0.632      | 0.149 |    |    |            |      |      |
| Number of Children                    | 1.013      | 0.054 |           |    | 1.009      | 0.053 |    |    |            |      |      |
| Parental Education                    | 1.593      | 0.180 | ***        |    | 1.598      | 0.180 | ***    |    |            |      |      |
| Family AGI                            | 1.064      | 0.031 | *          |    | 1.079      | 0.032 | *    |    |            |      |      |
| Dependent on FAFSA                    | 0.767      | 0.164 |           |    | 0.840      | 0.191 |    |    |            |      |      |
| Number of Hours Worked through 2009   | 0.994      | 0.026 |           |    | 0.986      | 0.026 |    |    |            |      |      |
| GPA                                   |            |      |           |    |            |      |      |    | 1.003      | 0.001 | ***  |
| Academic Major                        |            |      |           |    | 1.224      | 0.141 |    |    |            |      |      |
| Vocational Major                      |            |      |           |    | 1.401      | 0.235 | *    |    |            |      |      |
| Highest Degree Expected               |            |      |           |    | 0.531      | 0.077 | ***    |    |            |      |      |
| Social Integration Index              | 0.996      | 0.001 | **         |    |            |      |      |    |            |      |      |
| Academic Integration Index            | 1.008      | 0.001 | ***        |    |            |      |      |    |            |      |      |
| Part-Time/Mixed Attendance Pattern    |            |      |           |    | 1.052      | 0.121 |    |    |            |      |      |
| Enrollment Size                       |            |      |           |    | 1.074      | 0.047 |    |    |            |      |      |
| East Region                           |            |      |           |    | 1.685      | 0.241 | ***    |    |            |      |      |
| Midwest Region                        |            |      |           |    | 1.791      | 0.213 | ***    |    |            |      |      |
| West Region                           |            |      |           |    | 1.151      | 0.171 |    |    |            |      |      |

*p < .05 **p < .01 ***p < .001
Model 4B adds Demographic and Family Status variables into the regression, and the urbanicity and financial aid variable outcomes do not change much. Rural students continue to have better odds of graduating than their urban counterparts (OR=1.581, p<.001); however, suburban and town students continue to have better odds of graduating, but these two variables do not have statistical significance. For the financial aid variables, the Federal Subsidized Loan continues to have a negative relationship with graduation rates (OR=0.962, p<.01). Even though the Pell Grant odds continue to be positive and the Federal Unsubsidized Loan continues to be negative, no statistical significance is found. The variables with the highest odds are rural community college students and family AGI (OR=1.581, p<.001; OR=1.593, p<.001). Additional positive variables were found in this model: women are 27% more likely to graduate and students whose parents have a bachelor’s degree or higher are 59% more likely to graduate. Consistent with findings in previous models, minority students have lower odds of graduating (OR=0.720, p<.01). Age, marital status, number of children, dependent on FAFSA, and number of hours worked had no statistical significance in this model.

When all variables are included in Model 4C, there are changes in the significance of some of the financial aid variables. Unlike Models 4A and 4B, the Pell Grant has statistical significance when academic and institutional variables are included. As the amount of Pell Grant increases, the odds of a student graduating increases (OR=1.032, p<.05). Higher amounts of Federal Subsidized Loan has a negative association with graduation (OR=0.954, p<.001), and the Federal Unsubsidized Loan maintains a negative odds of graduating, but this finding continues to have no statistical significance. The
financial aid variables do not have the highest odds ratios in this model. Parental education, and attending institutions in the East and Midwest have the highest odds ratios (OR=1.598, p<.001; OR=1.685, p<.001; OR=1.791, p<.001).

In addition, other variables had positive and negative findings in Model 4C. Once again, rural community college students are 49% more likely to graduate than urban students (OR=1.490, p<.01), and suburban and town students have higher odds of graduating, though, there is no statistical significance for either town or suburban community college students. Students whose parents have a bachelor’s degree or higher are 60% more likely to graduate (OR=1.598, p<.001), and students who have a higher adjusted gross income (AGI) are 8% more likely to graduate (OR=1.079, p<.05). With the addition of academic and institutional variables, women and minority students no longer are statistically significant. In this model, age, marital status, number of children, being dependent on the FAFSA, and number of hours worked continue to have no statistical significance.

In Model 4C findings, the added variables for academic performance and institutional characteristics provide additional predictors for graduation. College GPA is positively related to graduation rates (OR=1.003, p<.001). Students in vocational majors also have better odds of graduating, and this seems logical because many certificates are in vocational majors (police science, automotive, welding, etc.). Additionally, students who are more academically integrated are 69% likely to graduate, but students who expect to earn higher degrees are 47% less likely to graduate (OR=1.685, p<.001; OR=0.531, p<.001). In Model 4C, academic major, part-time/mixed attendance pattern,
enrollment size, and students attending institutions in the West all have positive odds ratios but are not statistically significant.

**Model 3 and Model 4 comparison.** When considering research question four, in Models 3 and 4, rural community college students are found to be very positively, statistically significantly related to graduation rates. When including all variables through three- and six-years, the Pell Grant was found to be positively, statistically significant and the Federal Subsidized Loan was found to be negatively, statistically significant. Model 3 found minority students to have a negative relationship with graduation, but in Model 4, when all variables are included, this statistical significance is lost. Both models found that the higher the education for a student’s parent, the higher the odds that student will have of graduating.

**Models 1-4 comparison.** Additionally, similar to the findings in Models 1 and 2, data in Models 3 and 4 show that rural community college students have the highest odds of graduating and are very statistically significant across all models. When including certificates into the graduation rates in Models 3 and 4, the financial aid variables are found to have significance in comparison to Models 1 and 2 which only include associate degree graduation rates. The Federal Subsidized Loan is found to be negatively, statistically significant in Models 3 and 4; however, for predicting associate degree graduation rates, the Federal Subsidized Loan was only found to be negatively, statistically significant through the three-year period (Model 1). In Models 1 and 3, which includes graduation rates for associate degree and associate degree and/or certificate graduates through the three-year period, the Federal Unsubsidized Loan was found to be
negatively, statistically significantly related to graduation rates. The odds of graduating are still negative through the six-year period, Models 2 and 4, but the statistical significance is no longer found.

**Research question five.** What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for rural community college students?

Through the three-year period, Model 5A includes only financial aid variables for associate degree attainment for rural community college students. The results find that the Pell Grant has positive odds, and the Federal Subsidized and Federal Unsubsidized Loans both have negative odds, but none of these financial aid variables have statistical significance.
Table 11

Logistic Regression Analysis for Variables Predicting Associate Degree Graduation Rates for Rural Community College Students through 2006 (Sample n=1,140 (rounded), Population represented=289,340)

<table>
<thead>
<tr>
<th></th>
<th>Model 5A</th>
<th></th>
<th>Model 5B</th>
<th></th>
<th>Model 5C</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
<td>SE</td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.021</td>
<td>0.028</td>
<td>1.044</td>
<td>0.032</td>
<td>1.029</td>
<td>0.032</td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>0.993</td>
<td>0.026</td>
<td>0.981</td>
<td>0.026</td>
<td>0.960</td>
<td>0.026</td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.956</td>
<td>0.029</td>
<td>0.961</td>
<td>0.031</td>
<td>0.931</td>
<td>0.033</td>
</tr>
<tr>
<td>Women</td>
<td>1.196</td>
<td>0.255</td>
<td>1.045</td>
<td>0.237</td>
<td>1.059</td>
<td>0.222</td>
</tr>
<tr>
<td>Age</td>
<td>1.053</td>
<td>0.024</td>
<td>1.059</td>
<td>0.022</td>
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</tr>
<tr>
<td>Minority</td>
<td>0.561</td>
<td>0.162</td>
<td>0.698</td>
<td>0.215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintained Married from 03-06</td>
<td>0.475</td>
<td>0.274</td>
<td>0.380</td>
<td>0.224</td>
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</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.737</td>
<td>0.371</td>
<td>0.664</td>
<td>0.350</td>
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</tr>
<tr>
<td>Number of Children</td>
<td>0.704</td>
<td>0.130</td>
<td>0.757</td>
<td>0.139</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.574</td>
<td>0.390</td>
<td>1.849</td>
<td>0.475</td>
<td>1.008</td>
<td>0.059</td>
</tr>
<tr>
<td>Family AGI</td>
<td>0.979</td>
<td>0.053</td>
<td>0.980</td>
<td>0.059</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent on FAFSA</td>
<td>2.079</td>
<td>0.991</td>
<td>2.008</td>
<td>0.943</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Hours Worked</td>
<td>1.103</td>
<td>0.084</td>
<td>1.034</td>
<td>0.078</td>
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</tr>
<tr>
<td>GPA</td>
<td></td>
<td></td>
<td>1.006</td>
<td>0.002</td>
<td>1.542</td>
<td>0.395</td>
</tr>
<tr>
<td>Academic Major</td>
<td></td>
<td></td>
<td>1.560</td>
<td>0.559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational Major</td>
<td></td>
<td></td>
<td>1.111</td>
<td>0.326</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Degree Expected</td>
<td></td>
<td></td>
<td>1.000</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Integration Index</td>
<td>1.008</td>
<td>0.002</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Integration Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-Time/Mixed Attendance Pattern</td>
<td>0.499</td>
<td>0.125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrollment Size</td>
<td>0.782</td>
<td>0.060</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Region</td>
<td></td>
<td></td>
<td>0.562</td>
<td>0.272</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midwest Region</td>
<td></td>
<td></td>
<td>1.977</td>
<td>0.455</td>
<td>1.659</td>
<td>0.624</td>
</tr>
<tr>
<td>West Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05  **p < .01  ***p < .001
Model 5B includes demographic and family status variables in addition to the financial aid variables for rural community college students. Consistent with Model 5A, the Pell Grant is found to have positive odds and the Federal Subsidized and Federal Unsubsidized Loans have negative odds for graduation, and Model 5B results find none of the financial aid variables have statistical significance. There is one variable with positive statistical significance in Model 5B: as rural community college students get older, they have higher odds of graduating (OR=1.053, p<.05). However, minority students have 44% lower odds of graduating (OR=0.561, p<.05). The variables that did not have statistical significance in Model 5B are: women, marital status, single parent status, number of children, parental education, AGI, being dependent on the FAFSA, and number of hours worked.

In Model 5C, with the addition of academic status and institutional characteristic variables, the Federal Unsubsidized Loan becomes statistically significant. As the amount of the Federal Unsubsidized Loan increases, the odds of a student graduating decreases by 7% (0.931, p<.05). The Pell Grant continues to have positive odds and the Federal Subsidized Loan has negative odds, but neither are statistically significant. As found in Model 5B, Model 5C also found that as rural community college students get older, they have better odds of graduating (OR=1.059, p<.01). However, the variable with the highest odds is students who attend institutions in the Midwest (OR=1.977, p<.05).

Students whose parents have a bachelor’s degree or higher are 85% more likely to graduate than students who are first generation college students (OR=1.849, p<.05), and this is consistent with previous research (e.g., Engle & Tinto, 2008). Minority students
are no longer statistically significant in this model, and the following variables—women, marital status, single parent status, number of children, AGI, being dependent on the FAFSA, and number of hours worked—are not statistically significant in Model 5C.

The findings in 5C also indicate that rural students who have higher GPAs have better odds of graduating (OR=1.006, p<.001). Additionally, students who are more academically integrated (OR=1.008, p<.001), and students who attend part-time or have mixed attendance patterns have a negative association with graduation (OR=0.499, p<.001). Model 5C also found that for rural community college students, as the enrollment size increases, the odds that students have graduate decreases by 22% (OR=0.782, p<.01). The variables in this model that do not have statistical significance are a student’s choice of major, highest degree expected, social integration, and students who attend institutions in the East or West region.

Associate degree attainment for rural community college students through six-years is analyzed in Models 6A, 6B, and 6C. Model 6A includes only the financial aid variables for rural community college students. As the amount of the Federal Unsubsidized Loan increases by $1,000, the odds of a student graduating decreases by 11% (OR=0.890, p<.001). The Pell Grant and Federal Subsidized Loan have positive odds, but have no statistical significance through six-years.
Table 12.

Logistic Regression Analysis for Variables Predicting Associate Degree Graduation Rates for Rural Community College Students through 2009 (Sample n=1,140 (rounded), Population represented=289,340)

<table>
<thead>
<tr>
<th></th>
<th>Model 6A</th>
<th>Model 6B</th>
<th>Model 6C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.017</td>
<td>0.025</td>
<td>1.032</td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>1.032</td>
<td>0.028</td>
<td>1.016</td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.890</td>
<td>0.025</td>
<td>***</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.019</td>
<td>0.025</td>
<td>1.015</td>
</tr>
<tr>
<td>Minority</td>
<td>0.714</td>
<td>0.187</td>
<td>0.895</td>
</tr>
<tr>
<td>Maintained Married from 03-09</td>
<td>0.326</td>
<td>0.155</td>
<td>*</td>
</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.397</td>
<td>0.185</td>
<td>*</td>
</tr>
<tr>
<td>Number of Children</td>
<td>0.940</td>
<td>0.103</td>
<td>0.905</td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.684</td>
<td>0.410</td>
<td>*</td>
</tr>
<tr>
<td>Family AGI</td>
<td>1.093</td>
<td>0.075</td>
<td>1.085</td>
</tr>
<tr>
<td>Dependent on FAFSA</td>
<td>0.866</td>
<td>0.386</td>
<td>0.878</td>
</tr>
<tr>
<td>Number of Hours Worked</td>
<td>0.998</td>
<td>0.052</td>
<td>0.968</td>
</tr>
<tr>
<td>GPA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Major</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational Major</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Degree Expected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Integration Index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Integration Index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-Time/Mixed Attendance Pattern</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrollment Size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midwest Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Region</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05  **p < .01  ***p < .001
In Model 6B, demographic and family status variables are added to the financial aid variables. The Federal Unsubsidized Loan is found to decrease the odds of students graduating by 11% as the amount of Federal Unsubsidized Loan students borrow increases (OR=0.890, p<.001). The Pell Grant and Federal Subsidized Loan continue to have positive odds, but these two variables are found to have no statistical significance in Model 6B. Also found in Model 6B, rural women are 67% more likely to graduate than men through six-years with an associate degree, and students whose parents have a bachelor’s degree or higher are 68% more likely to graduate (OR=1.684, p<.05). However, rural community college students who have been continuously married through the six-year period and also students who are single parents are significantly less likely to graduate (OR=0.326, p<.05; OR=0.397, p<.05). Variables that had no statistical significance in this model are age, minority students, number of children, AGI, being dependent on the FAFSA, and number of hours worked.

Model 6C includes financial aid, demographic and family status, and academic and institutional variables for rural community college student associate degree attainment through six-years. As found in Models 6A and 6B, Model 6C also found the Pell Grant and the Federal Subsidized Loan to have a positive odds ratio, but they do not have any statistical significance. As the amount of the Federal Unsubsidized Loan increases, students are 12% less likely to graduate (OR=0.881, p<.001). This finding has been consistent for rural community students through three- and six-years.

Model 6C also found that students who have maintained being married for six-years are 70% less likely to graduate, but students whose parents have a bachelor’s
degree or higher are 80% more likely to graduate (OR=0.300, p<.05; OR=1.797, p<.05).

Women and single parent students are no longer found to be significant with the additional academic variables. Age, minority, number of children, AGI, being dependent on the FAFSA, and number of hours worked are not significant in this model.

Additionally, Model 6C found that students who are in an academic major are 72% more likely to graduate, and rural students who attend an institution in the Midwest are 80% more likely to graduate. Furthermore, students who have higher GPAs and students who are more academically integrated have higher odds of graduating (OR=1.004, p<.01; OR=1.007, p<.01). Academic and institutional characteristics variables that do not have any statistical significance in Model 6C include: vocational major, highest degree expected, social integration index, part-time/mixed attendance pattern, enrollment size, East region, and West region.

**Model 5 and Model 6 comparison.** For rural community college students, Models 5 and 6 found similar outcomes for financial aid variables. When all variables are included in the models through three- and six-years, the Federal Unsubsidized Loan is found to be negatively statistically associated with graduation rates. This variable has higher statistical significance through six-years. One explanation may be that, over the course of six years, students may not see the benefits of borrowing an interest accruing loan. Another similarity between the three- and six-year models is that academic integration is statistically significant for rural community college students. Students who are more academically integrated generally have higher GPAs which is also found to be statistically significant in the models for associate degree graduates.
Research question six. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for rural community college students?

Models 7A, 7B, and 7C are regression analyses for three-year graduation rates for rural community college students who graduate with associate degrees and/or certificates. Model 7A only includes the financial aid variables. As the Federal Unsubsidized Loan loan increases, rural community college students are 7% less likely to graduate (OR=0.934, p<.05). The Pell Grant and the Federal Subsidized Loan have positive odds for graduation, but do not have any statistical significance.
Table 13.

Logistic Regression Analysis for Variables Predicting Associate Degree or Certificate Graduation Rates for Rural Community College Students through 2006 (Sample n=1,140 (rounded), Population represented=289,340)

<table>
<thead>
<tr>
<th></th>
<th>Model 7A</th>
<th>Model 7B</th>
<th>Model 7C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>SE</td>
<td>OR</td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.032</td>
<td>0.025</td>
<td>1.064</td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>1.006</td>
<td>0.027</td>
<td>0.999</td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.934</td>
<td>0.030</td>
<td>0.948</td>
</tr>
<tr>
<td>Women</td>
<td>1.414</td>
<td>0.280</td>
<td>1.127</td>
</tr>
<tr>
<td>Age</td>
<td>1.050</td>
<td>0.022</td>
<td></td>
</tr>
<tr>
<td>Minority</td>
<td>0.504</td>
<td>0.143</td>
<td></td>
</tr>
<tr>
<td>Maintained Married from 03-06</td>
<td>2.452</td>
<td>1.244</td>
<td>2.307</td>
</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.552</td>
<td>0.277</td>
<td>0.537</td>
</tr>
<tr>
<td>Number of Children</td>
<td>0.617</td>
<td>0.098</td>
<td></td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.862</td>
<td>0.430</td>
<td></td>
</tr>
<tr>
<td>Family AGI</td>
<td>1.009</td>
<td>0.056</td>
<td>1.006</td>
</tr>
<tr>
<td>Dependent on FAFSA</td>
<td>1.478</td>
<td>0.642</td>
<td>1.485</td>
</tr>
<tr>
<td>Number of Hours Worked</td>
<td>1.134</td>
<td>0.080</td>
<td>1.119</td>
</tr>
<tr>
<td>GPA</td>
<td></td>
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<td>1.005</td>
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<tr>
<td>Academic Major</td>
<td></td>
<td></td>
<td>1.351</td>
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<td>Vocational Major</td>
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<td>Highest Degree Expected</td>
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<td>Social Integration Index</td>
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<td>Part-Time/Mixed Attendance Pattern</td>
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<td>0.723</td>
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<td>Enrollment Size</td>
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<tr>
<td>East Region</td>
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<td>Midwest Region</td>
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<td>1.789</td>
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<tr>
<td>West Region</td>
<td></td>
<td></td>
<td>0.951</td>
</tr>
</tbody>
</table>

*p < .05 **p < .01 ***p < .001
In Model 7B, demographics and family status block of variables are added to the financial aid variables in the logistic regression. This model found that as the Pell Grant increases, the odds of a rural community college student graduating increases by 6% (OR=1.064, p<.05). The Federal Subsidized and Federal Unsubsidized Loans are negatively associated with graduation, but these variables do not have any statistical significance. Students whose parents have a bachelor’s degree or higher have the highest odds of graduating in this model (OR=1.862, p<.01). Older rural students have a positive odds ratio, (OR=1.050, p<.05); however, minority students are 50% less likely to graduate (OR=0.504, p<.05), and as the number of children a student cares for increases, there is a negative association with graduation (OR=0.617, p<.01). The variables that do not have statistical significance in Model 7B are: women, marital status, single parent, AGI, being dependent on the FAFSA, and number of hours worked.

In Model 7C, the academic and institutional characteristics block of variables is added to the financial aid and demographics and family status blocks of variables in the hierarchical logistic regression. The Pell Grant continues to have statistical significance even when additional variables are included in the model. As the Pell Grant increases, the odds of a student graduating increases by 7% (OR=1.068, p<.05). Given the high reliance rural community college students have on the Pell Grant, the increased amounts of Pell Grant help students be able to cover the costs of college (Hardy & Katsinas, 2008). The Federal Subsidized and Federal Unsubsidized Loans do not have statistical significance through three-years, and this finding is consistent with Dowd and Coury’s (2008) findings of the neutral effects of loans. However, the variables parental education and
attending institutions in the Midwest have the highest odds in this model (OR=1.943, p<.01; OR=1.789, p<.01).

Additional positive and negative findings were found in Model 7C. As found in previous models, age continues to be a positive predictor for graduation rates through three-years for rural community college students. The number of children a student cares for has a negative association with graduation for rural community college students (OR=0.632, p<.01). Women, marital status, AGI, dependent on the FAFSA, and number of hours worked are not statistically significant. Additionally, minority students are no longer statistically significant in Model 7C.

Through the three-year period in Model 7C, college GPA is positively, statistically significant for rural community college students. Students who are academically integrated are also positively, statistically significant. Thus, these students who are more academically integrated may have higher GPAs because of the additional time invested in being integrated. Tinto (1987) found that students who are more academically integrated are more likely to persist. Additionally, students who attend institutions in the East are significantly (72%) less likely to graduate than students in the South (OR=0.283, p<.05). Variables that were not found to be statistically significant in Model 7C are: academic or vocational major, highest degree expected, social integration index, part-time/mixed attendance pattern, enrollment size, and students who attend institutions in the West region.

Models 8A, 8B, and 8C present the findings for the regressions for six-year attainment with an associate degree or certificate for rural community college students.
The first model in the hierarchical regression includes the financial aid variables only. As the Federal Unsubsidized Loan increases, the odds of a student graduating decreases by 10% (OR=0.902, p<.001). The Pell Grant has a positive odds and the Federal Subsidized Loan has a negative relationship with graduation, but these two variables do not have any statistical significance.
Table 14.

Logistic Regression Analysis for Variables Predicting Associate Degree or Certificate Graduation Rates for Rural Community College Students through 2009 (Sample n=1,140 (rounded), Population represented = 289,340)

<table>
<thead>
<tr>
<th>Model 8A</th>
<th>Model 8B</th>
<th>Model 8C</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td>SE</td>
<td>OR</td>
</tr>
<tr>
<td>Pell Grant</td>
<td>1.015 0.024</td>
<td>1.035 0.029</td>
</tr>
<tr>
<td>Federal Subsidized Loan</td>
<td>0.999 0.025</td>
<td>0.996 0.025</td>
</tr>
<tr>
<td>Federal Unsubsidized Loan</td>
<td>0.902 0.024 ***</td>
<td>0.904 0.023 ***</td>
</tr>
<tr>
<td>Women</td>
<td>1.581 0.312 *</td>
<td>1.382 0.293</td>
</tr>
<tr>
<td>Age</td>
<td>1.026 0.022</td>
<td>1.018 0.018</td>
</tr>
<tr>
<td>Minority</td>
<td>0.564 0.144 *</td>
<td>0.718 0.185</td>
</tr>
<tr>
<td>Maintained Married from 03-09</td>
<td>0.949 0.429</td>
<td>0.960 0.414</td>
</tr>
<tr>
<td>Student as Single Parent</td>
<td>0.363 0.167 *</td>
<td>0.429 0.211</td>
</tr>
<tr>
<td>Number of Children</td>
<td>0.973 0.105</td>
<td>0.919 0.101</td>
</tr>
<tr>
<td>Parental Education</td>
<td>1.682 0.440 *</td>
<td>1.676 0.389 *</td>
</tr>
<tr>
<td>Family AGI</td>
<td>1.097 0.068</td>
<td>1.086 0.065</td>
</tr>
<tr>
<td>Dependent on FAFSA</td>
<td>0.825 0.339</td>
<td>0.932 0.387</td>
</tr>
<tr>
<td>Number of Hours Worked</td>
<td>1.012 0.052</td>
<td>0.977 0.054</td>
</tr>
<tr>
<td>GPA</td>
<td>1.004 0.001 **</td>
<td>1.400 0.298</td>
</tr>
<tr>
<td>Academic Major</td>
<td>1.400 0.298</td>
<td></td>
</tr>
<tr>
<td>Vocational Major</td>
<td>1.066 0.382</td>
<td></td>
</tr>
<tr>
<td>Highest Degree Expected</td>
<td>0.538 0.133 *</td>
<td></td>
</tr>
<tr>
<td>Social Integration Index</td>
<td>0.997 0.002</td>
<td></td>
</tr>
<tr>
<td>Academic Integration Index</td>
<td>1.011 0.002 ***</td>
<td></td>
</tr>
<tr>
<td>Part-Time/Mixed Attendance Pattern</td>
<td>1.197 0.254</td>
<td></td>
</tr>
<tr>
<td>Enrollment Size</td>
<td>0.825 0.064 *</td>
<td></td>
</tr>
<tr>
<td>East Region</td>
<td>0.402 0.182 *</td>
<td></td>
</tr>
<tr>
<td>Midwest Region</td>
<td>1.770 0.388 **</td>
<td></td>
</tr>
<tr>
<td>West Region</td>
<td>0.992 0.388</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05  **p < .01  ***p < .001
In Model 8B, the Federal Unsubsidized Loan continues to be statistically significant with the addition of demographic and family status block of variables. As the Federal Unsubsidized Loan increases, the odds of a rural student graduating decreases by 10% (OR=0.904, p<.001). The Federal Unsubsidized Loan is a non-need based loan which generally would be available to middle and higher income families. Since this loan accrues interest for the life of the loan, the loan is costlier to borrowers and may have a negative association because of the costs of the loan. The economic benefit of college may be lost because of the higher costs incurred due to the interest on the loan. As found in previous models, the Pell Grant has a positive odds and the Federal Subsidized Loan continues to have negative odds but neither variable has statistical significance. Additionally, findings in Model 8B include: rural women are 58% more likely than men to graduate and students whose parents have graduated with higher levels of degrees are 68% more likely to graduate. However, Minority students have lower odds of graduating (OR=0.564, p<.05), and students who are single parents are significantly less likely to graduate than those who are not (OR=0.363, p<.05).

Model 8C adds the academic and institutional characteristics block of variables into the hierarchical model. The financial aid outcomes do not change. Higher amounts of the Federal Unsubsidized loan have a negative association with graduation rates for rural community college students (OR=0.895, p<.001). The Pell Grant has a positive odds and the Federal Subsidized Loan has a negative odds ratio, but these variables do not have statistical significance through the six-year attainment period. Additionally, only one family status variable is found to have statistical significance: parental education. As
found in all models in this dissertation, parental education is one of the strongest predictors of graduation for all community college students. In Model 8C, students with higher parental education levels are 68% more likely to graduate. None of the other family status or demographics variables have statistical significance.

With the addition of academic performance and institutional characteristics variables in Model 8C, college GPA continues to have statistical significance, and this is consistent in all eight of the models. The higher a rural community college student’s GPA, the higher the odds are of them graduating (OR=1.004, p<.01). Additionally, in Model 8C, academic integration is positively associated with graduation rates (OR=1.011, p<.001). Regionally, students who attend in the Midwest have higher odds of graduating, but students in the East are less likely to graduate than their counterparts that attend institutions in the South. Moreover, as enrollment size increases, the odds of a rural community college student graduating decreases (OR=0.825, p<.05), and the variable highest degree expected is negatively, statistically significant in Model 8C. Variables in this model that have no statistical significance are major, social integration index, part-time/mixed attendance pattern, and students who attend institutions in the West region.

**Model 7 and Model 8 comparison.** For students who are graduating with an associate degree or a certificate, the financial aid variables have differing effects between three-years and six-years. Through three-years, in Models 7B and 7C, the Pell Grant is found to be positively statistically significant, but when expanded to six years (Models 8A, 8B, and 8C), the Pell Grant loses all significance. Through three-years, only Model
7A, which only includes the financial aid variables, the Federal Unsubsidized Loan has negative statistical significance. Conversely, the Federal Unsubsidized Loan has negative statistical significance through six-years in all three models (8A, 8B, and 8C). Consistent with all of the previous models (1-6), GPA is a positively, statistically significant predictor for graduation rates. Additionally, in Models 7 and 8, students whose parents have higher levels of education have better odds of graduating.

**Models 5-8 comparison.** There are also similarities and differences for rural students who are graduating with an associate degree only or an associate degree or certificate through three-years. One similarity through three-years is that older students have better odds of graduating. Previous research supports that rural students are generally older than other types of community college students (e.g. Jacobs & King, 2002). This study supports that as the descriptive statistics show that rural students are the oldest students, on average, in comparison to other types of community college students. Other similarities include positive statistical significance for parental education and GPA. Additionally, students who attend rural community colleges in the Midwest have a positive relationship with graduation rates.

The greatest difference is the effects of financial aid. For associate degree graduates, the Federal Unsubsidized Loan is negatively statistically significant only in Model 5C which includes all variables. For associate degree or certificate graduates, the Federal Unsubsidized Loan is only significant when only the financial aid variables are in the model (Model 7A). The Pell Grant becomes significant when demographics and family status as well as academic and institutional characteristics variables are in the
models (7B and 7C). One of the reasons could be that the Pell Grant may significantly offset the cost of tuition for rural students. Since a certificate program is generally one year or less, students may see the financial value in attending because of the Pell Grant.

Through six-years, the financial aid variables have identical outcomes for associate degree and associate degree or certificate graduates. Both models (Models 6 and 8) found the Federal Unsubsidized Loan to be negatively, statistically significantly related to graduation rates. Again, since this loan accrues interest, students simply may not see the benefit of borrowing the funds. Other similarities are GPA, parental education, and academic integration, and all three are positively related to graduation rates. One of the most interesting differences is the highest degree expected variable. For associate degree graduates only, though there is a positive odds ratio for the highest degree expected, the variable does not have any statistical significance. For associate degree or certificate graduates, highest degree expected has a negative odds ratio and is found to be statistically significant. One explanation may be that certificate seekers may truly only be seeking a short term degree and do not have higher aspirations for education.

**Hypotheses**

This section will review the findings as they relate to the hypotheses posed in Chapter Three.

**Hypothesis I.** Different types of financial aid and amounts will affect graduation rates for rural community college students.
This study accepts the findings for this hypothesis. Rural community college students consistently use high amounts of financial aid through both three- and six-years. While rural community college students have high uses of financial aid, they also have the highest graduation rates in all categories except one: three-year graduation rates for associate degree attainment.

**Hypothesis II.** Students who attend rural community colleges are less likely to graduate in comparison to their urban, suburban, and town counterparts.

This study rejects this hypothesis. The descriptive statistics show that the graduation rates for rural community college students are significantly higher in comparison to urban, suburban, and town community colleges in all categories except for the three-year associate degree graduation rate. Otherwise, for rural community college students, the graduation rates for rural students is anywhere from 1% to 11% higher.

**Summary**

Chapter Four answers the six research questions that guided this dissertation, and the questions were answered using the methodology outlined in Chapter Three. This chapter provided an analysis of the relationship between financial aid and graduation rates for both all community college students and, more specifically, rural community college students. For all community college students, when all variables are included in the hierarchical regression, the financial aid variables were significant through three-years for associate degree graduates, but the variables lost their significance through six-years. For all community college students who graduated with an associate degree or certificate, the Pell Grant had a positive relationship and the Federal Subsidized Loan had
a negative relationship with graduation rates. The Federal Unsubsidized Loan had a negative relationship with graduation through three years only. For rural community college students, when all blocks are included in the hierarchical regression, borrowing the Federal Unsubsidized Loan is a negative predictor for graduation for associate degree graduates only through three- and six-years. For rural associate degree and certificate graduates, the Pell Grant has a positive odds ratio through three-years, but the significance is lost through six-years. The Federal Unsubsidized Loan has a negative relationship with graduation rates through six-years only.

Chapter Five includes a summary of findings. In addition, recommendations and the dissertation conclusion are included in the next chapter.
Chapter 5: Summary, Conclusion, and Recommendations

This study sought to determine whether there was a relationship between financial aid and graduation rates for rural community college students. Given the lack of previous research as it relates to rural community college students, this study hopes to help fill the gap in research that currently exists. The 2004/2009 Beginning Postsecondary Students Integrated Study (BPS:04/09) and the Integrated Postsecondary Education Data System (IPEDS) served as the datasets used to derive the institutions and variables that helped answer the six research questions posed.

The primary research questions that guided this research include:

1. What are the differences in the amount of financial aid, student demographics and family status, and student academic performance and status across these four types of community colleges?

2. What are the three-year and six-year graduation rates for associate degrees of rural community college students, compared with suburban, urban, and town community colleges? What are the three-year and six-year graduation rates for associate degrees and certificates of rural community college students, compared with suburban, urban, and town community colleges?

3. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for all community college students?
4. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for all community college students?

5. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree graduation rates for rural community college students?

6. What influence, if any, do the Federal Pell Grant, Federal Subsidized Loan, and Federal Unsubsidized Loan have on three-year and six-year associate degree or certificate graduation rates for rural community college students?

In particular, to respond to Research Question 5), this study posed two hypotheses:

Hypothesis I: Different types of financial aid and amounts will affect graduation rates for rural community college students.

Hypothesis II: Students who attend rural community colleges are less likely to graduate in comparison to their urban, suburban, and town counterparts.

The theoretical framework of this study incorporates five areas of consideration: psychological, sociological, organizational, interactionalist, and economic theories. Since BPS:04/09 is a longitudinal study, hierarchical logistic regression was used to determine which variables may have an effect on graduation rates. This statistical method is an appropriate model for longitudinal datasets (e.g., Tinto, 1987).

The main dataset for this study is the 2004/2009 Beginning Postsecondary Students Integrated Study (BPS:04/09). This nationally representative, longitudinal study focuses on first-time beginners from 2003-2004 to 2008-2009. Additional data was used
from the Integrated Postsecondary Education Data System (IPEDS), which provides the rural, urban, suburban, and town community colleges for this study. The final sample for this study is 6,450 (rounded) which represents a nationally representative sample of 5,353,890 students.

Based on the longitudinal nature of this study, this study used a hierarchical logistic regression model for data analysis. The model allows for a better understanding of how the variables in this study impact graduation rates. The three blocks of variables were broken down into financial aid, demographics and family status, and academic performance and institutional characteristics. By stacking these in the logistic regression, the data analysis can show which variables have a relationship with graduation rates for rural community college students.

This chapter provides a summary of this study. Conclusions and policy implications will also be discussed. Finally, recommendations for future research will conclude this chapter.

**Discussion**

One of the most surprising, and encouraging, findings of this study is that rural community college students exceed every other type of community college in graduation rates except for three-year graduation rates for associate degrees. Otherwise, rural community college students graduate at significantly higher rates. These rates range from 1% to 11% higher than the other institutions. A few reasons may explain these higher graduation rates. The first is the significantly higher cumulative GPA. This study found that rural community college students have the highest cumulative GPA among all types
of community colleges. Previous research (e.g., Dowd & Coury, 2006; Driscoll, 2007; Zhao, 1999) has found GPA to be a strong predictor of graduation in the past. Thus, this could be a contributing factor. A second reason could be the attendance patterns of rural students. Nearly 70% of rural students attend full-time. Students who attend full-time are more likely to have subsequent full-time terms of enrollment (Crosta, 2013). As students attend full-time, they are accruing more credits, and by accruing more credits, they are hopefully taking the classes that will put them closer to finishing their degrees.

**Descriptive statistics.** The descriptive statistics for rural community college students align with previous research. For example, women made up the majority of such attendees at 59%. This is consistent with national trends that women are more likely to attend community colleges (American Association of Community Colleges, 2015). Looking forward, female enrollment is projected to continue to increase through 2025 (Kena et al., 2016). Furthermore, rural students are primarily White (84%). This also is supported by previous research that indicates that rural students are very homogeneous (e.g., Koricich, 2014). Rural students are also older, on average, than the other types of community colleges: nearly 23 years old. While this finding is significantly lower than the average age—29—of all community college students (American Association of Community Colleges, 2015), such a contrast may be because this study only looked at first time beginners and not all students attending community colleges.

Contrary to some prior research (e.g., Hardy & Katsinas, 2008), this study found that rural community college students did not have the lowest adjusted gross income (AGI); urban community college students had the lowest AGI. Rural community college
families, on average, made $4,000 more than their urban community college counterparts, but they still made over $6,000 less than their suburban community college counterparts. In general, income is still an important consideration for rural community college students. Because of the limited housing and transportation options available, rural students need to stretch their funds further in order to be able to afford attending college.

In terms of academic performance and institutional characteristics, rural students were the least likely to expect to earn a bachelor’s degree or higher. There may be a few explanations for this. The first is access to bachelor’s degree or higher institutions. Many rural students choose community colleges because they are located close to home and they can stay home to help support the family (Wright, 2012). Thus, many rural students choose to stay home for their education; however, if the community college is the only local higher education option, some rural students may then feel place bound because of the lack of other higher education options. A second reason may be that some rural students have limited financial resources, and it may not be financially possible for such students to leave the area to attend colleges outside of the local area. Additionally, many of the types of jobs in rural areas do not require bachelor’s degrees or higher. Farming, registered nurses, and industrial type positions may not initially require advanced degrees for hiring.

In this study, rural community college students were found to have the highest cumulative grade point averages (GPA) among all institutions, and their GPAs were significantly higher (0.5) than the next closest group—suburban community college
students. College GPA has been consistently found to be a predictor for success (e.g., Dowd & Coury, 2006; Driscoll, 2007; McGrath and Braunstein, 1997; Pascarella & Terenzini, 2005; Zhao, 1999). For rural community college students, there may be several considerations concerning higher GPAs than with other institution types. One consideration is that rural community colleges are generally smaller than urban and suburban institutions. This study found that rural community colleges had approximately 6,200 students while urban community colleges had over 12,000 students, and suburban community colleges had over 11,000 students. Smaller institutions may be able to offer smaller class sizes than larger institutions. Additionally, smaller institutions may allow faculty and staff to make more connections with students because of the lower volume of students. This may increase academic integration which has also been found to be a predictor for persistence and graduation (Bean & Eaton, 2000; Tinto, 1987; Tinto, 1992). Thus, smaller institutions may lead to smaller class sizes which can increase faculty/student interactions which can lead to increased academic integration that ultimately prior research has found to increase persistence and eventual graduation.

**Hypotheses.** The first hypothesis sought to determine if there is a relationship between financial aid and the amounts of aid and graduation for rural community college students. We retain this hypothesis but recognize that different types of aid have different effects. One significant finding for rural community college students is the positive relationship between the Pell Grant and graduation rates through three-years for associate degree or certificate graduates. Previous research (e.g., Hardy & Katsinas, 2008) has indicated that rural students often have a lower-SES than other types of community
college students. A lower-SES is tied to higher amounts of Pell Grant. The researcher did find that rural students had the second highest amount of Pell Grant through three- and six-year periods which would show that rural students do have a strong reliance on the Pell Grant. Since the Pell Grant is money that does not need to be repaid to the federal government, rural students may find the economic benefit incentivizes them to complete a degree or certificate (Paulsen & Toutkoushian, 2008).

The second hypothesis posited that rural community college students were less likely to graduate than town, urban, and suburban students. This study rejects the hypothesis. Rural community college students were found to have the highest graduation rates among all types of community colleges through three- and six-years for associate degree and associate degree and certificate graduates. There is only one exception to this—the three-year graduate rate for associate degree graduates only. In this category, rural students were second to town students.

In regards to financial aid, through three-years, rural students had the highest cumulative amount of subsidized loan and the second highest cumulative amounts of Pell Grant and unsubsidized loan. Through six-years, rural students had the second highest amounts of Pell Grant and unsubsidized loan but the third highest amount of cumulative subsidized loan. The findings about the higher cumulative amounts of financial aid is consistent with previous research about rural community college students (Hardy & Katsinas, 2008). Thus, this study finds that rural community college students do have a high dependence on financial aid.
Regression findings. Through three-years for associate degree graduates at all community colleges, the unsubsidized loan has a negative relationship with graduation when for all levels of the hierarchical regression (Model 1). This is consistent with previous research (e.g. Cofer and Somers, 2001) that loans have a negative association with graduation. There may be a few explanations for this. The first is that the unsubsidized loan is a non-need based loan. This means that there are no income considerations for this loan. Mainly middle income and higher income families would apply for this loan. Meanwhile, this loan is accruing interest for the life of the loan. The economic benefits of the loan may be lost because of the debt burden it creates. Students who graduate with debt are already faced with the financial burden of having to pay loans back with the accrued interest. As explored in the economic portion of the theoretical framework, there may not be any incentives to borrowing loans that accrue interest and, thus, deter the decision makers from pursuing goals or completing a degree (Paulsen & Toutkoushian, 2008). Unfortunately, through six-years for all community college students, none of the financial aid variables have statistical significance.

When certificate seeking students are included with associate degree students at all community colleges, the financial aid variables have more statistical significance across all models (Models 3 and 4). Through three-years, when all variables are included in the model, all three variables have statistical significance. The Pell Grant is positively associated with graduation while the Federal Subsidized and Unsubsidized Loan are both negatively associated with graduation rates. Since certificate programs are short term, generally one year or less, the Pell Grant may help students be able to better afford the
short term programs. The loans may deter students from attending or completing because it is money that will need to be paid back with interest.

Associate degree graduation rates have a relationship with one financial aid variable for rural community college students through both three- and six-years. Through three-years, the Federal Unsubsidized Loan has a negative association with graduation rates when all variables are included in the model (Model 5C). Through six-years, the Federal Unsubsidized Loan is found to have a negative association in all models (Model 6A, B, C). This is a consistent finding through the entire study. This finding also consistent with previous research about the negative effect of loans on students (e.g., Cofer & Somers, 2001).

For rural students who graduate with an associate degree or certificate through three- and six-years, financial aid is found to have a relationship with graduation rates. Through three-years, the Pell Grant is positively, statistically significant when all variables (financial aid, demographics/family status, and academic performance/institutional characteristics) are included in the model. This is consistent with previous research (e.g., Bettinger, 2004; McKinney & Novak, 2013) that the Pell Grant encourages persistence and graduation. Since students do not need to repay the Pell Grant, there is no long-term financial obligation to pay off the funds. Given that the Pell Grant is significant during the first three-years of starting at a community college, the Pell Grant may encourage students to complete more expeditiously. Students may find that the Pell Grant is an incentive to complete their education and in a much more timely
fashion. Since economic theory hopes to find what incentivizes decision makers, the Pell Grant could incentivize rural community college students to graduate.

Through six-years, the roles of financial aid changes for rural community college students in that the unsubsidized loan is found to be very statistically significant and negatively associated with graduation for rural community college students. The Pell Grant is no longer found to be statistically significant. As students age, students may make more money which would reduce or eliminate their eligibility for the Pell Grant. Research already supports that rural students are already highly dependent on loans, but that reliance may be negatively impacting their graduation rates. It should be noted that the subsidized loan did not have an effect on financial aid in any of the three- or six-year models for rural community college students.

For associate degree and certificate students, there are mixed findings. For such students at all community colleges and when only considering rural community college students, the Pell Grant and the Federal Unsubsidized Loan have statistical significance. The Pell Grant is positively associated with graduation rates, and the Federal Unsubsidized Loan is negatively associated with graduation rates. Through six-years, the findings are mixed. As the Federal Subsidized Loan increases, the odds of all community college students graduating decreases. For rural students, as the Federal Unsubsidized Loan increases, the odds of students graduating decreases. These mixed loan findings suggest that more research is needed as to how associate degree and certificate students differ in regards to their relationship between financial and and graduation rates.
It is important to note the relationship between rural community college graduation rates and financial aid. Given the mixed previous research about student loans and the impact on persistence and graduation, the findings here should not be understated. For rural students graduating with just an associate degree or an associate degree or certificate through six-years, the unsubsidized loan is consistently found to be very statistically significant and negative. Since the unsubsidized loan is a non-need based loan, students who generally would be borrowing these funds are more likely to be mid- to high-SES families. Students who come from middle class families may face negative graduation rates because of the additional financial pressures that are placed on them. Many middle income families will not be Pell Grant eligible and may not be eligible for other federal or state grants. This creates a reliance on federal loans.

Policy Recommendations

Federal recommendations. As expected, this study found a heavy reliance on federal financial aid for rural community college students. Thus, there are important policy implications that should be considered. The first is to increase grant opportunities from the Department of Education. This study found the Pell Grant to be statistically significant for both all community college students and for rural students primarily in the three-year models. The Pell Grant helps bridge the affordability gap for low-SES students—who are the most likely to receive the Pell Grant and receive higher amounts of funds. Given that community colleges generally offer one-year certificates and two year degrees, increasing funding for the Pell Grant may help students be able to fund their education and obtain their degrees more quickly. In addition to increased funding, I
recommend increased annual awards. For the 2016-17 year, the maximum Pell Grant is $5,815. While the average tuition at a community college is $3,260, expenses such as room and board, books, transportation to campus, and personal expenses, far exceed the maximum Pell Grant. Low income students should have access to additional resources to be able to attend college without having to risk homelessness or reducing to part-time status to work more hours which takes away from academics, and, thus, deter students from graduating.

Another Pell Grant recommendation is to adopt year-round Pell Grant. This would allow students to have access to the Pell Grant during a third semester during the year. Under the current policy, students who attend full-time during the school year are eligible for two semesters of Pell Grant. If students choose to attend during the third semester of a school year, they often do not have access to additional Pell Grant funding. Students who attend during the summer can increase their cumulative credits and may graduate earlier than students who do not. Thus, by offering year-round Pell Grant, lower SES students will be able to attend year-round and graduate sooner. Expansion of the needs formula for the Pell Grant is also recommended. Currently, there is no set income cutoff for the Pell Grant. The researcher does not recommend one but rather advocates for further inclusion of middle income families to help make a college education more affordable. Since the Pell Grant program is currently operating with a nearly $8 billion surplus, there are funds available to expand the program. By expanding the eligibility for the Pell Grant, middle SES families will be able to afford higher education without such a heavy reliance on student loans.
Rural community colleges. As this study has found, there is a reliance on loans that is shown to have a negative relationship with graduation for all types of community college students. More specifically, prior research has shown (e.g., Hardy & Katsinas, 2008) rural students have high borrowing rates for student loans. This study has similar findings consistent with the prior research. Students who borrower at higher rates may be at risk of borrowing too much and having difficulty paying back their loans. Additionally, research has found that students who do not complete a degree or certificate at community colleges are significantly more likely to default on their student loans (Campbell & Hillman, 2015). It is important to note that while private loans are a source of funding, their use in community colleges has decreased from a high of 4.3% in the 2007-2008 award year to 1.6% in the 2011-2012 award year (Woo, Velez, & Simone, 2016). Therefore, the researcher finds private loans inconsequential to this study. Based on this information, this study has a few recommendations for student loans.

One recommendation is expanding financial literacy for loan borrowers. Currently, there is no federal requirement for either the Department of Education or for schools to incorporate financial literacy. The students who are most likely to default on their student loans on students who borrow less than $5,000 and do not complete a credential (Fain, 2015). With financial literacy initiatives, educating borrowers prior to incurring debt, regardless of how much, may encourage responsible borrowing and repayment. For rural students, financial literacy may deter excessive amounts of borrowing that only hurts rural students economically long term. A second recommendation is to streamline the repayment options for students. There are currently
seven repayment options in addition to the traditional repayment option that students are placed into. These repayment options can be confusing and difficult to navigate for students. By reducing the number of repayment options, students may be able to avoid defaulting on their federal loans. This would be beneficial to both the student, the institution, the Department of Education, and taxpayers.

Student graduation is not the only measure of success for community college students because success is not easily defined for these students. Taking a class for advancement in a career, gaining new skills to reenter the job force after a layoff, transferring to a four-year institution, or graduating can all be considered individual measures of success for a community college student. It would be especially unwise for this study to suggest that graduation rates are the only measure of success for rural students at community colleges for whom there are so many other factors.

Access to financial aid and the awareness about financial aid needs to be increased. In order to apply for federal aid, students need to complete the Free Application for Federal Student Aid (FAFSA). As shared above, this form is often the gatekeeper for financial aid. Rural community colleges can increase awareness by holding more FAFSA completion workshops, sharing more information about the FAFSA complete with FAFSA completion tips, and work with local high school guidance counselors to increase awareness of the application. The more students that know about the application, the more students that can apply and potentially be eligible for much needed aid.
This study has found that roughly 4% of rural students are single parents and rural students have higher numbers of children than any other institution type. As mentioned in Chapter 2, women who are single parents persist at lower rates than women who are not (Jacobs & King, 2002). Given that women also make up the majority of all community college students, this is an important consideration for rural community colleges. A recommendation to help with this issue is for community colleges to have childcare available for their students. By having access to childcare on campus, this can help alleviate the stress of worrying about who will watch the children while the students are in class. Additionally, this may be a more affordable childcare option than outside day care options for families.

**Rural community college students.** While rural students did not have the lowest SES in this study, there are still financial considerations for these students. Given that rural students have higher housing and transportation costs than their urban and suburban counterparts, there are a few recommendations for institutions to better assist these students. The first recommendation is to encourage ride sharing for students at the institution. For example, a bulletin board, Facebook page, or other public forum where students from similar areas can link up to share transportation and expenses would decrease the transportation costs for any student who participates. Another recommendation for students is to increase food options available on campus. Many rural students travel far distances to campus. Given that the students cannot easily go home for meals, increased meal options couple with longer hours of operations would assist students with their food needs. For the housing issue, one recommendation is for the
institution to work with local apartment complexes to offer discounts for more affordable housing options for students. Another recommendation would be similar to the ride share forum. A separate forum could be created for students to find roommates to make housing more affordable for both students. In a 2013 qualitative study, Peck, Dietz, and Fishback found that some rural students were willing to welcome students to stay in their homes to help them with both housing and transportation costs. However, given the costs, potential legal ramifications, and potential lack of student interest, I do not recommend that rural community colleges expand their campuses to add dormitories.

**Student record data.** One of the greatest policy implications is the need for accurate and nationally representative data. Under the current system, there is no readily available national data for all years and all variables of student information. By improving the current data, more research could be conducted to better understand the benefits and downfalls of student financial aid for all students. There is also lots of missing data. For example, in BPS:04/09, only the first year of work-study and FSEOG is available. The lack of cumulative amounts of these variables make it difficult to study the longitudinal effects of this aid. While these programs are campus-based aid, they are nonetheless still federal programs that should be studied further to determine the benefits to students on a longitudinal scale.

Additionally, the accuracy of data needs to be continuously improved. The NCES recognizes the need for accurate data, but also recognizes the difficulty in obtaining accurate data. In a 2016 NCES blog post about this issue, Lauren Musu-Gillette shares that socioeconomic status is one of the most difficult data elements to collect accurately.
In some studies, the data that makes up SES (family income, parental education, and parental occupation) can be collected from parents but in other studies this is not the case (Musu-Gillette, 2016). Thus, SES may be more accurate in some studies over others. To combat this issue, the NCES is working to correct the reporting issues but also convened a panel to help identify other ways to measure SES.

Another student record data issue is the accuracy of the data because of how or who is reporting the data. Currently institutions submit data as part of their federal IPEDS reporting requirement. This is an annual requirement for all institutions annually. The accuracy of the data is only as good as the person who submits the data. Because of this, the accuracy can vary greatly from institution to institution. Another issue with the reporting is that students have a choice on whether to participate in longitudinal studies such as NPSAS or BPS. There is no federal requirement that schools must participate in these studies if they are chosen for the study. Instead, they have the option to opt-out or not respond to requests from the NCES for data with no repercussions for refusal. This hinders a researcher’s ability to analyze data because it does not exist. Additionally, the refusal to participate may make it difficult for the NCES to collect a more accurate nationally representative sample.

**Policy Implications**

For rural students with lower incomes are much more likely to receive the Pell Grant than their higher income counterparts. This is logical because of the way that the federal aid system has been set up. The Pell Grant has found to be statistically significant and positively associated with graduation through three-years. This finding is important
because traditionally community colleges are two-year institutions. One of the goals of a community college is to get students in and out with a credential in an expeditious fashion. Given the significance to rural students, year round Pell should be a consideration. This would allow students to have access to the Pell Grant in the summer term in order to be better able to afford to attend year round and, potentially, complete within the three-year period.

While this study found that minority students comprise roughly 18% of the sample, there are still many important considerations for minority students who attend rural community colleges. As written in Chapter 2, Black and Native American students disproportionately do not have access to federal student loans. Higher education institutions have the option to opt in or opt out of offering student loans to students. There is an inherit risk in offering student loans to students in that institutions can lose their ability to offer all Title IV funding if their default rates exceed certain thresholds. Unfortunately, this has negatively impacted many students at rural community colleges. As of the 2013-2014 academic year, 2,000 rural students, of which 49% are Black, at Southern Alabama Community College, none of them have access to federal student loans. At Bay Mills Community College, where 59% of their 400 rural students are Native American, do not have access to federal student loans. Finally, Coahoma Community College, where 95% of their nearly 3,000 students are Black, do not have access to federal student loans. These are just three examples of rural community colleges that are not currently offering federal loans to students. This lack of access may be preventing students from persisting and eventually graduating from rural community
colleges. This study suggests all students should have access to federal student loans as long as they understand that they are borrowing money and they are responsible borrowers.

Another consideration that may impact minority graduation rates at rural community colleges is the lack of access to additional resources that may encourage persistence. Previous research has found that has the number of minority students increase, graduation rates decrease (e.g., Bailey, Calcagno, Jenkins, Kienzl, & Leinbach, 2005). One recommendation for rural community colleges for improving minority graduation rates is to increase the diversity of faculty on campus. By attracting a more diverse faculty, minority students on campus may increase their academic integration and feel more included on campus (Eberle-Sudré, Welch, Nichols, 2015). A second recommendation is to increase tutoring, early interventions, and other academic resources for minority students. In the research conducted by Bailey, Jenkins, and Leinbach (2005), they found that Hispanic students who take remedial classes graduate at less than half of the rate of Hispanic students who do not take remedial classes. By increasing academic interventions, institutions may be able to lower the gap in graduation rates.

**Recommendations for Future Research**

Given that prior research about rural community colleges is very limited and that the majority of community college attendees choose rural community colleges, educational researchers should expand the research for these students. Any research about rural community college students would help to fill the large gap in research that currently exists. The researcher recommends a few areas about rural community college
students that would help further the research for the students who make up the majority of community college attendees.

One of the largest gaps in research for rural community college students is the lack of longitudinal studies. Previous studies (e.g., Hardy & Katsinas, 2008; Kennamer, Katsinas, & Schumacher, 2010) used single-year data from IPEDS to study the effects of aid on students. This study supports using longitudinal data to understand the effects of financial aid over time. By using logistic regression on longitudinal data, researchers can understand which variables may impact rural community college students. As this study has shown, financial aid plays a role in graduation rates for rural students. By looking at single year data, researchers may have biased outcomes.

This study has retained the hypothesis that financial aid has a relationship with graduation rates for rural community college students. The findings support that rural community college students have a high reliance on aid to help fund their education. The Pell Grant was found to be positively, statistically significant through three-years for associate degree and certificate graduates. The Federal Unsubsidized Loan was found to be negatively, statistically significant in all models through six-years. Because of this significance, it is important to conduct further research about the relationships between financial aid and graduation rates for rural community college students. The researcher recommends that sub-group analyses should be examined within the rural student population. For example, it may be beneficial to look at how different types of financial aid impact graduation rates for different groups of students such as women, varying races/ethnicities, or different levels of SES.
Additionally, because minority students have disproportionate access to student loans, it may be worthwhile to research how this lack of access impacts graduation rates for different groups of students. Including regional differences and differences in the ethnicities of the minority students may help explain the differences. For example, Hispanic students may be broken down to students of Dominican or Mexican descent. Additional research that examines what other financial resources help these students persist or graduate or not would be valuable to help fill the gap in research. This current study did not account for these differences.

Another recommendation for future research is to consider the use of a different statistical model. While this study used the widely used and acceptable logistic regression model, using event history modeling, also called survival analysis, may yield different results. This model was employed by Rong Chen (2008) to study the effects of financial aid on departure for four-year college attendees. Event history analysis model allows a researcher to use a discrete-time model because, in the case of this study, graduation rates are not defined precisely. They are in the data by academic year only. This would allow the researcher to “analyz[e] data where the outcome variable is the time until the occurrence of an event of interest. The event can be death, occurrence of a disease, marriage, divorce, etc.” or, for future research, graduation (Despa, n.d., para. 1). This model would allow researchers to study the effects of financial aid up until the graduation occurs.

This study recommends that the NCES continues to collect relevant data to help researchers help fill the many gaps in research about financial aid, graduation rates, and
rural community college students. There are many unanswered questions about not only these three areas but also the relationship between these three areas. By continuing to collect the data, researchers from many different backgrounds will be able to use their expertise to help explain student behaviors. This research will help inform policy and hopefully make improvements for students so that they are better able to afford a college education.
References


Jenkins, D., & Weiss, M. J. (2011). *Charting pathways to completion for low-income*


Washington, DC.


presented at the meeting of the American Education Research Association, Philadelphia, PA.


## Appendix A: Summary of Variables in the Model

<table>
<thead>
<tr>
<th>Variable Label</th>
<th>BPS Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative persistence and attainment anywhere 2005-06</td>
<td>PROUT3</td>
<td>1 = Attained bachelor’s degree; 2 = Attained associate’s degree; 3 = Attained certificate; 4 = No degree, still enrolled; 5 = No degree, not enrolled; 6 = No degree, left without return</td>
</tr>
<tr>
<td>Cumulative persistence and attainment anywhere 2008-09</td>
<td>PROUT6</td>
<td>1 = Attained bachelor’s degree; 2 = Attained associate’s degree; 3 = Attained certificate; 4 = No degree, still enrolled; 5 = No degree, not enrolled; 6 = No degree, left without return</td>
</tr>
<tr>
<td>Cumulative Pell through 2006</td>
<td>PELLCU06</td>
<td>From “100” to “12,150”.</td>
</tr>
<tr>
<td>Cumulative Pell through 2009</td>
<td>PELLCU09</td>
<td>From “100” to “25,241”.</td>
</tr>
<tr>
<td>Cumulative Stafford subsidized through 2006</td>
<td>STSCUM06</td>
<td>From “100” to “15,672”.</td>
</tr>
<tr>
<td>Cumulative Stafford subsidized through 2009</td>
<td>STSCUM09</td>
<td>From “100” to “26,438”.</td>
</tr>
<tr>
<td>Cumulative Stafford unsubsidized through 2006</td>
<td>STUCUM06</td>
<td>From “100” to “24,625”.</td>
</tr>
<tr>
<td>Cumulative Stafford unsubsidized through 2009</td>
<td>STUCUM09</td>
<td>From “102” to “38,122”.</td>
</tr>
<tr>
<td>Gender</td>
<td>GENDER</td>
<td>1 = Male; 2 = Female.</td>
</tr>
<tr>
<td>Age first year enrolled</td>
<td>AGE</td>
<td>From “15” to “79”.</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>RACE</td>
<td>1 = White; 2 = Black or African American; 3 = Hispanic or Latino; 4 = Asian; 5 = American Indian or Alaska Native; 6 = Native Hawaiian/other Pacific Islander; 7 = Other; 8 = More than one race.</td>
</tr>
<tr>
<td>Student's marital status as of 2004</td>
<td>SMARITAL</td>
<td>1 = Single, divorced, or widowed; 2 = Married; 3 = Separated.</td>
</tr>
<tr>
<td>Student's marital status as of 2006</td>
<td>SMAR06</td>
<td>1 = Single, never married; 2 = Married, 3 = Separated; 4 = Divorced; 5 = Widowed.</td>
</tr>
<tr>
<td>Student's marital status as of 2009</td>
<td>SMAR09</td>
<td>1 = Single, never married; 2 = Married, 3 = Separated; 4 = Divorced; 5 = Widowed.</td>
</tr>
<tr>
<td>Single parent status in 2003-04</td>
<td>SINGLPAR</td>
<td>0 = Not a single parent; 1 = Single parent.</td>
</tr>
<tr>
<td>Dependent children: Number 2003-04</td>
<td>DEPNUMCH</td>
<td>From “1” to “9”.</td>
</tr>
<tr>
<td>Dependency status 2003-04</td>
<td>DEPEND</td>
<td>1 = Dependent; 2 = Independent.</td>
</tr>
<tr>
<td>Parents' highest level of education</td>
<td>PAREDUC</td>
<td>0 = Do not know parent’s education level; 1 = Did not complete high school; 2 = High school diploma or equivalent; 3 = Vocational or</td>
</tr>
<tr>
<td>Variable</td>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Adjusted Gross Income (AGI) 2003-04</td>
<td>CAGI</td>
<td>From “100” to “497,686” dollars.</td>
</tr>
<tr>
<td>Academic integration index 2006</td>
<td>ACAINX06</td>
<td>From “25” to “200”.</td>
</tr>
<tr>
<td>Social integration index 2006</td>
<td>SOCINX06</td>
<td>From “33” to “200”.</td>
</tr>
<tr>
<td>Highest Degree Expected</td>
<td>HIGHLVEX</td>
<td>1 = No degree; 2 = Certificate; 3 = Associate’s degree; 4 = Bachelor’s degree; 5 = Post-BA or post-master certificate; 6 = Master’s degree; 7 = Doctoral degree; 8 = First-professional degree.</td>
</tr>
<tr>
<td>Grade point average 2003-04</td>
<td>GPA</td>
<td>From “4” to “400”.</td>
</tr>
<tr>
<td>NPSAS: Attendance intensity 2003-04</td>
<td>ATTNPTRN</td>
<td>1 = Exclusively full-time; 2 = Exclusively part-time; 3 = Mixed full-time and part-time.</td>
</tr>
<tr>
<td>Job 2006: Hours worked weekly</td>
<td>JOBHRS06</td>
<td>From “3” to “80”.</td>
</tr>
<tr>
<td>Job 2009: Hours worked weekly</td>
<td>JOBHRS09</td>
<td>From “2” to “80”.</td>
</tr>
<tr>
<td>Major during first year 2003-04 (condensed)</td>
<td>MAJORS12</td>
<td>0 = Undeclared or not in a degree program; 1 = Humanities; 2 = Social/behavioral sciences; 3 = Life sciences; 4 = Physical sciences; 5 = Math; 6 = Computer/information science; 7 = Engineering/engineering technologies; 8 = Education; 9 = Business/management; 10 = Health; 11 = Vocational/technical; 12 = Other technical/professional.</td>
</tr>
<tr>
<td>Institution region 2003-04</td>
<td>OBEREG</td>
<td>1 = New England (CT ME MA NH RI VT); 2 = Mid East (DE DC MD NJ NY PA); 3 = Great Lakes (IL IN MI OH WI); 4 = Plains (IA KS MN MO NE ND SD); 5 = SE (AL AR FL GA KY LA MS NC SC TN VA WV); 6 = Southwest (AZ NM OK TX); 7 = Rocky Mountains (CO ID MT UT WY); 8 = Far West (AK CA HI NV OR WA); 9 = Other jurisdictions (PR).</td>
</tr>
</tbody>
</table>
### Appendix B: Degree of Urbanization (Urban-Centric Locales)

for Community Colleges 2009-2010

<table>
<thead>
<tr>
<th>Locale</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>City: Large</td>
<td>298</td>
<td>19.19</td>
<td>19.19</td>
</tr>
<tr>
<td>City: Midsize</td>
<td>146</td>
<td>9.4</td>
<td>28.59</td>
</tr>
<tr>
<td>City: Small</td>
<td>182</td>
<td>11.72</td>
<td>40.31</td>
</tr>
<tr>
<td>Suburb: Large</td>
<td>298</td>
<td>19.19</td>
<td>59.5</td>
</tr>
<tr>
<td>Suburb: Midsize</td>
<td>32</td>
<td>2.06</td>
<td>61.56</td>
</tr>
<tr>
<td>Suburb: Small</td>
<td>19</td>
<td>1.22</td>
<td>62.78</td>
</tr>
<tr>
<td>Town: Fringe</td>
<td>7</td>
<td>0.45</td>
<td>63.23</td>
</tr>
<tr>
<td>Town: Distant</td>
<td>94</td>
<td>6.05</td>
<td>69.29</td>
</tr>
<tr>
<td>Town: Remote</td>
<td>123</td>
<td>7.92</td>
<td>77.21</td>
</tr>
<tr>
<td>Rural: Fringe</td>
<td>275</td>
<td>17.71</td>
<td>94.91</td>
</tr>
<tr>
<td>Rural: Distant</td>
<td>52</td>
<td>3.35</td>
<td>98.26</td>
</tr>
<tr>
<td>Rural: Remote</td>
<td>27</td>
<td>1.74</td>
<td>100</td>
</tr>
</tbody>
</table>