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**The Impact of Virginia Statewide Community College Transfer Policy on Student
Academic Success**

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of
Philosophy at Virginia Commonwealth University

by

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Abstract

THE IMPACT OF VIRGINIA STATEWIDE COMMUNITY COLLEGE TRANSFER POLICY ON STUDENT ACADEMIC SUCCESS

By Paul Allen Smith, Ph.D.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of
Philosophy at Virginia Commonwealth University

Virginia Commonwealth University, 2014

Director: Lisa M. Abrams, Ph.D., Associate Professor, Foundations of Education

Community colleges are an increasingly important component of the higher education systems in the United States. Community college as a pathway toward a better educated workforce has been emphasized at a national and state level. Virginia's policy makers set a goal of producing 100,000 new baccalaureate degrees in the Commonwealth by 2025. Critical to meeting this goal is Virginia's Community College System. In 2005, Virginia passed the Higher Education Restructuring Act which granted students graduating from Virginia's community colleges with an associate's guaranteed admission into any state-funded, four-year institution. Building on this earlier policy, Virginia passed The Higher Education Opportunity Act of 2011. This act expanded the role of the community college and placed a greater emphasis on articulation policies and baccalaureate attainment. The effectiveness of articulation policies on community college transfer and baccalaureate attainment has been debated in the academic literature. Some have suggested to measure policy effectiveness, academic outcomes and not

transfer rates, must be compared before and after policy implementation. To gauge the effectiveness of Virginia's guaranteed admission policy, this study examined archival student data for native and transfer students who achieved a junior standing at a single four-year state-funded institution. Furthermore, transfer student baccalaureate attainment rates and time to degree baccalaureate completion were compared before and after policy implementation. The study results showed native students graduated in greater percentages and have lower mean time to baccalaureate completion than transfer students; high school and college GPA are predictors of baccalaureate attainment for transfer and native students; transfer student baccalaureate attainment rates and mean time to baccalaureate completions were lower following policy implementation, or simply, fewer bachelor's degrees were awarded but those completing a baccalaureate did so in less time after policy implementation. The findings of this study suggest transfer students with baccalaureate aspiration are negatively impacted for attending community college prior to transfer and Virginia's articulation policy at the study institution had little impact on academic outcomes for transfer students following policy implementation. These single institutional results may suggest modification to Virginia's articulation policy is necessary to improve academic outcomes for community college transfer students.

Chapter 1

Introduction

Background

Community colleges are an increasingly popular pathway for obtaining a bachelor's degree. In addition to offering a wide variety of career and technical programs, community colleges also provide pathways to baccalaureate degree attainment. Their open admission policies and lower tuition costs have made the dream of a college education a reality for many individuals, ultimately making higher education possible for students with baccalaureate aspirations. Over the last decade government policy makers have recognized the benefit of community colleges for their impact on college access, local businesses, and tax revenue. As such, many states have placed a greater emphasis on easing the transition process from the two-year to the four-year institution by enacting policies that allow for direct articulation, or transfer, from a two to four-year institution. However, transfer rates have remained constant across the country leading some to question whether articulation policy has an impact on transfer rates between two-year to four-year institutions and, subsequently, baccalaureate attainment (Roksa & Bruce, 2008; Roksa, 2009). Although articulation is touted as a viable alternative pathway to obtaining a bachelor's degree, minimal research has been conducted that examines the educational outcomes of community college transfer students in states with articulation policies that provide guaranteed admission. To more thoroughly assess the impact of articulation policy

on baccalaureate attainment, further research is needed to explain whether articulation agreements ease transfer between two and four-year institutions and how these agreements affect student educational outcomes, such as baccalaureate degree obtainment and graduation rates.

In 2009, President Barack Obama stated community colleges are critical to achieving his goal of having the highest college graduation rate within the world by the year 2020. To accomplish this goal the president introduced the American Graduation Initiative. This initiative emphasized community colleges as the primary means for attaining a bachelor's degree. Community colleges are critical to the fulfillment of jobs devoted to science, technology, engineering, and mathematics. This emphasis on higher education is shared by state policy makers who have the authority to regulate college and university funding, transfer, and accountability measures (Ewell, 2009). Given the interest of policy makers in the role of community college as a path for baccalaureate obtainment, both at the federal and state level, it is important to gain a greater understanding of student outcomes following transfer.

Government interest and history. Articulation agreements are formal agreements that allow a student to begin their program of study at one institution and seamlessly transfer credits to a second institution for the completion of their degree (Roksa, 2009; O'Meara, Hall, & Carmichael, 2007). Articulation has been a part of the American higher education system since approximately 1896 when the president of the University of Chicago divided the school into junior and senior colleges (Kintzer, 1996). The first state supported agreement appeared in 1921 when the University of California Berkley (UCB) encouraged high schools to offer college courses that would provide graduating students with two years' worth of college credit at UCB (Kintzer, 1996). Later in the 1920s, California adopted a full state supported articulation agreement (Robertson-Smith, 1990).

After World War II the federal government took a major interest in two-year college programs. As a result, the number of community colleges and two-year programs across the country expanded. The curriculum at the two-year college would constitute the first two years of a baccalaureate degree (Kintzer, 1996). With this concept firmly supported by the government, it was in the best interest of both the four-year and the two-year institutions to align their curricula. With the Higher Education Act of 1965 the federal government further encouraged the development of a coordinated system of higher education by requiring states to create a coordinating commission for higher education in order to remain eligible for federal financial aid (Cohen, 2001). From this point forward, institutions began developing coordinated systems for transfer; however, this system was voluntary and controlled at the state level and not at the federal level.

By 1975, state supported articulation agreements were in place in seven states. These early agreements coordinated credits between two and four-year institutions (Robertson-Smith, 1990). Prior to the 1980s, the use of community colleges and interest in vertical transfer, which is transfer from a two to a four-year institution, by policy makers and institutions of higher learning as a means to baccalaureate attainment was on the rise. But in the 1980s, a loss of interest in articulation agreements was observed due to the perceived lack of academic rigor at the two-year institution. The resulting perception led to a break-down of relationships between two and four-year institutions which affected the growth of articulation agreements (Cohen & Brawer, 1985; Prager, 1988). Data management and complicated budgetary problems led to difficulties in developing articulation agreements or policies in the late 1980s. However, with the growth of computerization and increased government interest, regarding community college student dropout rates, a renewed interest in coordinating curriculum between two and four-year

institutions occurred during the 1990s (Mosholder & Zirkle, 2007). In the late 1990s, articulation agreements began to shift from individual institutional agreements to a program managed at the state level (Robertson & Frier, 1996). In 2009, Roksa provided a summary of statewide articulation policy and showed every state had some form of articulation or transfer agreement in place; however, not all states had mandated articulation agreements. Mandated articulation plans are codified or established through the state legislature. Codified plans cover the transfer of course credits completed at a public two-year institution to the four-year college. These credits fulfill the first two years of general education requirements at the four-year institution. By 2004, thirty states had some form of legislation regarding movement of students between institutions of higher education. Of those thirty, 25 of these states had mandated policies (Keith & Roksa, 2008; Roksa & Keith, 2008). Three types of articulation policies have been identified: 1) formal agreements which are legally mandated within the state, 2) state system policies which are not codified within the state regulations, and 3) voluntary agreements between institutions (Kintzer, 1973; Kintzer & Wattenbarger, 1985).

State involvement signals a shift from earlier practices where many agreements were made between the individual institutions. The early agreements were considered informal and were dependent upon the relationship between the institutions involved. State intervention formalizes the articulation process and transfer becomes standardized; thus, increasing access, affordability, degree completion, as well as reducing confusion in the transfer process (Cohen & Brawer, 2003; Boswell, 2001). This process is designed to decrease the complexity of transfer from two-year to four-year institutions. However, all formal agreements between state governments and participating institutions are not created equally. Many states offer nothing more than basic guidelines for transfer while other states offer more detailed articulation policies.

States with a more formal articulation policy and centralized control tend to be more effective at achieving the goal of articulation, which is to facilitate effective transfer of students from a two to four-year institution (Falconetti, 2009). O'Meara et al. (2007) advocated formal articulation agreements for the growth of higher education and to promote an alternative path for students working toward a baccalaureate degree.

Historically, many of the early articulation agreements were made voluntary and were decentralized outside of state control. These agreements existed between individual institutions and were dependent upon the institutional relationship as well as the quality of education received at the two-year college. With an informal or voluntary system, the four-year institutions possessed more power than the two-year college (Roksa, 2006). The 1990s saw a shift toward more formal articulation agreements mandated through state involvement (Mosholder & Zirkle, 2007). However, determining state articulation policy is difficult due to lack of a formal definition. Roksa (2009) identifies twenty one states with formal articulation policies and concludes that state involvement in the development of articulation policy is a positive outcome since it reduces the imbalance of power between the institutions and places the interest of the students before the institution. As stated previously the intent of an articulation agreement is to seamlessly transition students from one level of higher education to the next with the goal of facilitating the earning of a bachelor's degree (O'Meara et al., 2007). Defining the success of state mandated articulation policy is difficult due to lack of consensus on defining how the goals of the agreement will be evaluated. To effectively evaluate state supported articulation the goals of the policy must be clearly identified. For example, is the goal of articulation policy to increase transfer or to maintain college credits upon transfer? Is the goal to increase access to higher education or to increase baccalaureate degree attainment? Each state may have a

different definition on success and as such evaluated on different outcomes. What Roksa (2009) found was state supported articulation agreements may not increase transfer but they reduce the time required for completion of a bachelor's degree.

National statistics. In fall 2008, the total enrollment at all community colleges across the country was approximately 12.4 million. Of that total, approximately 40% were full-time students. Approximately 7.4 million students were credit-seeking. The remaining five million students were noncredit-seeking students and were generally enrolled in work force development courses. The average student age was 28 with approximately 39% of students under the age of 21. The 2008 fall headcount showed that 58% of all community college students were female and 45% were minorities (American Association of Community Colleges, 2011). The National Center for Educational Statistics (NCES) (2001) reported transfer rates for first-time credit seeking students ranging from 25% to 52% for students seeking a bachelor's degree. Transfer rates are sensitive to the definition used to measure transfer. According to Roksa and Bruce (2008), measuring the student transfer rate was difficult because the key metric used in determining the success of transfer and articulation, the transfer rate, is often calculated using different numerators. The definitions used to define transfer and subsequently the transfer rate varies according to the researcher. Definitions of transfer include: 1) students who transfer following completion of an associate's degree, 2) students that transfer following the completion of a specified number of credits, 3) student who complete one year at the community college and then return, 4) all first-time, full-time students who begin at the community college, 5) students who state their intention is to transfer when first enrolling at the community college, and 6) students who intend to transfer based on their enrollment in academic programs versus occupational programs (WICHE, 2009).

Having a general understanding of community college demographics will help policy makers understand and craft articulation policies that will promote a more effective transfer program. The focus of such policies should be consistent with the student's goals, needs and aspirations; therefore, establishing a more student-friendly environment that will promote positive educational outcomes. The national statistics illustrate the diversity of the community college student body. Examination of the data collected by NCES showed that overall college enrollment in 2009 for all Title IV institutions was approximately 21 million. Of that number, approximately eight million students were enrolled in two-year institutions which comprised approximately 40% of all college enrollment (NCES, 2011). Even at the lowest transfer rate of 25%, about two million students will transfer each year which is an estimated 10% of college enrollment. Nationally, transfer rates peaked in the 1960s when two-thirds of all community colleges students transferred. Students during this period saw community colleges as a means for completing general education courses prior to transferring to a senior institution. By the mid-1980s, the transfer rate was about one-fourth of all for credit seeking students (Bryant, 2001; Cohen, 2001). The reason for decline was two-fold. First, students sought a non-academic vocationally oriented education rather than the standard transfer route. Second, the informal articulation agreements at the time did not provide students with much guidance on transfer to a more senior institution. Mullins (2012) reported a national transfer rate of approximately 21%.

Overview of Literature

Educational outcome of community college transfer students is influenced by several factors which directly impact the student's likelihood of attaining a baccalaureate degree. Wang's (2009) model of baccalaureate attainment and college persistence among community college transfers provides the theoretical underpinnings of this research (See figure 1).

According to Wang's theory, transfer student's college experiences, precollege characteristics, and external environmental factors are associated with baccalaureate attainment. Precollege characteristics include demographic background, academic resources in high school, and the student's psychological attributes (e.g. locus of control, student self-concept, and student baccalaureate aspiration). College experience includes enrollment intensity, remediation, college involvement, and academic performance. Environmental factors revolve around employment hours and dependent(s). Wang's model of educational outcome and persistence identifies several contributing variables that, as a whole, contribute to the student's academic outcome. The impact from a single variable may not determine the student's educational outcome but the combination of these variables may predict the community college transfer student college persistence and academic success. Although this model explains educational outcome, it does not address the impact of the transfer process. State articulation policy may impact the educational outcome of transfer students. Many state policies are measured for their impact on transfer, but for an articulation policy to be successful the transfer student must have a positive educational outcome which may include the attainment of an associate's degree, transfer to a four-year institution, or completion of a baccalaureate degree.

Successful educational outcomes extend beyond the point of transfer. As Wang (2009) suggests, baccalaureate attainment is the goal of many community college transfer students, but often, articulation policy is measured by transfer percentages. The lack of cohesion between transfer definitions, measurements, data, and analytical methods complicate the evaluation and the determination of articulation policy effectiveness (Roksa, 2009). Based on Roksa's conclusions, the alignment of policy success with educational outcomes will provide a better based on the number of successful baccalaureate degrees awarded to transfer students. Aligning

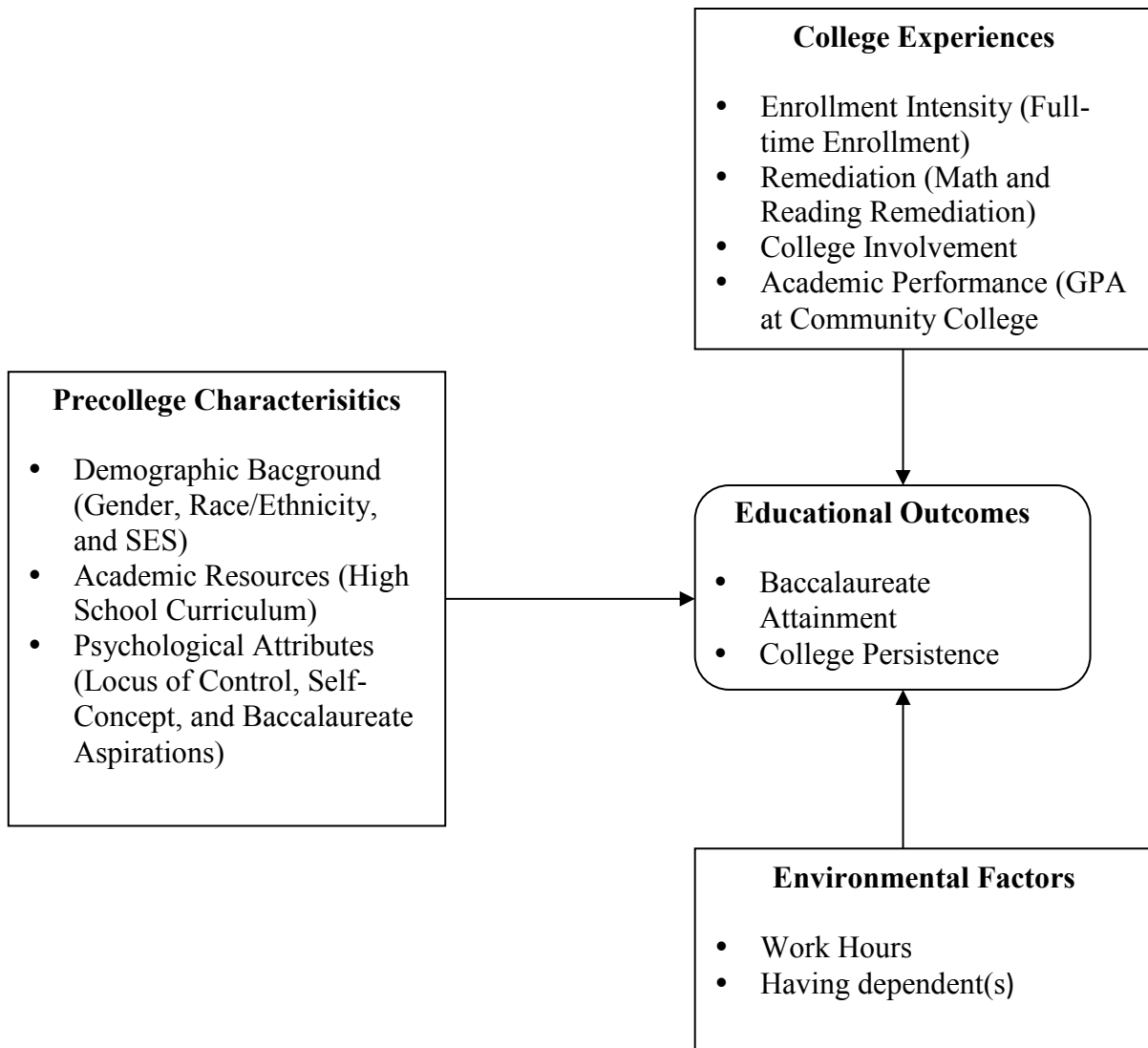


Figure 1. Wang's model of baccalaureate attainment and college persistence among community college transfers

the articulation policy with educational outcomes will ensure an accurate description of policy effectiveness because only students who have transferred will be measured. If the goal of articulation policy is to promote community colleges as a viable means to obtaining a baccalaureate degree then effectiveness should be measured in the number of bachelor's degrees awarded to transfer students rather than the number of students that transfer. These should be considered of interest to policymakers since cooperation and collaboration will be required

between the institutions as well as making “well-informed policies to assist students with successful baccalaureate completion” (Wang, 2009, p 586).

Pre-college characteristics described by Wang have an impact on academic success and act as predictive indicators on the likelihood of student transfer. Younger students are more likely to transfer than older students. Students over the age of thirty have the least likelihood of transfer than students who enter community college immediately following high school (Dougherty & Kienzl, 2006; Peter & Forrest-Cataldi, 2005; Lee et al., 1993). Dougherty and Kienzl (2006) report that transfer is directly affected by socio-economic status (SES) and students from higher income brackets are more likely to transfer to a four-year institution. In addition, Blacks and Hispanics have a lower transfer rate than both Caucasian and Asian students. Women, although the majority of those enrolled in community colleges, are less likely to transfer than males (Hagedorn et al., 2008). Other factors influencing transfer are enrollment intensity, remedial course work and the student’s academic performance prior to transfer (Wang, 2009; Hagedorn et al., 2008). Furthermore, Wang as well as Hagedorn et al. show students enrolled full-time, with less remedial course work, and with a higher grade point average (GPA) have an increased rate of transfer. Dougherty and Kienzl explain that academic preparation, educational goals, major, and extra responsibilities may explain the differences observed in transfer rates.

Transfer student success and positive educational outcomes hinge on their college experience both before and following transfer. The early years of college prove to be the strongest single indicator of degree attainment (Pascarella & Terenzini, 2005). It is the early academic performance that predicts or plays a significant role in final degree completion (Adelman, 2006; Reason, 2003). According to the literature, the strongest indicator of

baccalaureate attainment and student persistence prior to and after transfer to a four-year institution is GPA (Crisp & Nora, 2010; Wang, 2009; Hagedorn et al., 2008; Pascarella & Terenzini, 2005; DesJardins et al., 2003; Reason, 2003; Carlan & Byxbe, 2000). GPA has been commonly used to determine student success or academic achievement when examining program outcomes because it is readily available in many national longitudinal data bases. GPA is often used to evaluate transfer program success over degree completion because once the student transfers that student is tracked like a native student. Native student populations are those students who begin their college at the four-year institution. GPA as it relates to transfer success can be both used as a predictive variable or as an outcome variable (Gawley and McGowen, 2006). Higher GPA at the community college level correlates to increased likelihood of transfer and increased likelihood of academic success following transfer to a four-year institution (Wang, 2009; Hagedorn et al., 2008; Carlan & Byxbe, 2000). Although GPA can be influenced by a number of factors it is important that the two-year institution encourage students to maintain a satisfactory GPA early in their academic years to improve transfer success later.

The transition process can be difficult for students. Many transfer students show a drop in GPA following transfer to the four-year institution (Carlan & Byxbe, 2000; Cjeda, 1997; Fredrickson, 1998; Glass & Harrington, 2002; Laanan, 2001; Rhine et al., 2000). However, the drop in GPA, known as transfer shock, is only temporary (Townsend, 1993; Cejada, 1997; Laanan, 2001; Laanan, 2007; Cejada et al., 1998). Transfer shock and the increased workload at the four-year institutions lead many students to withdraw from higher education (Van Middlesworth et al., 2002). According to Lanaan (2007), it is the four-year institution that has the greatest impact on the transition process and transfer student academic success. Institutional intervention can ameliorate the academic issues associated with student transfer from a

community college. Providing the transfer student access to transfer specific orientation programs and access to student run organizations may improve transfer student academic success (Lanaan, 2007).

Positive academic outcomes can be improved for transfer students if states develop articulation policies that ease the challenges following transfer to four-year institutions (Eggleston & Lanaan, 2001). Anderson and colleagues (2006) showed that state-mandated articulation policies do not necessarily increase transfer rates. This data was supported by Roksa (2006) who showed that states with articulation policies did not increase transfer rates above the national average; however, this data does not provide the true picture of the impact of articulation policy on transfer rates since the data were gathered from national longitudinal data collected prior to modern articulation policies. In contrast, examination of institutional data shows that states with formal articulation policies have observed an increase in transfer rates (Banks, 1994; Higgins & Katsinas, 1999). However, because of the complexity in identifying and tracking students once they transfer to the four-year institution, much of the literature falls short in examining the final indicator of effective degree completion and baccalaureate attainment transfer policy. States with formal articulation policies often track transfer rates as a measure of policy effectiveness. Unfortunately transfer does not always lead to baccalaureate attainment. In which case, one could question the effectiveness of the policy if these transfer students are not graduating at the same rates as native four-year students. Much of the research focuses on transfer and not educational outcomes. This may be due to the lack of consensus on defining articulation policy goals (Roksa & Bruce, 2008; WICHE, 2009).

Articulation in the Commonwealth of Virginia is not mandated by a specific statute but is a policy required by the Higher Education Restructuring Act of 2005 (HERA) and subsequently

in the Higher Education Opportunity Act of 2011 (HEOA). In essence, public four-year institutions are required to develop guaranteed articulation agreements with the Virginia Community College System (VCCS). Although each institution is permitted to develop their own standards for admission they must follow the guidelines established by the State Council of Higher Education for Virginia (SCHEV). The articulation agreement for the Commonwealth was established so students who transfer with an associate's degree have met all general education requirements at the accepting four-year institution (HERA, 2005).

To ensure compliance with HERA and HEOA, articulation numbers are tracked for public institutions and linked to performance based criteria established by SCHEV. The transfer benchmark varies by institution but must “have uniform application to all Virginia community colleges and meet appropriate general education and program requirements at the four-year institution, provide additional opportunities for associate degree graduates to be admitted and enrolled ...” (HERA, 2011, p 12). According to section C of HERA, each institution will develop, in conjunction with the Commonwealth, educational-related and institutional performance benchmarks for which the institution will be graded and certified by SCHEV. Institutions that are certified by SCHEV for achieving an institutional performance benchmark “shall be provided financial benefits” (HERA, 2011). As a result, individual institutions have to meet their stated benchmark and establish enrollment targets on an annual basis for transfer students. The benchmarks established by SCHEV address transfer rates and not baccalaureate attainment rates.

For example, in 2009 Virginia Commonwealth University (VCU) was required by SCHEV to meet a benchmark threshold of 175 transfer students with a target enrollment rate of 195 students. The institution enrolled 536 students for that year. For 2010, the threshold

established by SCHEV remained at 175 transfer students enrolled while the benchmark target increased to 200 students. The actual number of transfer students that enrolled in 2010 was 1,448. Based on these data, VCU exceeded the threshold and target enrollments for community college transfer students, but these data alone should not be used as a basis for policy effectiveness because they do not include graduation rates or previously enrolled transfer students. Furthermore, articulation benchmarks may be measured by the number of articulation agreements developed between VCCS and the four-year institutions. VCU's threshold benchmark for new articulation agreements was two, while the target benchmark was three in 2009 (JLARC, 2011). VCU exceeded the SCHEV threshold and target by developing four new articulation agreements with VCCS institutions. Benchmarks are established for state agencies in the Commonwealth as performance measures, this includes publically-funded universities and colleges.

Significance of Study

The purpose of this study was to examine the effectiveness of the Commonwealth of Virginia's guaranteed admission policy between the state's two-year public community colleges and its four-year public institutions. Effectiveness was defined by an increase in baccalaureate completion rates and a reduction in time to bachelor's degree completion. The purpose for choosing these endpoints as measure of policy success was a result of the specified objectives in HEOA. One objective of HEOA was to "place Virginia among the most highly educated states and countries by conferring approximately 100,000 cumulative additional undergraduate degrees on Virginians between 2011 and 2025...[and] improving undergraduate graduation and retention rates in the Virginia higher education system, and increasing degree completion by Virginians with partial credit toward a college degree" (p. 5). The listed HEOA objectives imply success is

measured by baccalaureate attainment rates. SCHEV monitors each of Virginia's four-year public institutions for compliance with HERA and HEOA by tracking transfer student progress and graduation rates. The Commonwealth, by enacting HERA and HEOA, has attempted to ease the transfer process for community college students. Promoting a more seamless transition from community college to four-year institution has been shown to produce academic outcomes similar to native student (Roksa & Bruce, 2008; Melguizo et al., 2011). Despite Virginia's efforts, a disparity remains between the academic outcomes of transfer and native students (SCHEV 2012, SCHEV, 2014). If everything were working successfully then the graduation rates and time to degree completion for transfer and native students should be equal. If the transfer policy was effective then students transferring from Virginia's community colleges should graduate at similar rates and show similar time to degree completion as native students. This is predicated on the findings of Roksa and Bruce (2008) who suggested articulation policies are designed for a seamless transition between two and four-year institutions and others who suggest native and transfer students have similar academic outcomes (Melguizo et al., 2011; Lichterberger & Dietrich, 2013).

The available peer reviewed literature has focused on three primary areas of study: 1) transfer student characteristics that affect academic outcomes, 2) the comparison of transfer and native student academic outcomes, and 3) the effectiveness of articulation policies (Adelman, 1999; Lee & Frank, 1990; Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987; Melguizo et al., 2011; Shapio et al., 2013; Lichterberger & Dietrich, 2013; Roksa & Bruce, 2008; Turk, 2012; Wang, 2012; Roksa, 2010). However, these studies had mixed results, compared native and community college populations directly, or did not account for the impacts of policy on transfer student academic outcomes. (Adelman, 1999; Lee & Frank, 1990;

Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987). This study attempted to examine Virginia's articulation policy through the use of Wang's model (2009) of baccalaureate attainment and persistence, Melguizo et al.'s (2011) approach to compare native and transfer students of equal academic standing, and Roksa's (2009) suggestion to compare articulation policies policy outcomes before and after policy implementation.

Virginia, unlike many states, has a state supported articulation program. However, the articulation agreements within the Commonwealth are not codified as they are in states like Arkansas, Florida, or Texas. In these states a specific policy governs articulation and typically provides uniform transfer policies across the state (Achieving the Dream, 2008). In the Commonwealth the individual institutions are permitted to establish their own academic criteria for transfer, and admission is guaranteed if those criteria are met by the student. In this regard, Virginia public four-year institutions have the autonomy to establish their own standards for articulation while still being governed at the state level to ensure compliance. Articulation benchmarks are established in collaboration with SCHEV. This approach has integrated articulation without establishing statewide standards which permits individual institution to admit transfer students that are consistent with their academic goals and institutional mission. States with strongly integrated articulation systems, like Virginia, are more effective in decreasing achievement disparities for students transferring from community colleges to four-year institutions (Boswell, 2004). Falconetti (2009) suggested that states who have integrated articulation policies are more effective. Virginia's approach to articulation is designed to allow four-year institutions to maintain autonomous while providing affordable access to higher education to many Virginians. Virginia's approach to articulation has produced community college student baccalaureate attainment rates greater than the national average. The national

average for transfer student baccalaureate attainment was approximately 44% while Virginia's baccalaureate attainment rate for transfer students was 61% (NCES, 2003; SCHEV, 2011c).

Virginia is one of only 21 states offering guaranteed transfer to its public four-year institutions. In addition, Virginia's approach to transfer has yielded higher than average transfer rates, approximately 33% compared to 22% nationally; indicating Virginia's approach is successful at accomplishing the intended goal of increased transfer rates (VCCS, 2011c; Cohen & Brawer, 2003; O'Meara et al., 2007). However, Virginia has limited data on transfer students' academic performance once they enroll at the four-year institution. A successful transfer is essential to baccalaureate attainment. In December 2012, SCHEV published the *Report on Transfer from Community Colleges in Virginia Public Institutions*. The report examined transfer from Virginia community colleges to public four-year institutions. Data were disaggregated into three groups based on degree completion, type of degree completed, and whether a degree was obtained prior to transfer. Data were categorized based on two, three, or four-year graduation rates following transfer. Students not falling into those categories were considered enrolled or they did not graduate in the specified time. Of the 26,079 students that transferred to public four-year colleges between the 2004 and 2008 fall terms, approximately 61% graduated from the four-year institution within four years following transfer. The six-year graduation rate for the first-time, full-time freshman cohort beginning college in 2007 was 69% (SCHEV, 2014). These data suggest a disparity in academic outcomes for native and transfer students in Virginia. To understand this disparity native and transfer student characteristics and academic outcomes were examined within the context of Virginia's articulation policy which guarantees admission to the state's publically-funded four-year institutions. Furthermore, this study contributed to the

literature by comparing transfer and native student academic outcomes before and after policy implementation.

The purpose of this research was to compare native full-time enrolled students at a Virginia four-year public institution to equivalent transfer students to better understand why Virginia community colleges students are not graduating with a bachelor's degree at the same rate as their peers. To meet Virginia's goal of 100,000 new bachelor's degrees by 2025 the Commonwealth will have to increase the graduation rate of the public-four year institution as well as increase the transfer student graduation rate. To achieve this goal, Virginia will have to graduate approximately 61,000 students from each year beginning in 2011. This is equivalent to an annual increase of new degrees of 2.6% for the 14 year period (Gorman, 2013).

Understanding how policy affects baccalaureate attainment and time to degree completion will aid in crafting better policy in the Commonwealth that will identify students at the community college and target directed action to facilitate their attainment of a baccalaureate degree. Crafted policies will aid students with baccalaureate aspiration and foster a more effective transition from community college to the four-year institution. Using community college as a path to a four-year degree increases educational equality, reduces financial burdens on the student, and a reduction in cost for the state.

Research Questions

This research will be guided by several questions to address the impact of articulation policy on transfer student educational outcomes.

- 1) How do transfer student graduation rates and time to degree completion compare to those of native four-year students who have achieved junior status at a Virginia four-year public institution?

- 2) What individual student characteristics and college engagement factors are associated with transfer and native student baccalaureate degree completion in the Commonwealth of Virginia?
- 3) To what extent is Virginia's articulation policy associated with baccalaureate attainment rates and time to baccalaureate degree completion following community college transfer?

Design and Methodology

This study used a quantitative, non-experimental comparative design that included a secondary data analysis of two discrete data sources to examine the effect of government supported guaranteed articulation agreements on educational outcomes of junior level transfer and native four-year students. Institutional archived student record and student engagement survey data were examined to determine how transfer students compared to native four-year students. Student characteristics, baccalaureate attainment rates, and time to degree were examined for native students, transfer students with an associate's degree, and transfer students without an associate's degree. Furthermore, policy efficacy was examined by comparing academic outcomes of transfer students before policy implementation and transfer students after policy implementation.

The population and sample was collected from a single state university that enrolled approximately 23,700 undergraduate students in 2012 (U.S. News and World Report, 2013). The study institution between the years of 2004 and 2009 had a total of 4,570 students who transferred from Virginia community colleges (SCHEV, 2012). The transfer population consisted of 1,087 students who transferred with an associate's degree and 3,493 students who transferred without an associate's degree. Transfer students between 2004 and 2009 comprised approximately 19% of the institution's total undergraduate student body. The transfer student population at the study institution has been increasing each year.

The sample was composed of individuals who had achieved a junior standing at the senior institution, which was the equivalent of completing at least 60 college credits. The sample included students who enrolled, transferred, or graduated from the participating public four-year institution between 2008 and 2012. The transfer student sample was limited to students who had transferred from institutions that were part of the Virginia Community College System. Students transferring between four-year institutions and from out of state two-year colleges were excluded from the study. These criteria limited the sample to the population of interest and allowed for comparison of transfer students under Virginia's guaranteed admission policy. The benefit of comparing native and transfer students at the junior level allowed for the examination for two student groups who utilized different paths toward a baccalaureate degree. Student characteristic data and outcome measures were consistent with Wang's Model on baccalaureate attainment and persistence, previous work on articulation, and student classification data reported by SCHEV.

Analysis of student data was three-fold. First, graduation rate and time to degree completion were examined native students, transfer students with an associate's degree, and transfer students without an associate's degree. Second, using logistic regression, student characteristics were examined for predicting baccalaureate completion. Student characteristics were divided into precollege characteristics, college experiences, and environmental factors. Precollege characteristics included gender, ethnicity, parental education, and high school GPA. Student college experience characteristics included transfer GPA, GPA at graduation, the student's area of study, and college involvement. Environmental factors consisted employment and dependent status. Finally, the transfer student's academic outcomes were compared before and after articulation policy to determine the policy impact at the study institution.

Transfer students were compared to native four-year students to determine the effectiveness of Virginia's guaranteed admission policy and how transfer students compare to their four-year counterparts based on bachelor's degree attainment rates and time to degree completion. These aggregate data covered a five-year span beginning in 2008 and ending at the conclusion of the fall 2012 semester. Research questions one and two examined native and transfer students for the five-year period. Research question three was developed to examine transfer students based on policy implementation. The study institution implemented the guaranteed articulation agreement mandated by HERA in the spring of 2009. Students who transferred after the spring of 2009 were designated post-policy students. Having the a pre and post-policy date range allowed for the comparison of transfer students before and after policy implementation and subsequently determine the impact of legislative action on transfer and graduation rates at the institution. Data were compared for changes in baccalaureate attainment rates and time to degree completion. Data analyses for the study were three-fold and involved the use of chi-square analysis, analysis of variance (ANOVA), and logistic regression. Each research question used a distinct sub-sample of the overall sample. Descriptive statistics were provided for the overall sample and for each sub-sample. All data were analyzed using IBM SPSS Statistics 21.

A chi-square analysis using standardized residuals was used to determine if transfer and native students differed in graduation rates and if graduation rates for transfer students differed after articulation policy implementation. The standardized residuals allowed for the determination of which group of students contributed the most to the significant chi-square result. Student graduation was a dichotomous categorical dependent variable which required an analysis of the magnitude of discrepancy between the expected outcome and the actual outcome

across the levels of student type. ANOVA was used to identify differences in mean student time to degree completion for native and transfer students, as well as, differences in mean time to degree completion for transfer students before and after policy implementation. Time to degree was a continuous dependent variable and assumed to follow a normal distribution. Examining differences in mean time to degree completion identified whether community college attendance hindered academic outcomes for transfer students. Furthermore, examining the difference in mean time to degree using ANOVA identified if articulation policy implementation improved transfer student academic outcomes at the study institution. Logistic regression analysis was conducted on archived student record and engagement survey data and used to predict what student characteristics were associated with baccalaureate attainment at the study institution. Understanding which factors influenced transfer student academic success will assist in crafting future articulation policies targeted toward transfer students with baccalaureate aspirations.

Definition of Terms

Articulation: Robertson-Smith (1990) defined articulation as a process that coordinates curriculum at different levels of education promoting increased efficiency and effectiveness in the educational process. Coordination can occur between secondary and post-secondary institutions, as well as between two and four-year institutions. For the purposes of this project articulation agreements will refer to coordination at the post-secondary level, in particular the coordinated transfer between two-year and four-year institutions.

Articulation agreement: Articulation agreements are formal collaborative agreements between two institutions that allow students to begin their program of study at one institution and seamlessly allow the transfer of course credits toward the completion of a degree or

program (Roksa, 2009; O'Meara et al., 2007). The benefits of articulation agreements are two-fold. Students benefit by the increased access to educational opportunities while governments reduce the cost of educational funding to post-secondary institutions (Roksa, 2009; Mosholder & Zirkle, 2007; Anderson et al., 2006).

College experience: Defined by Wang (2009) as possessing several variables consisting of student enrollment intensity, remediation course work, college involvement, and academic performance.

Enrollment Intensity: Defined as whether a student is enrolled full or part-time.

Environmental factors: External demands placed on the college student. These demands include work and family responsibilities (Wang, 2009)

Junior level student: A student who has attained junior status at a four-year college or university either by enrolling directly into that institutions or through transfer from a community college (Melguizo et al., 2011). Junior status is indicated by achievement of 60+ credit hours of college level course work.

Native four-year student: A student who graduated high school and enrolled directly into a four-year college or university without ever attending a community college.

Positive academic outcome: The student graduates from the four-year institution with a baccalaureate degree between the spring 2008 semester and the fall 2012 semester.

Pre-college factors: Pre-college factors include demographic background, academic resources, high school curriculum, and psychological attributes (Wang, 2009).

Transfer student: "Transfer refers to the flow of students between institutions and programs"

(Roksa, 2009). In the context of this study, transfer refers to the movement between a two-year and four-year institution. A transfer student is defined as a freshman with 12 or more credits who transfers to a public in-state four-year institutions (Cohen, 1994).

Vertical Transfer: The process of transferring from a two-year to a four-year institution.

Chapter 2

Review of the Literature

Method for Review of the Literature

The review of the literature was a multi-step approach which included an electronic search of published journal articles, an electronic search of documents published by the Commonwealth of Virginia, and a hand search of embedded reference lists in previously obtained documents. The initial electronic search was conducted using the Educational Resources Information Center (ERIC) via the U.S. Department of Education. A follow-up search using Google Scholar was conducted using similar search terms. The searchable terms included articulation, policy, transfer, GPA, higher education, demographics, pre-college factors, college experience, and community college student. The electronic search of state documents included three sources: SCHEV, VCCS, and the Legislative Information Center Legal Code of Virginia, Title 23 pertaining to higher education. State related research information was obtained from agency supported websites. Documents from SCHEV were extracted from the categorical links provided by the agency which included “Legislative Issues,” “Higher Education Opportunity Act (Restructuring),” “Research and Statistics,” and “SCHEV Reports.” VCCS literature was obtained from categorical links which include “Achieve 2015,” “News & Events,” and “Research and Statistics.” Embedded reference lists were examined for articles, government documents, and dissertations that were applicable to the current research.

The literature search resulted in 46 articles and white papers related to community college transfer and articulation policy. Articles related to policy and individual student factors that influence academic success and transfer rates were selected. A total of 22 articles were determined to be applicable and bear relevance to this research topic and meet the *Standards for Reporting on Empirical Social Science Research in AERA Publications* (AERA, 2006). For inclusion the article had to be published after 1990, published in a peer reviewed journal, applied directly to community college transfer students, or associated with articulation policy. The article inclusion date was chosen because during the 1990s policy makers began to show an increased interest in state supported articulation and as such, a growth into research associated with community college transfer increased. Excluded from the inclusion criteria were several seminal pieces of research that took place prior to 1990, as well as several government research documents and review articles that were discovered through the original search.

Community College Student Transfer: Persistence and Outcomes

Student transfer is an individual decision. However, several predictive variables have been identified to determine the likelihood of transfer. Factors such as the student's socio-economic status (SES), age, academic preparation, gender, access to four-year institution, program of study, and whether they live in a rural or urban setting influence the likelihood of vertical transfer (Tinto, 1975; Adelman, 1999; Lee & Frank, 1990; Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987; Hagedorn et al., 2008). These variables can be organized into three categories: pre-college factors, college experiences, and environmental factors (Wang, 2009). In addition, the student's pre-college characteristics, college experiences, and environmental factors have been used to predict the community college transfer student's persistence and educational outcome (Dougherty & Kienzl, 2006; Doyle, 2010; Gawley &

McGowan, 2006; Hagedorn et al., 2008; Hagedorn et al., 2010; Melguizo et al., 2011; Wang, 2009).

Pre-college factors. Pre-college characteristics have been studied for their influence on attrition, transfer, and degree attainment (Tinto, 1975; Adelman, 1999; Lee & Frank, 1990; Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987). Nonetheless, using a single pre-college factor to predict college student educational outcome may be inappropriate (Terenzini & Pascarella, 1978). Pre-college factors include high school curriculum, demographic background, and psychological attributes.

Demographic background. Demographic background is commonly used when examining transfer students. The use of gender, SES, age, and ethnicity have been used to determine the probability of a student staying in college and subsequently obtaining a degree (Adelman, 1999; Tinto, 1993; Dougherty & Kienzl, 2006; Hagedorn et al., 2008; Wang, 2009). Individuals with lower income, increased age, and who are Black or Hispanic had a reduced likelihood of transfer and reduced baccalaureate degree attainment (Adelman, 1999; Tinto, 1993; Dougherty & Kienzl, 2006; Hagedorn et al., 2008; Wang, 2009).

Gender. Gender is readily utilized as a demographic classifier in educational research and often used when describing a college student's likelihood of transfer, college persistence, and educational outcome. Several authors documented a gender relationship between a student's likelihood of transfer, college persistence, and educational outcome (Adelman, 1999; Lee & Frank, 1990; Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987). Wang showed female transfer students were more likely to complete a bachelor's degree than their male counterparts but did not offer justification for this finding and cited prior research by Adelman (1999) and Roksa (2006a) for the influence of gender on persistence and educational

outcome. Wang's study used logistic regression to analyze college persistence and baccalaureate attainment for 524 transfer students. The data were gathered from the National Educational Longitudinal Study (NELS) and included students who graduated by the year 2000. NELS is a nationally representative sample of approximately 25,000 eighth graders first interviewed in 1988. A number of follow-up studies were conducted through the 1990s and participants were tracked for student academic progression through the year 2000. Students were examined based on their pre-college characteristics, college experiences, and environmental factors. Both Adelman and Roksa's findings showed gender had an effect on persistence and educational outcome. Similar to Wang, both Adelman and Roksa were not conducting research to clarify gender effects but to identify what student factors predict transfer, persistence, and educational outcome.

Lee and Frank (1990) showed gender played a role in transfer, but unlike the other studies, showed males and not females had a greater likelihood of transfer from a two-year to a four-year institution. Lee and Frank examined transfer rather than persistence and educational outcome. They included data from the High School and Beyond longitudinal study. These data were collected in the early 1980s and included approximately 30,000 random students from more than 1,000 randomly selected high schools. Lee and Frank used data collected from two follow-up surveys which included 10,815 participants. Analysis of these data included the investigation of the probability in transfer from a two-year to a four-year institution. They included in their analyses all full and part-time students who attended community college during any semester within the first two years following high school. The inclusion criteria limited the sample to 2,500 students. To be considered as a "transfer" group, students had to be enrolled at a four-year

institution either full or part-time during any semester of the period between two and four years after high school and attended community college prior to transfer to the senior institution.

Adelman (1999) followed a national cohort of tenth grade students from 1980 to 1993 and showed gender had no effect on baccalaureate degree completion. The study utilized student data collected by the High School and Beyond national database in an attempt to establish which student factors contribute the most to long-term baccalaureate completion. The study was conducted using logistic regression analysis of student high school transcripts, student standardized test scores, and survey data. Data were examined based on three categories which included student academic resources, demographic information, and an examination of college attendance patterns. Major findings from the study determined the student's high school curriculum impacted baccalaureate degree completion but the number of colleges attended did not affect a student's likelihood of completing a bachelor's degree. Student demographics, including gender, were not a major predictor of baccalaureate completion.

Roksa (2006a) examined student data from the Postsecondary Educational Transcript Study (PETS) which is a component of NELS. Students who reported enrollment in post-secondary education in the last two follow-up interviews were included in the PETS sample. The PETS reports were combined with the Integrated Post-Secondary Education Data Systems (IPEDS) which codes for the post-secondary institution that the participant attended. IPEDS was used to construct the independent variables in this study. The sample for the study included students who entered post-secondary education by September 1994 and within two years of high school completion. The sample included 2,680 students enrolled in approximately 600 community colleges across 49 states. Three educational variables were examined and included associate's degree attainment, transfer, and baccalaureate attainment. Data were analyzed by

logistic regression and compared students based on vocational or academic tracks at the community college. The findings showed female community college students were more likely to earn an associate's degree and more likely to earn a bachelor's degree following transfer.

Others have shown no difference in persistence and educational outcomes based on gender (Hagedorn et al., 2008; Melguizo et al., 2011). Hagedorn et al. (2008) explored the relationship between student factors and urban community college transfer using discriminant analysis. Data were collected from 5,000 participants in the California Community College System using information gathered from student records. The findings showed no difference between male and female transfer rates (Hagedorn et al., 2008). However, the study found enrollment intensity, transfer readiness, and academic progressions were stronger predictors of student transfer and persistence than gender.

Melguizo et al. (2011) supported Hagedorn et al.'s claim that gender had no effect on educational attainment and persistence. Melguizo et al.'s work differed from Hagedorn et al.'s because their study used national longitudinal data rather than state data. Melguizo et al.'s sample consisted of individuals "who graduated from high school on time, enrolled in college, and attained junior status at a four-year college either by enrolling only at a four-year college or by transferring from a community college" (p. 271). The final sample was composed of 3,160 individuals, of which 640 were community college transfer students and 2,520 were native four-year students. Data were analyzed by regression analysis and propensity score matching (PSM). PSM was used to "simulate the characteristics of an experimental design by matching groups of students based on observable characteristic so that the only difference is the type of treatment received" (p. 273). Melguizo et al. found no difference in the educational outcomes or the

number of non-remedial credits attained by community college transfer students who achieved junior status at a senior institution and their native four-year counterparts.

Socioeconomic status. SES affects transfer, persistence, and educational outcome and is a more reliable predictor of transfer and academic outcome than gender. Tinto (1975), in his seminal work on college retention, identified SES as a factor for determining withdrawal or dismissal. Tinto observed students with lower SES tend to have lower persistence in college due to academic dismissal. This dismissal was the result of lower aptitudes and lower intellectual development than the average college student. Since Tinto, much empirical research has gone into how SES affects educational outcome. These studies showed lower SES resulted in a decreased rate of transfer, persistence, and baccalaureate attainment (Bailey et al., 2005a; Dougherty & Kienzl, 2006; Lee & Frank, 1990; Melguizo et al., 2011; Roksa, 2006a; Velez & Javalgi, 1987; Wang, 2009).

Bailey et al. (2005a) conducted a descriptive report to measure institutional characteristics that influence success of community college students. The report was primarily focused on low-income and minority students. The data were gathered using The National Center for Educational Statistic (NCES) IPEDS annual report of the Beginning Postsecondary Students Longitudinal Study 1996-2001 (BPS: 96-01). The BPS information showed lower SES corresponded to a decreased rate of credentialing and disproportionate degree attainment at the community college. As a result these students had lower transfer rates and subsequently lower baccalaureate attainment rate at the four-year institution. Bailey and colleagues further reported students in the lowest income quartile were less likely to transfer to a four-year institution. In addition, students enrolled at the community college in the lowest quartile for income had transfer rates of 19% compared to 47% for students in the highest income quartile. Of the 19%

of low income students that transferred only 26% earned a bachelor's compared to 37% for higher quartile students.

Many of the studies discussed in this review gathered their data from national longitudinal databases using nationally representative samples. A limitation of secondary data analyses of nationally represented databases is the absence of key descriptive variables (Bryman, 2012, p. 316). Were the variables gathered in the initial sample theoretically important to the secondary analysis or did the authors have to compromise? In addition, national databases often do not capture community college students who return to college after being out of high school for more than two years. However, even with the limitations, SES has consistently been shown to be a predictor of graduation and persistence. Particularly, a lower SES was associated with lower transfer, college persistence, and graduation rates (Lee & Frank, 1990; Melguizo et al., 2011; Velez & Javalgi, 1987; Wang, 2009). Research suggests SES affects student transfer and student outcome because these individuals tend to have less academic preparation at the high school level and less likely to follow a higher level academic track prior to entering college (Alderman, 1999; Melguizo et al., 2011). Lower income students tend to be less prepared and over represented at the community college which results in lower persistence and transfer rates (Wassmer et al., 2004).

Race/Ethnicity. Community college is an entry point for many students pursuing higher education. The open admission policy and reduced cost of community college make it a viable pathway to obtaining a bachelor's degree for many students. Many community colleges host a diverse student population. Unlike SES, the student's ethnic background does not prove to be a consistent predictor of transfer, persistence, and baccalaureate attainment. Several authors have reported ethnicity does not influence a student's likelihood of transfer or degree attainment

(Roksa, 2006a; Vorhees, 1987; Wang, 2009). Others have reported student ethnicity as a predictor for transfer and academic success (Dougherty & Kienzel, 2006; Feldman, 1993; Hawley & Harris, 2006; Lee & Frank, 1990; Long & Kurlaender, 2009; Velez & Javalgi, 1987; Wassmer et al., 2004).

Community colleges enroll the greatest proportions of Black and Hispanic students among all undergraduate institutions (Bailey et al., 2005a). However, many question the transfer function of the community college as a viable way for obtaining a bachelor's degree for these groups (Long & Kurlaender, 2009; Rouse, 1998) due to lower transfer rates and negative academic outcomes. Rouse (1998) examined state variation in two and four-year college systems to address educational attainment. The study measured educational attainment in three ways. First, the study examined the average number of years of education for high school graduates between the ages of 25 and 34. Second, the study examined the proportion of the population with a bachelor's degree. Finally, the study examined the effect of the two-year college on the proportion of individuals with some college education. Rouse's data consisted of a random sample of public release micro data from 1970-1990. The findings were calculated based on a proportion of 10,000 high school graduates and showed the cost of college and attending a two-year institution lowers educational attainment. Because minorities are disproportionately represented at the community college they may be at a disadvantage when looking to transfer or seek higher levels of education.

Velez and Javalgi (1987) reported being Black or Hispanic increased the odds of transfer during the 1970s and speculated the increase was a result of affirmative action programs and greater aspirations of minority students. Their study examined The National Longitudinal Survey of High School Class of 1972 using students who were enrolled in two-year post-

secondary education by the fall following high school graduation. Velez and Javalgi recorded a transfer event when the student responded to a follow-up questionnaire about attending a four-year institution after being enrolled in a two-year college. The sample included 1,407 students with approximately 50% being composed of males. The ethnic make-up of the sample was approximately 87% Caucasian.

Lee and Frank (1990) reported a weaker relationship between ethnicity and transfer but still a significant factor in determining minority matriculation. Both, Velez and Javalgi as well as Lee and Frank used national longitudinal data. The data from Velez and Javalgi's was from the 1970s while Lee and Frank's sample was from the 1980s. The observed difference may be a result of the time period for which the samples were gathered and explained by affirmative action policies in the early 1980s that were absent in the early 1970s. These policies increased the transfer rate for minorities in Lee and Frank's study making the effect of ethnicity on transfer less significant.

Institutional data show a larger student cohort of Blacks and Hispanics equates to decreased transfer rates for that institution; conversely, a larger White or Asian population show an increase in transfer rates (Wassmer et al., 2004). Wassmer's study examined data from the California Community College Chancellor's Office collected on all first-time freshmen. The authors examined factors associated with transfer rates using regression analysis. The analysis focused on two different definitions of transfer. The first definition involved dividing the number of transfer students by the total number of full-time students in the study cohort at the given community college. This definition included students who did not intend to transfer and was considered the "inclusive" transfer rate definition. The "narrow" transfer rate definition was more restrictive and calculated by dividing the number of students who transferred in the

cohort by the cohort students who completed at least 12 credits and enrolled in transferable English and math courses. According to Wassmer and colleagues, the differences may be linked to the “characteristics of and the resources available to, those racial/ethnic groups or to the policies, practices and environment at the institutions” (p. 664). The institutional effects associated with the college may explain why Hawley and Harris (2006) observed race was closely associated with persistence of first-year community college students. They showed being Black or Hispanic was a strong predictor of retention. These groups had an increased likelihood of dropping out during their first year of community college enrollment. Generally, Caucasian and Asian students had higher retention rates than Black students (Feldman, 1993). Lack of persistence early on with these minorities would result in a lower transfer rate when compared to Caucasian and Asian-Americans. Bailey et al. (2005a) reported African American students who started at community college had a 50% chance of obtaining an associate’s degree, as well as had about a 2% chance of earning a bachelor’s degree. Only about half as many African American students transferred to four-year institutions as Caucasian students. Bailey et al.’s findings did not include Asian students who exhibited transfer, retention, and baccalaureate attainment rates similar to Caucasian students.

Dougherty and Kienzl’s (2006) research findings diverged from these earlier studies and showed no significant relationship between minority status and transfer. Dougherty and Kienzl used NELS data and Beginning Post-Secondary (BPS) data. Both data used a large nationally representative student sample. The student sample entered post-secondary education and was subsequently tracked through higher education. Dougherty and Kienzl examined transfer which was established as a binary measure based on whether the student transferred to a four-year institution or did not transfer. All community college students were examined for transfer status.

The authors examined social background, precollege characteristics, college experiences, and external demands and how these factors affected student transfer. Data were analyzed through regression analysis. The decreased role of ethnicity on transfer may have been related to shifts in the 1980s and 1990s to reduce racial gaps in higher education (Dougherty & Kienzl, 2006).

Velez and Javalgi, Lee and Frank, and Dougherty and Kienzl showed change over a three decade period but their studies did not address how other factors, such as academic preparation, transfer agreements, or intrinsic motivation affect minority transfer and persistence.

Students who start their higher education careers at community college rather than a four-year institution are less likely to complete a bachelor's degree (Long & Kurlaender, 2009). Long and Kurlaender examined how community college transfer students compared to native four-year students within Ohio's higher education system. The study tracked student outcomes for a nine year period and used regression analysis, as well as propensity score matching (PSM) to estimate the impact of community college on educational outcome. First-time freshman were tracked beginning in the fall of 1998 through the spring of 2007 with an emphasis on baccalaureate completion. The sample was restricted to students who took the ACT college admission test. They found students who first enrolled at a community college were less likely to complete a baccalaureate degree. Furthermore, they found transfer students had lower earned credit hours, had an increased likelihood of dropout, and the negative impact of first attending a community college differed across ethnic background. Specifically, African American transfer students had the lowest baccalaureate attainment rates. Although, Long and Kurlaender's study was limited in geographic region, it highlighted that African American students were affected by the negative impact of community colleges more so than Caucasian students since they were disproportionately represented at the two-year college.

Early studies showed ethnicity affected student transfer and retention. However, more recent empirical research showed ethnicity was not strongly associated with transfer and educational outcome (Dougherty & Kienzl, 2006; Roksa, 2009; Wang, 2009). The research suggests if minority students can persist through community college then the likelihood of transfer and baccalaureate degree attainment is similar to Caucasian students. The biggest hurdle for minority student transfer and baccalaureate attainment was retention and persistence through the student's early community college years (Bailey et al., 2005a).

Academic resources. Academic resources prior to college have been identified as a strong and reliable predictor of academic success (Aldeman, 1999). Academic resources are typically defined by two factors: high school curriculum and high school academic intensity (Wang, 2009). Tinto (1975) identified academic resources prior to college entrance as a variable in his model of college retention. Tinto stated, "the ability level of students in school and the social status composition of the school affect not only the individual's perception of his own ability, but also his expectations for future college education; in this sense, they affect his commitment to the goal of college completion" (p. 102).

More recently, several authors have documented the effects of educational resources on college persistence, transfer, and student success. The type of high school curriculum, academic versus vocational, have been associated with college student persistence and baccalaureate attainment (Lee & Frank, 1990; Wang, 2009). Wang (2009) showed through logistic regression, from a nationally representative sample, that baccalaureate attainment was strongly associated with the student's high school curriculum. However, college persistence was not affected. Wang showed students who followed an academic track in high school were more likely to attain a bachelor's degree than students who followed a vocational track. In conclusion, Wang

theorized a quality academic program in high school “might imply a long-term academic investment” that trumps other disadvantages associated with attending community college.

Wang’s findings supported previous research that showed academic resources in high school were linked to academic success in college. Data collected in the early 1970s from a national longitudinal study showed increased high school GPA was linked to a higher likelihood of vertical transfer (Velez & Javalgi, 1987). However, the magnitude of effect was smaller than other variables that were studied. Velez and Javalgi, similar to Wang, speculated an academic track in high school presents a more favorable environment that encourages college success, and therefore provided students with a more positive opinion of themselves and promoted positive academic outcomes. Velez and Javalgi’s findings were supported by Lee and Frank (1990) who showed community college transfer students were more academically oriented in high school and followed a more academic track. The high school characteristics exhibited by the transfer students were similar to those students who enrolled directly into four-year institutions and showed no difference in baccalaureate attainment rates than native four-year students (Lee & Frank, 1990; Melguizo et al., 2011). Lee and Frank’s finding are supported by Dougherty and Kienzl (2006) who found high school math scores in the twelfth grade predicted the likelihood of transfer for community college students.

High school GPA was the strongest predictor of one-year retention at the community college (Feldman, 1993). Feldman’s study consisted of an examination of 1,623 students from a single rural community college. These data were gathered over a two-year period and the latter year was compared to the former year. It was assumed students still enrolled in the second year had been retained. Those not enrolled, were assumed to have dropped out. 1,425 students matriculated to the second year and of those students, 1,140 participated in the study. Low high

school GPA equated to decreased retention. Feldman showed an inverse relationship between retention and high school GPA. For every one point increase in high school GPA there was a decrease in the predicted dropout rate for that student. An increase in retention equates to an increased likelihood of positive academic outcomes, and as a result the negative effects of attending community college once the student transfers to the four-year institution are non-existent (Long & Kurlaender, 2009).

Psychological attributes. Student psychological attributes affect academic success (Bers & Smith, 1991; Dougherty & Kienzl, 2006; Gifford et al., 2006; Grimes, 1997; Hawley & Harris, 2006; Tinto, 1975; Velez & Javalgi, 1987; Vorhees 1987). As a pre-college factor, internal locus of control and student aspiration/expectancy are reliable indicators of transfer, retention, and academic outcome. Individual characteristics related to personality and attitudinal difference influence student persistence in college (Tinto, 1975). While establishing his model on college student retention, Tinto (1975) examined the relevant literature of the time and concluded college dropouts have personality characteristics that make it difficult for them to achieve in a college setting. The student's commitment toward college completion will affect retention and subsequently, transfer and baccalaureate attainment. The community college student's locus of control and aspiration/expectations have been explored and shown to impact student academic outcomes.

Locus of control. Locus of control (LOC) has been documented in education and explored as a factor in college persistence and academic success (Gifford et al., 2006; Grimes, 1997; Wang, 2009). LOC is defined as an individual's belief about control over life events. Individuals with internal LOC feel personally responsible for life events, where as individuals with external LOC believe outcomes in life are influenced by factors out of their control (eg.

fate, luck, other people). Most individuals fall within the two extremes (Findley & Cooper, 1983). Findley and Cooper (1983) conducted a quantitative review of the relevant research investigating the relationship between LOC and academic achievement. Findley and Cooper found internal LOC was associated with increased academic achievement and the magnitude of the relationship was determined to be small to medium. However, the relationship was stronger in adolescents than in adults and children.

Grimes (1997) conducted a study examining data collected from 140 recently admitted community college students. The college consisted of 8,000 students with a minority population of 15%. The sample consisted of 91 underprepared students. The study employed several psychological and assessment self-report instruments designed to measure learning strategies, LOC, and self-esteem. Student data was mined from the college's database. Grimes found students who were underprepared exhibited more external LOC and blamed their failures on the environment rather than taking personal responsibility for the outcome. These individuals had lower retention rates and less academic success than individuals showing a more internal LOC. It was theorized these students had decreased expectation in achieving their goals and were more likely not to be academically successful in the long-term. However, Grimes did not show whether GPA, study skills, or self-esteem differed between underprepared students and college ready students and stopped short of recommending LOC as a predictive factor of retention and overall academic success. Instead it was suggested LOC was more predictive of self-concept than academic achievement.

More recent studies have shown LOC plays a more substantial impact on academic success and retention of first year college students (Gifford et al., 2006). Gifford and colleagues examined two cohorts of students at a large public institution. Students were examined during

their freshmen year. The total number of study participants was 3,066. Using the Nowicki-Strickland Internal External Control Scale students were evaluated for LOC. Student characteristics associated with academic success were obtained from the institution's database. Correlational analysis, followed by individual t-tests, determined the relationship between LOC and academic success. Individuals with internal LOC had higher GPAs than individuals with external LOC. The results were in line with what Findley and Cooper observed and supported the notion that students with increased GPA have increased retention rates and academic success. External LOC students may be more prone to dropping out of college. Gifford and colleagues explained that retention was related to the reliance of one's self to get through increasingly difficult college course as one matriculates through academia. Since individuals with external LOC tend to not be self-reliant then they are more likely not to maintain the "self-efficacy" and "self-autonomy" needed to succeed in college. As a result they were less likely to be academically successful and had lower GPAs.

Wang (2009) examined how LOC affected baccalaureate attainment in addition to student persistence at the community college transfers. Wang found no effect on baccalaureate attainment based on LOC. However, LOC did affect student persistence. It was shown for every one point increase in measured LOC the student increased the likelihood of remaining in college and subsequently transferring to a four-year institution. Students with increased internal LOC place a greater intrinsic value on higher education and maintain their commitment to getting a bachelor's degree or higher and therefore remain in college.

Baccalaureate aspirations/expectations. A number of studies have shown a student's aspiration or expectation of attaining a bachelor's degree was a strong indicator of student transfer and retention (Bers & Smith, 1991; Dougherty & Kienzl, 2006; Gifford et al., 2006;

Grimes, 1997; Hawley & Harris, 2006; Tinto, 1975; Velez & Javalgi, 1987; Vorhees 1987). A strong predictive value is placed on the student's aspiration for a bachelor's degree. It has been shown students with plans to attend a four-year institution were more likely to transfer (Velez & Javalgi, 1987). Transferring to a four-year institution was "partially an expression of the individual's goals and intentions" (p. 92). Velez and Javalgi's results were supported by Dougherty and Kienzl (2006). Dougherty and Kienzl showed the student's educational aspiration had a significant impact on student transfer. The findings of Velez and Javalgi as well as Dougherty and Kienzl were similar despite two decades between the data. They showed educational aspirations had a significant impact on transfer when other factors like high school preparation and social background were controlled. Educational aspiration is pivotal in determining a student's likelihood of transfer and has an effect on college retention.

Vorhees (1987) studied 369 new and continuing students enrolled in a suburban community college. Subjects were randomly enrolled in one of 56 classes assigned to take the American College Testing program's Student Opinion Survey, which is a standardized instrument designed to provide profiles of student attitudes and opinions. Results were categorical in nature and analyzed by logit analysis using chi-squared ratios. The results of the study showed student's goals were important to college retention (Vorhees, 1987). This early work on persistence has been supported by more recent studies. Bers and Smith (1991) found student intent and educational objective were important factors in retention and college persistence, although it was a weaker association than other factors. In the Bers and Smith study students were randomly selected and administered a survey instrument. The research included 1,142 subjects. The self-administered survey was designed to measure student objectives, future

educational plans, future enrollment plans, and demographic information. Results were analyzed through factor analysis.

Other studies have found no association with student educational aspiration and retention rate (Feldman1993; Melguizo et al., 2011). Feldman found goals did not affect retention when controlling for other variables. By itself, a student's aspiration did not affect the likelihood of retention following one year at the community college. However, the results of this study may have been affected by students who transferred to a four-year institution rather than return to the community college. Feldman's findings may have been similar to Hawley and Harris (2006) who found students were enrolled in college just, not in the original community college. Findings have shown there are differences in baccalaureate aspirations between two-year and native four-year institution students; however, no significant difference in bachelor's degree attainment is observed (Melguizo et al., 2011). These finding are interesting but not addressed by Melguizo and her colleagues during their discussion. It can be postulated they were studying students that had already transferred to a four-year institution and these transfer students exhibited similar degree aspiration as their native four-year counterparts and persist to obtain a bachelor's degree.

Hawley & Harris (2006), using survey methodologies, examined student characteristics and the impact of these characteristics on persistence of first year students in a large urban community college. The survey response rate was 5.1% with only 108 students out of 2,120 possible participates returning the instrument. Data were examined through discriminant analysis. They found students' intentions to transfer were inversely related to college retention. What Hawley and Harris found was many of the students who did not return after the first year were enrolled in four-year institutions. Hawley and Harris posited that students who plan to

transfer were leaving the community college after receiving some college credits and improving their GPA. On the surface these finding showed reduced retention rates at the community college, but as a whole, student retention, based on intention or expectation, was consistent with previous findings.

Community college students who showed baccalaureate aspirations in their senior year of high school had an increased likelihood of earning a baccalaureate degree (Wang, 2009).

Wang's findings supported previous work that showed students with bachelor's aspirations or expectations had an increased likelihood of transfer and retention. Wang proposed the association between baccalaureate aspiration and an increase in transfer can be explained expectancy-value theory. Expectancy-value theory states an individual's motivation to achieve is dependent upon the expectation for success and the value placed on succeeding (Wingfield, 1994). This applies to transfer and educational outcome because those individuals that expect to earn a bachelor's degree are more motivated and strive to make progress toward their goal and increasing the likelihood of a positive educational outcome (Wang, 2009).

College experiences. The student's college experience has an impact educational outcome. College experiences are composed of the student's enrollment intensity, amount of remediation, college involvement, and academic performance (Wang, 2009). Along with the precollege factors, the community college student's college experience will impact transfer, retention, and baccalaureate attainment. Individual college experiences may factor differently in predicting a student's likelihood of transfer, retention, and educational outcome.

Enrollment intensity. Enrollment intensity is a measure of a student's course load where students are categorized as part- or full-time. It has been speculated the level of enrollment indicates the student's commitment to their educational success (Wang, 2009).

Research findings related to the effects of enrollment intensity are mixed. Voorhees (1987) showed no relationship between enrollment intensity and college retention. Supporting these finding were Wang (2009) who showed enrollment intensity had no effect on persistence and subsequently baccalaureate attainment. However, a number of other studies have shown enrollment intensity as a predictor of student transfer, retention, and baccalaureate attainment (Aldeman, 2006; Crook, et al., 2012; Dougherty & Kienzl, 2006; Doyle, 2010; Feldman, 1993; Hagedorn et al., 2008; Lee & Frank, 1990). Students who took more courses per semester were more likely to transfer than students taking fewer courses (Hagedorn et al., 2008). Enrollment intensity can be linked to the amount of time a student has to devote to academic endeavors and may also indicate the student's commitment toward education (Wang, 2009). By examining the level of enrollment, the students who enroll in more classes and had more of a commitment to their educational goals were more likely to transfer to a four-year institution. Full-time students had a higher rate of bachelor's degree attainment than part-time students (Berkner et al., 1996; Horn & Premo, 1995).

The discrepancies between Wang and Vorhees can be explained by examining their methodologies. Voorhees used the American College Testing program's Student Opinions Survey. This is a standardized self-report instrument that measures student attitudes and opinions regarding college. The lack of relationship between enrollment intensity and retention may be an artifact of the inherent problems associated with self-report measures. The studies that found significant relationships were using national longitudinal data. Wang showed no relationship between enrollment intensity and community college persistence and baccalaureate attainment. Unlike these other studies, Wang chose to include students who transferred from a two-year to a four-year institution. Wang eliminated the comparison between part-time and full-

time students. Empirical findings showed full-time students were more likely to transfer than part-time students (Dougherty & Kienzl, 2006; Doyle, 2010; Hagedorn et al., 2008; Lee & Frank, 1990). Wang was studying students who successfully transferred and full-time students were more likely to transfer, therefore the impact of enrollment intensity was eliminated.

Most important for degree attainment and transfer is the number of courses completed in the first year of community college. Twenty course credits completed in the first year of community college corresponded to a higher baccalaureate attainment rate, about 78% earned a degree (Adelman, 2006). Adelman's study was a national descriptive study designed to "explore the academic resource and momentum student build through their high school and college careers, and analyzed the relationship between those factors and degree completion rates" (p. 3). The analysis contained seven steps reflecting different variables: (1) demographic background and high school history, (2) post-secondary entrance (type of institution), (3) first post-secondary year history, (4) factor of financing education, (5) post-secondary attendance patterns, (6) extended post-secondary history, and (7) the final model with complete academic history. The study used NELS data which covered approximately 12,000 students. Doyle (2010) supported these finding by showing a "dose response" relationship between number of courses taken and the likelihood of student transfer. He found increased credit hours in the first year of community college increased the student's transfer probability. Doyle's study consisted of BPS data where students began their post-secondary careers in 1996. Doyle had a sample size of 930 participants and used PSM and regression analysis to determine the relationship between successful transfer and the number of non-remedial credits earned within the first year enrolled at the community college. Transfer students earned about twice as many credits than non-transfer students within the first two-years of community college (Lee & Frank, 1990). The increase course completion

by transferring students resulted in an increase in bachelor's degree attainment (Crook, et al., 2012).

Crook and colleagues showed the successful completion of twelve or more credit hours prior to transfer increased the student's probability of attaining a bachelor's degree. Crook et al.'s study used a specific university system to examine the impact of obtaining an associate's degree prior to transfer and if that led to better baccalaureate outcomes. The study conducted a secondary review of the system's institutional database. The review examined a cohort of transfer students in an associate's degree program that matriculated into a baccalaureate program during the academic year of 2003-2004. The longitudinal data allowed the researchers to track 4,549 students over a four-year period. The database included student demographics, high school performance, early college performance, and enrollment status.

Remediation. Remediation is an unfortunate reality for many community college students. Unlike their four-year counterparts, the open door policy of the community college provides many underprepared students the opportunity to obtain a college degree or certificate. Because many students are underprepared, remediation in math and reading is required to prepare them for the rigors of college academics. Unfortunately, the literature is unclear on the impact of remediation on the student's likelihood of transfer, persistence, and baccalaureate attainment.

Data collected from the BPS showed in the mid-1990s remediation was required by many students entering post-secondary education at both the community college and the four-year institution (Bailey et al., 2005b). The results of Bailey et al.'s analysis showed over 42% of community college students had to enroll in at least one remedial course. This result was more than twice that seen at the four-year institution, thus indicating students at the community college

may be starting at lower academic levels than their four-year counterparts. In addition, of the community college students enrolled in remedial course work nearly two-thirds of them spent over a year in remediation compared to a little over one-third of students at the four-year school. Bailey et al. showed remediation was not dependent on SES. Ninety-one percent of community college students who took remedial course work in the first year of college were in associate's degree programs versus vocational programs. This result indicated vocational training at the community college did not require more advanced English or math skills.

Several authors reported remedial course work affects college retention, transfer, and academic outcomes (Adleman, 1999; Bailey & Alfonso, 2005; Pascarella & Terinzini, 2005; Grimes, 1997; Hagedorn et al., 2008; Wang, 2009). Bailey and Alfonso (2005), in their review of the literature on community college effectiveness and persistence, showed remedial course work had a negative effect on college retention. Their report showed students who take remedial courses graduated at lower rates than students who are not required to take remediation. Students with lower reading abilities were more likely to need remediation and had lower degree attainment rates than students who did not. Nonetheless, students who persist through remediation had transfer rates similar to community college students who were not required to enroll in remedial courses. To reduce the negative impact of remediation on transfer and persistence, institutional action is required. Institutional practices that promote retention and reduce the negative effects of remediation include: (1) assessment of the student's remedial needs after they have enrolled into a college degree program, (2) provide different grading criteria for remedial courses, and (3) provide college credit for remedial course work taken (Perin , 2006).

Remediation for community college students was shown to decrease the odds of baccalaureate attainment; however, remediation had no impact on college persistence (Wang, 2009). Wang suggested remediation reinforces negative perceptions of the student's own abilities, thus increasing withdrawal rates prior to baccalaureate attainment. Underprepared community college students required to take remedial reading were more likely not to pass the course which led to higher withdrawal rates (Grimes, 1997). Community college transfer students who had higher reading placement scores were more likely to transfer (Hagedorn et al., 2008). Not all of these students tested out of remediation indicating remedial course work did not have a completely negative effect on student transfer. This is supported by Feldman (1993) who showed remediation was not a reliable predictor of community college retention.

Grade point average. Several student characteristics have been utilized to study student transfer and academic success, but community college GPA has been shown to be the strongest indicator of future college success. It correlates positively with transfer, retention, and baccalaureate attainment and is considered the strongest predictor of degree completion (Pascarella & Terenzini, 2005; Reason, 2003). In addition, GPA has been widely measured when studying college retention, transfer, and academic success. As with other measures, GPA is often cross-tabulated with other findings and used to predict educational outcome (Kozeracki, 2001).

Tinto (1975), cited academic performance as the most important factor in predicating student persistence. GPA has been commonly used to determine student success or academic achievement when examining program outcomes. GPA as it relates to transfer success can be both used as a predictive variable or as an outcome variable. In their qualitative study Gawley and McGowen (2006) used GPA to determine academic performance and adjustment following

transfer to a four-year institution. GPA can be reviewed through transcript analysis which is not subject to problems with self-reporting. Higher GPA at the community college correlated to an increased likelihood of transfer and increased likelihood of academic success following matriculation to a four-year institution (Wang, 2009; Hagedorn et al., 2008; Hagedorn et al., 2010; Carlan & Byxbe, 2000). Wang (2009) supported previous empirical studies showing community college GPA was the most significant predictor of bachelor's degree attainment.

Velez and Javaligi (1987) showed GPA was a predictor of transfer and was significant at the 0.001 level. However, the effects of GPA on transfer were not discussed since their work was concerned with the impact of other predictive variables. In addition, Lee and Frank (1990) found a significant association between GPA and transfer. They showed increased GPA correlated to increased transfer but did not discuss the findings further. DesJardins et al. (2003) measured the factors that affect bachelor's degree completion. Using data collected from the University of Iowa, they examined the student persistence, graduation rates, and time to graduation. Data were obtained from ACT, Inc. for the fall 1990 entering student cohort. Students were retroactively tracked for eight years. The population consisted of 2,730 students with a sample size of 2,498 students. Data gathered from ACT was composed of test scores, self-report about high school coursework, high school grades, family income, student choice information, financial need, expected highest education level, certainty of major, certainty of occupation, and UNIACT scores. They found first year GPA predicted student retention and baccalaureate attainment. For every point increase in GPA the student increased their chance of graduation within four-years.

In review of the literature, Reason (2003) concluded first year GPA was a significant predictor of student retention. First year post-secondary GPA data provided an indicator of

student effort and academic performance on tests and general learned ability (Adelman, 2006). In addition, Adeleman's research on GPA provided a strong reliable indicator of baccalaureate attainment. If the student's GPA fell within the top two quartiles, "the probability of earning a degree increase[d] by nearly 22%" (Adelman, 2006, p. 48). However, these data were collected at four-year institutions and may not be directly applicable to community college students and their academic success upon transfer.

Crisp and Nora (2010) in their study on Hispanic student success examined the impact of a set of theoretically-derived predictor variables on the persistence and transfer of community college students. Using logistic regression Crisp and Nora showed a student's GPA in the first year of college had a significantly positive association with the student's GPA in the third year of college. For every one unit increase in GPA the student increased their odds of academic success by a little more than one-fold (Crisp & Nora, 2010). This find was in line with Adelman's findings that showed an increase in baccalaureate attainment with higher percentile GPAs. Although GPA can be influenced by a number of factors, it is important that the two-year institution encourage students to maintain a satisfactory GPA early on in their academic years to improve transfer success and degree attainment later.

Many community college students experience changes in their academic performance following transfer. Transfer shock and transfer ecstasy are both common when students transfer to a four-year institution (Cejada, 1997; Van Middleswovrth et al., 2001; Laanan, 2001). Understanding what happens following transfer is critical to the academic success of community college students. In 1965, the concept of transfer shock was introduced (Hills, 1965). This is a temporary drop in GPA following transfer to the four-year institution. In this early, pivotal study Hills found that recovery of transfer shock was observed. However, there were degrees to the

student's recovery of their GPA. It was stated that a transfer student "can expect to have an appreciable drop in his college grades upon transfer...probably his grades will recover to at least some extent [but] more likely than not, be lower than those of the native students at the college to which he transfers" (Hills, 1965, p. 209). Since this early report on transfer shock, policies have changed and the bleak expectations painted by Hills are not as common. More recent research showed students experiencing transfer shock usually recover their GPA within one-year following transfer and a large proportion of these students recovered completely (Laanan, 2001). Others have found student GPA did not recover within two-years following transfer (Gawley & McGowen, 2006). However this study was qualitative in nature and conducted in Canada, therefore the results should not be generalized to those within the United States. In addition, at the time of Gawley and McGowen's publication, the Canadian system did not appear to have a seamless community college to four-year institutions transfer process like that found within the U.S.

Environmental factors. The student's environmental condition will affect their academic success. Environmental conditions are factors that influence the student's academic goals and affect the amount of time a student can devote toward their academic ambitions. Environmental factors affect transfer, enrollment intensity, and academic educational outcome. Wang (2009) identified employment and having dependents as environmental factors. However, the literature indicates institutional factors influence student success, as well.

Institutional factors. Institutional culture and policy can directly influence the success or failure of the transfer student. Institutional factors include credit transfer, transfer articulation agreements, and access to information. The transfer of credits affects student matriculation because loss of credit for courses taken negatively impact student transfer options (Kinnick et al.,

1997; Ullman, 2011). The loss of credit can be a result of poor advising or lack of an articulation agreement between the institutions (Hagedorn et al., 2008). Obtaining information regarding transfer can be difficult for students. Ullman (2011) advocated for increased communication and advising on transfer at the community college. If the institutional culture is focused on transfer then the two-year school is likely to have a higher transfer rate (Ullman, 2011).

Transfer to a four-year institution from a two-year institution is often viewed negatively. Many feel community college students are underprepared for the academic requirements of the larger institution (Pascarella & Terenzini, 2005). Melguizo et al. (2011) conducted a study comparing transfer students to native junior students. This study compared the educational outcomes of the two different groups of students. Melguizo et al.'s study was different from previous studies because it compared the students on observed characteristics who differed only in their path to obtaining a baccalaureate degree. Findings from the Melguizo et al. study showed no major differences in educational outcome between transfer and native four-year students. Both community college transfer students and rising juniors earned similar numbers of non-remedial credits and had an equivalent rate of bachelor's degree attainment. In addition, students who transferred from a community college were academically prepared for the increased demands at the four-year school, thus implying the community college is a feasible and reliable path to bachelor's degree attainment.

Interventions can be implemented by the two-year school, as well as the four-year institution, this helped create an atmosphere that better prepares students for transfer (Ullman 2011; Lanaan, 2007). However, it is the four-year institution that can have the greatest impact on the transition process. Lanaan (2007) found many students that had difficulty adjusting to the new institution spent many hours studying and discussing the situation with counselors about

their academic challenges with no gain in their academic performance. As such, the four-year institution needs to provide a quality transition experience that promotes academic success. This process can be accomplished through the use of new orientation programs, student-run services or clubs, and faculty involvement that are all geared toward the transfer student. The transfer process must be a coordinated effort between the four-year and the two-year institutions. As the number of state supported articulation agreements increases it is important for the institution to keep pace with the growing demands of the transfer student, as well as distribute and coordinate information to all participating institutions (Gawley & McGowan, 2006).

Once transfer students reach the four-year institution they often encounter negative attitudes, admission issues, registration problems, new student program issues, advising issues, housing issues, and issues with institutional change (Eggleston & Lanaan, 2001). Many of these issues can be rectified by information dissemination between the two institutions. However, the sharing of information is often a problem because the two institutions are often competing for new students. Therefore, providing too much information to one's competitor places the four-year institution at a disadvantage (Mosholder & Zirkle, 2007). However, with state mandated articulation policy institutions must cooperate and therefore share necessary information to assist the transfer process. The transfer student can benefit from increased course articulation, counseling and advising, faculty sensitivity, academic support services, transfer student centered orientation programs, student activities, and knowledge of campus resources (Eggleston & Lanaan, 2001). With increased enrollment at the community college the four-year institution can expect an increase in transfer and should prepare for the coming influx of transfer students.

Dependents. Having dependents redirects one's priority away from education (Bean & Metzner, 1985). During their synthesis of a conceptual model for non-traditional college student

attrition, Bean and Metzner found that factors such as dependents increased the responsibility of the student and increased the rate of student withdrawal from college. During their review of the literature Bean Metzner found older students with more dependents had an increased rate of withdrawal. Nora and colleagues (1996) supported this finding and showed family affected one's decision on whether to persist in college or withdraw. Nora and colleagues study population consisted of 3,900 freshman students across 26 two and four-year, private and public institutions. The participants were involved in a three hour testing event in the fall of 1992 using four different instruments and questionnaires. Using logistic regression, Nora and others examined the impact of precollege factors, institutional-related factors, environmental factors, and student perceived gains on college-related behavioral outcomes across different ethnic and gender groups in a four-year institution. The findings showed the effect of having children on minority students increased withdrawal rate by 87%.

More recently, findings have shown having children and being married had a negative association with attaining an associate's degree, transferring to four-year institution, and baccalaureate attainment (Roksa, 2006a). Community college students with children were 60% less likely to earn an associate's degree than students who had no dependents. Roksa utilized student level, IPEDS data gathered from PETS to research the effects of community college vocational training on educational attainment. Three measures of educational outcomes were examined and included associate's degree completion, transfer, and baccalaureate completion. 2,680 student samples across 49 states in 600 community colleges were used in the study. Roksa concluded that vocational students do not have lower educational attainment and state policies are complex and may not impact educational outcome. Like Roksa, Dougherty and Kienzl (2006) examined both marital status and parental status of community college students. They

found marital status had no impact on transfer; however, having children negatively impacted transfer. Roksa (2006a) as well as Dougherty and Kienzl (2006) used the similar national data for their research.

Wang (2009) found dependents had no effect on baccalaureate attainment and persistence. Despite using the same national data sources and examining data on comparable years of college entry, the outcome of Wang's study differed from that of Roksa (2006a) and Dougherty and Kienzl (2006). Both Roksa (2006a) as well as Dougherty and Kienzl examined all community college entrants, thus catching the effect of having dependents on academic success. Wang limited the sample to those students who transferred to a four-year institution; therefore, only capturing students who were less likely to have been affected by dependents. The effect of dependents on transfer would not have been observed because students with dependents would be less likely to persist into the four-year institution. As such, these students would not be captured in the study results.

Employment. Similar to having dependents, employment takes away from a student's ability to focus on their academic endeavors. Working "may serve as a proxy measure of educational aspirations" (Lee & Frank, 1990, p. 186). Non-transfer students were more likely to work and were less satisfied with their employment than student who transferred to a four-year institution. Lee and Frank postulated those students who transferred may view employment as a means to partially support themselves while focusing on their education while non-transfer students may have perceived work as a precursor to future employment. Those differing perspectives may have influenced the student's educational aspirations and subsequently reduced the likelihood of academic success for the non-transfer student.

Lee and Frank's findings supported earlier findings which showed non-traditional community college students were likely not to persist in college because of increased work responsibilities (Bean and Metzner, 1985). Work, like having dependents, increased the student's responsibility outside of college which ultimately proved more important to the individual and increased the likelihood of withdrawal. Others have found employment prevented full integration of the student into the academic arena and therefore, those students were less likely to persist (Nora et al., 1996). Nora and colleagues found being employed decreased minority student retention by 36%. Dougherty and Kienzl (2006) found not working or working less than forty-hours per week had a more positive impact on transfer and further offering evidence that students who work are less likely to be academically successful. However, employed students who do successfully transfer showed no difference in baccalaureate attainment when compared to native four-year students (Melguizo et al., 2011). Wang (2009) found employment status had no effect on college persistence and bachelor's degree attainment. As stated previously, Wang's data only included students who successfully transferred to a four-year institution and eliminated the effect of work on the student's likelihood of transfer and future academic success. The other studies examined the larger community college student body.

Articulation Policy

Government involvement. Government interest in transfer policy is economically motivated (Anderson et al., 2006a; Ewell, 2009). Specifically, Anderson and colleagues "posit[ed] that the importance of statewide articulation agreements is increasing as state governments attempt to manage competing economic and social constraints without allocating additional funds to higher education." Equally important, these state policies have generated a

lower cost alternative for the first two years of college for both the student and the state” (p. 446). Ewell, during his review of higher education assessment, accountability, and improvement discusses state involvement in public higher education funding through direct financial support. Higher education funding has decreased over the past 25 years. As a result, policy makers have to take a closer look at state spending patterns in higher education. “With regard to money, the conventional wisdom has it that accountability goes up as the money gets tight” (Ewell, 2009, p. 10). In addition, bachelor’s degree attainment is linked to higher incomes and increased likelihood of employment which result in increased tax revenue (Cameval et al., 2012; Kantrowitz (2007). To boost graduation rates and subsequently increase productive economic conditions within the state and the U.S. it is in the best interest of policy makers to initiate policies that promote a more successful higher education establishment while keeping state expenditures to a minimum. Higher education is expected to be equitable by creating programs that promote access and keep tuition low while ensuring a quality education for all students. Transfer policies fulfill the government’s role of increasing access to higher education, as well as promoting baccalaureate attainment.

President Obama in 2009 stated community colleges are critical to achieving his goal of having the highest college graduation rate within the world by the year 2020. He subsequently introduced the American Graduation Initiative that emphasized community colleges as the primary means for attaining a bachelor’s degree. Community colleges are critical to filling jobs devoted to science, technology, engineering, and mathematics. (Ewell, 2009). This emphasis on higher education is shared by state policy makers who have the authority to regulate college and university funding, transfer, and accountability measures. Many states place an emphasis on higher education and have formal articulation policies that increase access to higher education.

Government involvement in post-secondary enrollment is important for increased access and affordability (Boswell, 2001). In her study of post-secondary enrollment options, Boswell identified government involvement in articulation reduced college costs, accelerated progress toward a degree, increased student aspiration, increased academic opportunities in rural communities, and established stronger community and college ties. Although her article focused on concurrent and dual enrollment patterns the policies governing these options are often linked to articulation policies which may impact transfer and academic outcomes. Rifkin (1996) argued in his review of transfer and articulation policy that institutional culture surrounding articulation had a greater effect on transfer than government policy. The government should provide the basic framework while the institutions should promote transfer because what takes place at the institutional level determines the effectiveness of articulation policy (Rifkin, 1996).

Beginning in the 1970s there was nearly no involvement of state government in articulation and transfer policies (Knoell, 1990). However, by the middle of the 1970s state lawmakers and governing boards were increasing their interest in higher education and particularly, how to reduce costs (Richardson et al., 2001). By the mid-1990s a total of 10 states had transfer agreements while another 20 had transfer policies, and the remaining 20 states had individual institutional agreements. The issues driving the change between the 1970s and the 1990s were increased globalization and the need for more skilled labor. Globalization and the need for skilled labor changed the perception that higher education was a microcosm of individual units. From that point forward policy makers began to view higher education as a single large unit requiring policies governing transfer and degree attainment (Cohen, 2001). There have been mixed results on whether state supported articulation agreements are successful at increasing transfer or bachelor's degree completion. The mixed results may be an artifact of the

many definitions of academic success used to determine policy effectiveness (Mosholder & Zirkle, 2009). Transfer refers to the flow of students from community college to a four-year institution. Some states examine policy effectiveness on the basis of transfer rates while others evaluate articulation policy based on educational outcomes (Brawer, 1991; Crook et al., 2012). Variations on the definition of what constitute transfer success leads to difficulties in determining effectiveness of articulation programs (Roksa, 2009).

Arnold (2001) showed during the evaluation of Oregon's transfer system that approximately 90% of all Oregon community college student credits transferred to the senior institution. Arnold's study further showed if students transferred with 45 to 89 credits they had a graduation rate of 62% compared to 65% for native four-year first-time freshmen. These data were later supported by others who advocated for articulation agreements designed to preserve credit transfer to the senior institution (Dougherty & Reid, 2007; Roksa & Bruce, 2008; Chase, 2011). By preserving academic credit upon transfer baccalaureate attainment is promoted at a rate similar to the native students (Arnold, 2001; Crook et al., 2012). Crook et al. showed that students who graduated with an associate's degree prior to transfer graduated at a higher rate than those students who transferred prior to attaining an associate's degree.

Dougherty and Reid (2007) examined state policies and their effect on "access to" and "success in" community college. The study examined the relationship between state policy and remediation, transfer of credits, and baccalaureate degree completion. In addition, the policies were examined in relation to performance accountability which included performance reporting and funding, and how it pertains to access and success. Performance reporting requires public reporting of college data. Virtually every state uses some level of performance reporting. Less common and an alternative to performance reporting, is performance funding where states

allocate funds for institutional performance. As of 2007 fifteen states used a performance funding system to allocate resources to state community colleges and four-year institutions.

Essentially, Dougherty and Reid were asking whether performance accountability measures affected community college funding and were the accountability data used to direct access and outcome policy. Dougherty and Reid examined government policies on articulation and their acceptance of general education credits earned at the community college and how those credits transfer to the four-year institution. By surveying the appropriate state agencies, they found 37 states had strong provisions for transfer of general education credits, nine states allowed transfer of general education credits with an associate's degree, and four states had no provisions relating to transfer of general education credits. Although the provisions vary in scope, the transfer of applicable credits is important for student retention and academic success.

Roksa and Bruce (2008) advocated for articulation policy to be evaluated more on academic outcomes rather than transfer rates. To examine the role of statewide articulation policy on community college transfer, Roksa and Bruce reviewed state statutes to understand the justification for the legislation. The review led to the conclusion that state supported articulation policies were to preserve college credits and not ease transition between community college and the senior institution. The research was conducted in a two-step process with the first stage consisting of the evaluation of all 50 states' articulation provisions. The second stage was a review of PETS data and included community college students who enrolled within two years following high school graduation and subsequently, transferred to a four-year college. The selection resulted in a sample of 935 students. Roksa and Bruce concluded that articulation policies were ineffective because of a disconnection between mandate and practice as well as being too complicated in some states. To increase policy effectiveness, they advocated for

increased data driven decision making and evaluating programs on overall academic success. This could be accomplished through preserving general education credits at transfer.

Chase (2011) supported Roksa and Bruce's conclusions and advocated for the preservation of credit upon transfer. Chase's study examined the equity in transfer of career and technical associate's degree credits to four-year institutions (Chase, 2011). While examining state policy related to transfer of technical credit it was observed that a limited number of states had articulation policies that dictate the number of technical credits that transfer. Chase's recommendation for government policy makers was to increase equity in transfer of credits. Technical credits were not accepted at many four-year institutions which left students pursuing technical degrees at a disadvantage. Preservation of transfer credits was essential for student retention and academic success following transfer. Chase recommended that policies should increase the number of transferable credits for vocational students to increase their academic success.

Policy effect on transfer. Examination of institutional data showed states with formal policies regarding articulation saw an increase in transfer rates (Banks, 1994; Higgins & Katsinas, 1999). Banks (1994) examined environmental factors that influenced community college transfer rates. Her variables included economic conditions, proximity to a four-year institution, tuition rates, and student demographics. Out of 78 community colleges located throughout fifteen states Banks found no significant difference in community college transfer rates between states with formal articulation policies and those without. However, when examining institutional data Banks found an increase in transfer rates from community colleges located in higher income areas within states who have formalized policy. Although Bank's data as a whole supports other national studies, it implied transfer rates may be influenced by state

support. Bank's research was supported by Higgins & Katsinas (1999) who investigated the environmental conditions surrounding transfer rates of rural community colleges. Their 1999 study compared 97 rural community colleges based on internal and external factors. They found rural community colleges in states with mandated articulation policies and located within higher median income service areas had higher transfer rates than those with lower median incomes and voluntary articulation policies. The Higgins & Katsinas' study divided state articulation policy into three distinct categories ranging from formally mandated to voluntary agreements. Their findings suggested strong state involvement in the transfer process improved transfer rates. Unfortunately, Higgins & Katsina did not examine educational outcomes; therefore it is difficult to determine whether strong state articulation policy increases baccalaureate degree attainment.

By promoting student success through the successful creation and implementation of articulation agreements the institution, the student, and the community all benefit (Zinser & Hanssen, 2006). Zinser and Hanssen analyzed national data from the Advanced Technology Education program using both qualitative and quantitative methodologies. The study addressed articulation agreements for the transfer of two-year technical degrees to baccalaureate degree programs. Data were obtained from the 2004 and 2005 program grantees through survey techniques and divided into three required and four supplemental sections. As proposed by Zinser and Hanssen, the student benefited from reduced cost, schedule flexibility, broadened access, and additional student services. The institutional benefits included marketing, new source of student recruits, and shared resources across institutions. Finally, the community benefited by gaining trained workers which promoted economic growth in the community.

Dougherty et al. (2006) advocated more assistance for transfer students when considering articulation policy. They suggested transfer students receive additional financial aid since

transfer students were more likely to go through remediation and therefore, have greater expenses due to the increased number of courses taken. States should offer direct funding to institutions for transfer advisors, offer guaranteed junior status for academic associate's graduates, encourage more articulation with private institutions, and enhance transferability of occupational credits. In addition, Dougherty and colleagues suggested transfer should be considered as a measure of performance accountability for the senior institutions. Finally, they suggested states consider post-transfer success as an accountability measure since community college students experience problems and increased withdrawal rates following matriculation. Dougherty et al. were conducting a review of the Lumina Foundation's, "Achieving the Dream: Community Colleges Count" initiative. The methodology included review of the academic and non-academic literature as well as telephone interviews in each participating state. Interviews involved public officials, state agency administrators, community college officials, and community organization leaders.

Anderson et al. (2006a) found states with articulation policies did not increase transfer rates. This was a result of poor institutional incentives for transfer, poor information distributions, and the commitment of both two and four-year institutions to the transfer process. Unfortunately, the study was limited to transfer and did not address educational outcomes of the transfer students. This study was conducted using data gathered by BPS from 1989 through 1994 with a sample of 690 participants across 12 states. The results were analyzed through logistic regression. The study examined the likelihood of student transfer in states that had state mandated articulation policies in 1991. Anderson et al. suggested articulation agreements were a cost cutting measure for the state. Articulation policies increased in the 1980s and 1990s in an attempt to manage gloom economic conditions and were a way for lawmakers to manage

competing funds without having to allocate additional resources toward higher education and as a result generate a lower cost alternative for obtaining a college degree (Anderson et al., 2006b). These articulation policies were in their “infancy” and not representative of articulation policy effectiveness. Many of the early policies lacked an accountability component for promoting transfer by linking state incentives with increasing transfer rates. Roksa (2006a) supported Anderson et al.’s claims that statewide articulation policies did not promote community college transfer.

Roksa (2006a) took a more open interpretation of state articulation policies, subsequently comparing data across 49 states. A broad definition of state supported articulation may not provide a clear comparison of states with mandated policies and those without. Similar to the Anderson et al. (2006), Roksa used longitudinal data collected prior to the implementation of stronger state support for articulation. Roksa concluded in later work that several factors led to the appearance of ineffective articulation policy and include the structure of higher education, different approaches to facilitating transfer, different transfer rates across institutions, and the overall influence of articulation policy on obtaining a bachelor’s degree (Roksa, 2009).

Additionally, problems arise from perceived goals of articulation policy. Often, articulation policy is thought to promote transfer (Anderson et al., 2006a; Banks, 1994; Higgins & Katsinas, 1999; Roksa, 2006a). However, the argument has been made that the purpose of state supported articulation agreement is to promote credit perseveration which will assist students who have decided to transfer (Roksa & Bruce, 2008). They found articulation policies fail to consider individual factors that influence transfer and college retention. The focus of such policy was to preserve “earned credits” for the community college transfer student. This was interesting because if credit preservation was the purpose for articulation policy then one would

expect a shorter time to and increased rates of baccalaureate attainment for transfer students. However, this is not what Roksa and Bruce found. The data showed states with articulation policies had no significant increase in transfer rates, no increase in baccalaureate attainment, and time to baccalaureate was not changed. The conclusion was articulation policies were ineffective because they were disconnected from the intent of the mandate and implementation by the institutions. Roksa and Bruce examined data from 2000 and compared these data to state policies that were in effect at the time of the article publication in the late 2000s.

Crook and colleagues (2012) conducted an evaluation of the City University of New York college system (CUNY). In this evaluation they examined the relationship between earning an associate's degree prior to transfer and educational outcomes at the four-year institution. The CUNY articulation policy identified transfer students between those who lacked an associate's degree and those who had an associate's degree. Transfer policy in the CUNY system differed for these two groups of students. Those students who had an associate's degree were deemed to have completed all general education requirements for transfer, while students who transferred before completing an associate's may have lost credit upon transfer. Ultimately, holding all other factors constant, earning an associate's degree increased the likelihood of earning a bachelor degree by nearly 7%. The findings suggested the way articulation policies are written could lead to better educational outcomes following transfer. These findings differed from Roksa and Bruce (2008) possibly because the study was conducted in a single university system rather than nationally. In addition, Crook and colleagues were looking at educational outcomes rather than duration to degree completion. The Crook et al. study suggested policy had an impact on educational outcome. If the general goal of articulation policy is to ensure general education credits transfer then it is in the best interest of the state lawmakers to ensure students

have earned an associate's degree prior to transfer. Students who earn a degree prior to transfer are committed to their education, which results in increased student retention and positive educational outcomes (Vorhees, 1987; Bers & Smith, 1991; Wang, 2009).

Commonwealth of Virginia Articulation Policy

Higher Education Restructuring Act of 2005. Articulation in the Commonwealth is not mandated by a specific statute; however as an additional measure required in the Higher Education Restructuring Act of 2005 (HERA) and subsequently in the Higher Education Opportunity Act of 2011 (HEOA). In essence, public four-year institutions are required to develop articulation agreements with the Virginia Community College System that guarantees admission for transfer students with an associate's degree. Although each institution is permitted the luxury of developing their own standards for admission, they must follow the guidelines established by the State Council of Higher Education for Virginia (SCHEV). The articulation agreement for the Commonwealth is established so students who transfer with an associate's degree have met all general education requirements at the accepting institution (HERA, 2005).

Restructuring of higher education in Virginia was a result of Virginia Tech, University of Virginia, and the College of William and Mary seeking greater operational and administrative autonomy. HERA states that institutions be divided into three tiers with each tier providing increasing levels of autonomy. Level one institutions receive little autonomy from the State. Institutions enter level two through a memorandum of understanding with the State and receive authority in two of three areas which include capital outlay, information technology, and procurement. Level three is awarded to institutions through a management agreement with the Commonwealth and receive autonomy in capital outlay, information technology, procurement, human resources, and finance. For increased autonomy, each institution had to show an

increased commitment to the education of Virginia meeting specified benchmarks established by state statute. Thresholds and targets are established in conjunction with SCHEV. The benchmarks focus on the following areas: access, affordability, academic offerings, academic standards, student progress and success, articulation and dual enrolment, economic development, research, enhancement of K-12 education, strategic planning, finance and administration, and campus safety and security (Commonwealth of Virginia, 2005).

Articulation, as specified by HERA, is a measurable benchmark that public institutions in the Commonwealth must track. By establishing a benchmark for articulation the state forced public four-year institutions to develop articulation agreements with Virginia community colleges. Historically transfer in the Commonwealth was regional and institutional specific. However, HERA tasked SCHEV to establish guidelines for the development of articulation agreements among the community colleges and public four-year institutions, provided the agreement met the admission requirements of the four-year school. Subsequently, the individual institutions were required to “develop articulation agreements that have uniform application to all Virginia community colleges and meet appropriate general education and program requirements at the four-year institution [and] provide additional opportunities for associate’s degree graduates to be admitted and enrolled.” As a result, individual institutions had to meet and establish targets on an annual basis showing the number of transfer students enrolled.

The articulation agreements generated under HERA did not involve course by course transfer or programmatic details. Instead, following completion of an associate’s degree the student was guaranteed admission into the four-year institutions assuming they met other institutional requirements like GPA. These students would maintain junior status and receive

credit for all general education requirements upon admission (SCHEV, 2011a; Jobs for the Future, 2008). The transfer guidelines developed by SCHEV ensure that:

1. Courses taken comprise the general education requirements of the four-year institution;
2. All four-year public institutions provide transfer information to faculty, student, and advisors in a clear and concise manner;
3. The articulation agreement should be uniform between all Virginia community colleges and the respective four-year institution;
4. Students must meet specified criteria for guaranteed admission to the four-year institution which include GPA, accepted associate's degree majors, specific course requirements, and completion timetables. In addition the agreement must provide the student with a list of privileges of enrollment;
5. Both the two- and four-year institution freely exchange information regarding transfer statistics;
6. Admission priority is provided to students who have completed a transfer degree over those who have not;
7. Transfer students have equal opportunities as students with comparable standing at the four-year institution (SCHEV, 2006).

Higher Education and Opportunity Act of 2011. In 2010 Virginia's Governor, Bob McDonnell, established a commission to review higher education reform in the Commonwealth. The resulting interim report was released in December 2010, and out of this report the HEOA was enacted. The objective of this Act is to fuel economic growth and prepare citizens of Virginia for better more technologically driven job opportunities which promote both economic and personal growth. To succeed in this endeavor a stronger commitment to higher education was needed in Virginia. Building upon Virginia's "excellent higher education system," state policy makers hoped to add approximately 100,000 new undergraduate degrees to the Commonwealth. HEOA did not replace HERA but simply expanded and modified how higher

education will be structured. As part of this bill, the lawmakers in Virginia increased transfer opportunities.

To promote transfer, HEOA tasked SCHEV, the Virginia Community College System (VCCS), and public four-year institutions to establish a uniform certificate of general study. This certificate program provides community college students the opportunity to complete a one-year general education certificate that will be transferable to the state's four-year institutions. This transfer will be in accordance with SCHEV guidelines. This component of the new Act strengthens articulation in the Commonwealth, as well as moves the Virginia system of higher education toward a more standardized course numbering system which will reduce transfer student confusion. HERA and HEOA both advocate and emphasize an increase in transfer, graduation, and retention rates as a measure of policy success. However, neither policy, with regard to articulation, addresses transfer student graduation and retention rates or whether there has been an increase in baccalaureate attainment.

Virginia community colleges. Virginia has 23 community colleges spread out over 40 campuses throughout the state. These institutions play a significant role in higher education throughout the Commonwealth enrolling approximately three-fifths of all college students within the state. There were 286,920 students enrolled in for credit courses at Virginia community colleges. Of those enrolled, 65% of those students reported being in a transfer-oriented program (VCCS, 2011a). In 2010, approximately 128,416 full-time equivalent students were serving in credit courses in Virginia community colleges (VCCS, 2011b). The VCCS has guaranteed articulation agreements with over 25 different bachelor's degree granting institutions in the state and include both public and private institutions.

VCCS in the Commonwealth is operated by a chancellor who acts as the chief executive officer. The system is governed by The State Board of Community Colleges whose members are appointed by the governor for a maximum of two four-year terms. The Board consists of 15 members and meets six times per year to establish policy for Virginia's community colleges (VCCS, 2012a). State funding for Virginia community colleges is based on a full-time-equivalent student enrollment. Revenue for VCCS during the 2010-2011 fiscal year exceeded \$1.22 billion. Of which approximately \$340 million was provided through state appropriations (VCCS, 2011d).

Like community colleges around the country, Virginia's community colleges provide affordable access to college for many citizens of the state. Virginia community colleges maintain an open door admission policy where "individuals are eligible for admission to the community college if they are high school graduates or the equivalent, or if they are eighteen years of age or older and able to benefit from study at the community college" (VCCS, 2012b, p. 6-1). Since 2005, these students have enjoyed guaranteed admission to Virginia's public four-year institutions following completion of their associate's degree. For many students the path to a bachelor's degree is through a community college. It is imperative that state policy makers here in Virginia and elsewhere evaluate their programs for success, which should include baccalaureate degree attainment by transfer students.

VCCS reported 8,138 students transferred to Virginia four-year colleges in 2010 (SCHEV, 2011b). This included transfers to both public and private institutions in the Commonwealth. The transfer of all community college graduates in 2010 was 33% (VCCS, 2011c). This was higher than the reported national average of about 22% (Cohen & Brawer, 2003; O'Meara et al., 2007). The 2010 transfer rate was higher than that reported by McHewitt

and Taylor (2004) who reported a 19.8% rate for Virginia using a 1997 cohort. McHewitt and Taylor conducted a descriptive evaluation of VCCS transfer rate using the Cohen measure. The Cohen measure is a transfer rate calculated by examining “all students entering the two-year college in a given year who have no prior college experience and who complete at least 12 college credit units within four years, divided into the number of that group who take one or more classes at a public, in-state university or college within four years.” The calculation by McHewitt and Taylor was based on data collected prior to the authorization of HERA which promoted the development of guaranteed admission programs. Since HERA was enacted transfer rates in the Commonwealth have gradually increased (VCCS, 2011c) due to an increase in community college enrollment.

More recently, Dunlop (2011) expanded on McHewitt and Taylor’s early evaluation work of Virginia’s transfer rate and examined the association of baccalaureate attainment and the quality of the local four-year institution. Through regression analysis, Dunlop showed the quality of the nearest four-year institution had a significant effect on the student’s probability of earning a bachelor’s degree. As the quality of the institution increased, the transfer student graduation rate increased. Dunlop reported living near a high quality four-year institution increased individual community college transfer rates as high as 40% for students that earned an associate’s degree. Dunlap’s sample consisted of 34,000 transfer students. The sample was collected from data reported by SCHEV and the U.S. Census Bureau’s 2000 population census. In conclusion, Dunlop reported the quality of the local four-year institution had a significant effect on the likelihood transfer student baccalaureate attainment.

Articulation Policy and Educational Outcome

Research indicates the effects of the community college student's precollege characteristics, college experience, and environmental factors impact transfer and student educational outcome (Dougherty & Kienzl, 2006; Doyle, 2010; Gawley & McGowan, 2006; Hagedorn et al., 2008; Hagedorn et al., 2010; Melguizo et al., 2011; Wang, 2009). However, the current literature addressing how articulation policy affects degree attainment is limited. Using baccalaureate attainment and persistence as dependent variables, Wang (2009) examined how a number of independent variables affected the educational outcome of community college students. Wang defined persistence as the continuous reenrollment of the student from one college term to the next. The results of the logistic regression analysis and descriptive statistics showed 62% of community college transfer students attained a bachelor's degree following transfer. Furthermore, the results showed gender, SES, high school curriculum, degree aspirations, college involvement, and community college GPA were positive predictors of baccalaureate attainment. In addition, results indicated remediation negatively affected educational outcome. The strongest predictor of positive academic outcome was GPA. In conclusion, Wang suggested earning a bachelor's degree was a function of the student's individual characteristics and that goal orientation in their senior year of high school, which leads to long-term academic success and has implications for crafting effective articulation policies. From a policy stand point the focus should be to improve learning and academic performance to increase baccalaureate attainment, involve high schools to decrease remediation at the college level, and promote college involvement for students interested in transfer (Wang, 2009). Unfortunately, Wang's approach did not consider the influence of state policy on academic outcomes. Others have suggested the goal of articulation policy is to promote credit

transfer (Roksa & Bruce, 2008). An increase in credit transfer increases the likelihood of baccalaureate attainment (Crook et al., 2012).

Research into transfer student success often revolves around the individual student characteristics (Dougherty & Kienzl, 2006; Doyle, 2010; Gawley & McGowan, 2006; Hagedorn et al., 2008; Hagedorn et al., 2010; Melguizo et al., 2011; Wang, 2009). Melguizo et al. (2011) chose to compare educational outcomes of transfer students to native four-year students. In this study, the authors examined the educational outcomes of junior transfer students and native four-year college students who had similar educational outcomes. The data were drawn from national longitudinal data collected between 1988 and 2000 and examined educational outcomes of students graduating college within eight years following high school graduation. This study considered individual student characteristics as well as simulated experimental design by using PSM. PSM allows for the researcher to control for individual factors, therefore the population can be limited to what the study is reviewing, for this study the comparison of educational outcomes based on where the student started their college career.

The descriptive statistics from Melguizo et al.'s study showed graduation rates of 60% for transfer students versus approximately 73% for native four-year students when considering all student characteristics (GPA, ethnicity, SES, dependents, etc). However, when the individual characteristics were controlled, the result of the study showed no difference in graduation rates between native four-year and transfer students who achieved junior status. The results were determined based on linear regression and PSM. Melguizo et al.'s study supported the findings of Dougherty and Kienzl (2006) who also found no difference in graduation rates of transfer and native students when controlling for individual characteristics. The findings show transfer

students earned approximately the same number of non-remedial college credits eight-years following high school graduation.

In conclusion, Melguizo and colleagues suggested community colleges have the potential for preparing students for the rigors of study found at the four-year institution due to the equal number of degrees awarded to both groups of students and the approximate equal number of non-remedial course credits earned. As a practice, Melguizo and others suggested community colleges prepare students for transfer and promote transfer curriculum necessary for the student to matriculate to the senior institution “on-time.” The four-year college should work with transfer students to make the transition process more seamless. Although this study did not consider the role of articulation policy on educational outcome, it did suggest articulation policy could assist the transfer student. Since educational outcomes are equivalent between native and transfer students, the articulation policy can promote a more seamless transition. The seamless transition can be facilitated by ensuring community colleges and four-year institutions have aligned curriculums. In addition, policy can link transfer as a performance funding measure for the two-year institution which encourages community colleges to promote the transfer curriculum and senior institutions to work with transfer students to facilitate positive educational outcomes.

The findings presented by Melguizo and colleagues are in direct contrast to Long and Kurlaender (2009) who showed students who attend community colleges graduated at significantly lower rates than native four-year students. In addition, they showed community college transfer students earned a lower number of credits and had increased dropout rates. The studies differed in a number of ways. Long and Kurlaender’s study used single state data collected by the state’s higher education administrative agency. The source of data included

student applications, transcripts, and entrance exam scores. The data allowed the authors to track the students across schools and determine educational outcome. Long and Kurlaender used first-time freshman in their study and measured educational outcomes over a nine year period. The sample was limited to students who took either the ACT or SAT college entrance exams. The authors speculated students taking these exams exhibited baccalaureate aspirations and could be compared based on the type of college first attended. Similar to Melguizo's study, Long and Kurlaender used PSM and regression analysis to control for individual characteristics. Their findings suggested students who entered higher education at the community college were at a disadvantage when compared to students who began their education at the four-year school. Students who started at the community college were 14.5% less likely to complete a bachelor's degree than their four-year counterparts. Long and Kurlaender advised caution on policies that promote college entrance at the community college since it may hinder overall baccalaureate attainment.

Long and Kurlaender's study measured educational outcome. However, the results should be viewed with caution. Long and Kurlaender's study restricted the sample to students who had either taken the ACT or SAT. Since many community colleges have open enrollment and do not require entrance exams the sample may be overly skewed toward four-year students. Furthermore, Long and Kurlaender acknowledged the data omitted students who transferred to a private or out of state college as well as non-traditional age students. This omission may have impacted the results of the study. A more accurate description of community college graduation rates and baccalaureate attainment would have been possible had the authors examined community college students and native four-year students who attained junior status. The strength of Long and Kurlaender's study was the use of data derived from state resources and not

national databases. In essence, the data is more relevant to current articulation policies than Wang (2009), Melguizo et al. (2011) or Roksa (2009). The conflicting results between Long and Kurlaender and Melguizo et al.'s studies, as well as the fact these two studies did not examine articulation policy, suggest more research is needed to determine how state policy affects educational outcome.

To examine the effectiveness of articulation policy transfer data must be compared pre and post-policy. Unfortunately, student data prior to implementation of state articulation policy is limited; therefore determination of policy effectiveness is difficult. Analysis is convoluted because statewide articulation policy typically does not include statistics on out of state and private four-year college transfer (Roksa, 2009). Finally, determination of policy effectiveness is hindered by varying definitions for "transfer success." Roksa (2009) advocated for articulation policies to succeed scholars, policy makers, and practitioners must come together in three critical areas. These areas include (1) the collection and sharing of data, (2) the development of consistent definitions and measurement methodologies, and (3) identifying the overall goal of the policy. Roksa (2009) examined state and individual data to evaluate the effectiveness of articulation policies across the country. Using regression analysis data showed states with articulation policies did not correlate with an increase in baccalaureate degree attainment.

It is generally assumed state articulation policy is effective, but the results of Roksa's study suggested otherwise (Roksa, 2009). Previous work suggested state articulation policies did not increase transfer (Roksa, 2006a). Despite evidence that state articulation policies do not promote transfer or baccalaureate attainment state involvement does decrease the power imbalance between the community college and the senior institutions (Roksa, 2006b). By having a third party involved the senior institutions are no longer directing how students will transfer to

the public college. The study used national longitudinal data collected between 1988 and 2000. In conclusion, Roksa suggested the problem lies in the inability of policy makers and researchers to communicate the goals of such policies. Reasons for lack of communication include the number of definitions used to define articulation, lack of adequate data for analysis, and inability to define the goals of higher education articulation policy.

Before determining whether state articulation policies are effective, the issues described by Roksa (2009) must be resolved. Is the goal of the policy to preserve credits or to promote bachelor's degree attainment? Roksa and Bruce (2008) suggested many state policies are too complicated to be practical. They suggested using more transcript data and direct data collection methods and moving beyond measuring transfer rates. They theorized that articulation policy was important to the preservation of college credits and did not promote an increased transfer rate for community college students. The preservation of credits through articulation policy only made it easier for students who decided to transfer but it did not promote the process of articulation for all community college students, thus making them ineffective (Roksa & Bruce, 2008). To gauge policy effectiveness, policy success should be evaluated on educational outcome and not transfer rate. Roksa (2009) examined state and individual data to evaluate the effectiveness of articulation policies across the country. The next step would be to evaluate state data and the role articulation policy plays in baccalaureate attainment.

For an articulation policy to be effective it must go beyond transfer and increase positive educational outcome. As discussed, the available literature focused on the impact of state mandated articulation policy and its impact on community college transfer. However, the literature falls short in examining the impact of articulation policy on educational outcome. This may be due to the lack of consensus on defining articulation policy goals. The first step of

increasing positive educational outcomes for transfer focused community college students is to promote transfer. Unfortunately, many policies fall short of achieving this goal. To fill the void in the literature, research is needed that examines articulation policy both pre and post implementation and includes an analysis of how community college transfer students compare to native four-year students at the senior institution.

Summary

Community colleges have been identified by government policy makers as critical for the future of higher education. Policy makers, both in the Commonwealth of Virginia and at the national level, have emphasized the need for an increase in baccalaureate attainment (Ewell, 2009; McDonnell, 2010). As a result of rising government interest in higher education states have seen an increase in policies relating to articulation between two and four-year institutions. However, mixed results have been published in the literature on the effectiveness of such policies (Banks, 1994; Higgins & Katsina, 1995; Roksa, 2006a; Roksa, 2009; Crook et al., 2012). The mixed findings in the literature may be a result of the mandates themselves and not a reflection of the research methodologies because many of the policies fail to consider all factors affecting student transfer (Roksa & Burce, 2008). With government interest in higher education focusing on the community college as a gateway to baccalaureate attainment such policies must extend beyond transfer and promote degree completion. Future policies designed for degree completion following transfer should consider individual student factors, complexity in application of the policy, and preservation of transfer credits.

The Commonwealth of Virginia has mandated articulation. Although this policy does not specifically align public university and community college curricula, it does guarantee individuals who graduate with an associate's degree from one of Virginia's 23 community

colleges admission to a public four-year institution. Admission to Virginia's public-four year schools following graduation from the community college is institution dependent. If the student meets the threshold requirements for admission, then they transfer with all general education requirements met and begin at the four-year college as a junior. Virginia's program is assumed to be effective. SCHEV maintains data on community college transfer rates and subsequently graduation rates of community college transfer students. However, the current policies have not been examined for effectiveness. As Roksa (2009) suggested the data should be compared pre and post-policy implementation to determine effectiveness. Data has not been compared pre and post-policy in Virginia. This research hopes to add to the available literature by examining institutional data to determine policy effectiveness based on educational outcomes and not transfer rates. Community college transfer students will be compared to their four-year peers to determine if community college students are as academically successful. This research hopes to close a gap in the literature by examining current data on the effects of articulation policy on transfer and educational outcomes by using data that has been collected post-policy implementation.

Chapter 3

Methodology

Introduction to Methods

This study utilized a quantitative non-experimental comparative design that included secondary data analysis of two discrete data sources to examine the effect of government supported articulation agreements with guaranteed admission for community college transfer students in the Commonwealth of Virginia. Both data sources come from a single state-funded institution of higher learning. The first set of data consisted of individual student information. The second set was composed of individual student response data to an institutionally administered survey of engagement. The study design and variable selection was informed by the work of Melguizo et al. (2011) and Wang (2009). The archived student record and survey data provided graduation outcomes, time to degree, participation on campus, external commitments, GPA, and demographic information. Data were gathered for transfer students with and without an associate's degrees and native four-year students.

Adhering to Wang's and Melguizo et al.'s models as well as remaining consistent with measures utilized by the Commonwealth of Virginia, two indicators of educational attainment were used and included time to degree completion and baccalaureate attainment. Wang examined two different outcomes of community college transfer students, baccalaureate attainment and college persistence. Using logistic regression, Wang, examined several predictor

variables that suggested the transfer students likelihood of remaining in college and attaining a bachelor's degree. Wang's study found that gender, SES, high school curriculum, baccalaureate aspirations, course remediation, community college involvement, and GPA were predictors of baccalaureate attainment. In contrast, Melguizo et al. used a "human capital framework" to study the impact of type of first institution attended on the likelihood of baccalaureate attainment. Particularly important in their study was the use of junior level four-year college students. Melquizo et al. compared the two student group's educational outcome status based on where the students started college, two-year versus four-year institution. The comparison of the student's educational outcomes began following the attainment of junior status at the four-year institution. Melguizo et al. used two measures of educational outcomes, number of non-remedial post-secondary credits accrued and baccalaureate attainment. The analyses controlled for ethnicity, gender, high school academic preparation, financial aid received, and regional labor market characteristics differences. Comparing students at the junior level allows for direct comparison of community college students with baccalaureate aspiration and four-year college students without the confounding factors associated with comparing the entire community college population to students who begin at a four-year institution. To understand how guaranteed admission in Virginia impacts baccalaureate attainment of community college transfer students it is imperative that only the students who have baccalaureate aspirations were examined. Therefore, Melguizo et al.'s approach of comparing students upon attaining junior status at the four-year institution and using baccalaureate attainment as the outcome variable was used to inform the design of the present study.

This study used a five-year graduation rate following obtaining junior status at the four-year institution and corresponded with the sample years. Defining a five-year graduation rate

was in line with previous work published by SCHEV as reported in the *Report on Transfer from Community Colleges at Virginia Public Institutions* (2012). The predictor variables were similar to those in Wang's model of college student persistence and baccalaureate attainment which included student's pre-college characteristics, their college experiences, and environmental factors. Furthermore, the study built upon Wang's work by using a Melguizo et al.'s research approach by analyzing educational outcomes obtained by junior students at the four-year institution. By using a combination of Wang and Melguizo et al.'s approaches, the study provided greater insight into the effectiveness of Virginia's articulation policy. Limited and mixed results in the published literature warranted further investigation of the effects of articulation policy on student outcomes. Furthermore, this study examined the effectiveness of the Commonwealth of Virginia's state mandated articulation policy. The study was intended to expand the literature by comparing native and transfer student's academic outcomes following attainment of a junior standing at the senior institution. Unlike other studies, the goal was to determine the impact of state articulation policy before and after the policy implementation.

Research Questions

The following research questions guided the study design and analysis:

- 1) How do transfer student graduation rates and time to degree completion compare to those of native four-year students who have achieved junior status at a Virginia four-year public institution?
- 2) What individual student characteristics and college engagement factors are associated with transfer and native student baccalaureate degree completion in the Commonwealth of Virginia?
- 3) To what extent is Virginia's articulation policy associated with baccalaureate attainment rates and time to baccalaureate degree completion following community college transfer?

Design

To determine the effectiveness of Virginia's articulation policy a secondary data analysis of institutional archived student data was conducted for community college transfer students and native four-year students. The secondary analysis consisted of three steps. First, the process involved analyzing archived student record data for native and transfer student graduation rates and time to degree completion. Included with these records were student demographic and academic data. The institutional data was used to gain an understanding of how transfer students compared to their four-year counterparts in the areas of graduation and time to degree completion. The second approach to understanding Virginia's articulation policy involved a secondary analysis of archived student data and data collected by the institutionally administered National Survey of Student Engagement (NSSE). The survey was designed to "reflect behaviors by students and institutions that are associated with desired outcomes of college. NSSE does not assess student learning directly, but survey results point to areas where colleges and universities are performing well and aspects of the undergraduate experience that could be improved" (NSSE, 2013a). The survey data were used to gather several student characteristics for data analysis. Third, transfer student record data were used to determine policy effectiveness. The collected data spanned a five-year period which corresponded to two years of data prior to articulation policy implementation and three years of data post articulation policy implementation. These data, along with time to degree completion and baccalaureate attainment rates, were used to determine whether the policies governing articulation in the Commonwealth eased the transfer to a four-year institution for community college transfer students.

Population and Sampling

The population and sample were collected from a single state university that enrolled approximately 23,700 undergraduate students in 2012 (U.S. News and World Report, 2013). According to the State Council of Higher Education for Virginia (SCHEV) (2012), between the years of 2004 and 2009 the study institution had a total of 4,570 students who transferred from Virginia community colleges. The transfer population consisted of 1,087 students who transferred with an associate's degree and 3,493 students who transferred without an associate's degree. Transfer students between 2004 and 2009 comprised approximately 19% of the institution's total undergraduate student body. The transfer student population at the study institution has been increasing each year. The study sample was drawn from both native and transfer student populations at the study institution beginning with the spring 2008 semester and ending at the conclusion of the fall 2012 semester.

The sample was composed of individuals who had achieved junior status, which was the equivalent of completing at least 60 college credits. The sample included students who enrolled, transferred, or graduated from the participating public four-year institution between the years of 2008-2012. The transfer student sample was limited to students who had transferred from institutions that are part of the Virginia Community College System. Students transferring between four-year institutions and from out of state two-year colleges were excluded from the study. These criteria limited the sample to the population of interest and allowed for comparison of transfer students under Virginia's articulation policy.

The sample was stratified according to three variables based on the student's entry point into higher education. The student categories were (1) native students defined as those students who began college at a four-year institution; (2) transfer students, those students that attended a

two-year institution and earned an associate's degree prior to transferring to the senior post-secondary school; and (3) transfer students, who attended a two-year institution and transferred to the senior post-secondary school before earning an associate's degree. Student record data was reviewed to place individual students in the appropriate classification. This stratification procedure was utilized to address research questions one and two. These two research questions compared the three groups based on their educational outcomes. The sample was collected for a five-year period beginning with the spring 2008 semester. The data were constrained to the five-year period due to institutional software changes that occurred in 2007. Data gathered prior to 2007 were unable to be accessed by university personnel due to administrative constraints. Furthermore, the data prior to 2007 were considered unreliable by university administrators and not recommended for use in this study. At the time data were received, the fall 2012 student data were most the recent.

The research sample provided by the four-year institution consisted of 14,565 students. The sample included junior level transfer and native students beginning with the spring semester of 2008. The data were sorted by the type of transfer student, with or without an associate degree, and native students. Furthermore, students were sorted based on current enrollment status. Students classified as "enrolled" were excluded from analyses. The exclusion of currently enrolled students provided a final sample composed of 9,286 individuals. Sixty-six percent of the final sample was comprised of native students. Students that transferred without an associate's degree composed approximately 25% of the sample while students who transferred with an associate's degree made up approximately 9% of the sample. Fifty-eight percent of the final sample was composed of female students. The ethnic breakdown consisted of 53%

Table 1

Summary table of student sample characteristics for native, transfer with an associate degree, and transfer without an associate degree

	Full Sample	Native	Transfer w/	Transfer w/o
Totals	9,286	6,140	827	2,319
Sample Characteristics				
<i>Pre-College</i>				
Gender*				
Female	58%	61%	52%	51%
Ethnicity				
Asian/Pacific Islander/Hawaiian	13%	14%	8%	11%
Black/African American	18%	19%	17%	15%
Caucasian/White	53%	51%	57%	58%
Hispanic/Latino	6%	5%	7%	6%
Other**	10%	11%	11%	10%
% Parental education beyond high school	71%	75%	63%	66%
Average High School GPA	3.37	3.44	3.03	2.94
<i>College Experience</i>				
% College Involvement***	54%	74%	6%	20%
Top Five Majors				
Business	16%	13%	24%	21%
Art	16%	21%	NA	NA
Government and Public Affairs	11%	11%	11%	11%
Biology	10%	10%	10%	9%
Psychology	8%	8%	9%	9%
Education	NA	NA	6%	NA
Mass Communication	NA	NA	NA	7%
Last Reported GPA	3.13	3.16	3.10	3.00
Transfer GPA	NA	NA	3.07	3.09
Graduation Rate	80%	85%	68%	74%
<i>External***</i>				
Dependents	28%	20%	46%	44%
Average time commitment	11 to 15	6 to 10	16 to 20	11 to 15
Employment	74%	72%	84%	75%
Average hours worked	16 to 20	16 to 20	16 to 20	16 to 20

Note. * = Sixty five students did not report gender.

** = "Other" consists of American Indian, international students, two or more races, and unknown.

*** = on random student sample of NSSE results (N = 1,079).

Caucasian/White, 18% African American/Black, 13% Asian/Pacific Islander/Hawaiian, and 6% Hispanic/Latino. Table 1 provides a description of the student characteristics for the study.

Instrumentation

This study used existing data from a measure of student engagement to determine the conditions that contributed to graduation and student success. The NSSE is a multi-item student self-report survey on college student engagement and includes items on students' age, ethnicity, residency, major, parental education level, and the type of college the student first attended. The NSSE is administered by Indiana University's Center for Postsecondary Research. According to NSSE, "[i]nstitutions use their data to identify aspects of the undergraduate experience inside and outside the classroom that can be improved through changes in policies and practices more consistent with good practices in undergraduate education" (2013a). More specifically, the NSSE measures student engagement in and the students' perceived benefit of their college experience as an indicator of learning (Kuh, 2001; Carini et al, 2006). According to NSSE, the survey was first administered in 2000 and updated in 2013. The survey gathers data in five areas which include 1) student participation in educational related activities, 2) institutional requirements and the difficulty of course work, 3) student perception of the college environment, 4) student educational and personal growth, and 5) student background information (NSSE, 2013b).

The NSSE is designed to assess student participation and the effectiveness of the institutional educational practices. As an example, the 2011 NSSE, asked students to identify how often they had conducted classroom activities such as asking questions, giving presentations, group exercises, or used email to communicate with an instructor. Respondents had the option to choose "Very Often," "Often," "Sometimes," or "Never." Furthermore, students

were asked how frequently their course work required mental activities like memorizing, analyzing, synthesizing, making judgments, and application of theory. Additional survey items included an assessment of student engagement in homework, course reading, written assignments, and quality of examination material. The 2011 survey inquired about the respondent's institutional relationship with other students, faculty, and administrative personnel. Finally, participants were asked about the amount of time spent participating in homework, working, co-curricular activities, relaxing, taking care of dependents, and commuting to class (NSSE, 2013c).

The participating institution has employed the use of NSSE since 2004 and currently houses data from 2006-2011. Only NSSE data from 2007 and later can be linked to specific students but data available to this study was limited to the 2010 and 2011 survey years. The participating institution limited the data due to administrative constraints and difficulties matching survey items prior to 2010. The survey was administered to all first year and senior baccalaureate degree seeking students. Students were recruited for participation through email or regular mail. If using email, all recruitment messages were sent electronically. If regular mail was used for recruitment then a random sample of students received two recruitment letters containing survey log-in information for online survey completion. A reminder postcard and two follow-up emails were sent to non-respondents. The choice of recruitment method was determined by the participating institution with email recruitment being strongly recommended. The participating institution provided NSSE with a student data file that contains contact information for all first-year and senior students. The participating institution generated promotional information to encourage student participation which contained institutional logos

that students would recognize. The participating institution was required to coordinate with institutional review boards for the protection of human subjects (NSSE, 2013d).

According to NSSE (2013a), the survey has been administered to over 1,552 institutions of higher education since 2000. The 2013 edition was administered to 621 institutions of higher learning. Over 328,000 undergraduates completed the survey in 2012 and approximately 3.7 million students have completed the survey since 2000. Kuh (2001) reported on the psychometric properties of the NSSE and found the skewness factor between variables “relatively normal.” Reliability for the NSSE has been documented and has a Cronbach alpha reliability coefficients ranging from 0.66 to 0.80 depending on the survey scale examined (NSSE, 2013e). These reliability coefficients indicated an internal question consistency between good and excellent. The survey has documented content and construct validity and shown to possess good internal reliability as well as established validity as a student self-report measure of college progress (NSSE, 2013e). As such, using archived NSSE data to examine the effectiveness of Virginia’s articulation policy was appropriate.

Variables

Independent variables. Multiple independent variables were analyzed for their impact on baccalaureate degree attainment, time to degree completion, and articulation policy effectiveness. These variables included student type (research questions one and two) and policy implementation (research question three). Student type had three levels and included: (1) native students, (2) transfer students with an associate’s degree, and (3) transfer students without an associate’s degree. Policy implementation had two levels and included pre and post-policy implementation.

Another aim of the study was to examine what student and institutional factors contributed to the likelihood of baccalaureate attainment (research question 2). These factors, also considered covariates, were consistent with the published literature and have been used as predictor variables in determining student likelihood of transfer and baccalaureate completion (Adelman, 1999; Lee & Frank, 1990; Melguizo et al., 2011; Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987). The covariate categories included the student's pre-college characteristics, college experiences, and external factors. The student's pre-college characteristics were individual attributes that each student possessed prior to enrolling in post-secondary education (Tinto, 1975; Wang, 2009). These attributes, as identified by Tinto in his seminal work on college persistence, had "direct and indirect impacts upon performance in college." Pre-college characteristics included student demographics, high school GPA, and level of parental education. Student demographics included gender and ethnicity. The level of parental education was used as a proxy for SES since higher degrees of education are associated with increased income (Bureau of Labor Statistics, 2014). These covariates were used to determine variation across demographic classifiers and their impact on baccalaureate attainment. All pre-college characteristics were generated through examination of archived student records. Dougherty and Kienzl found that ethnicity, gender, age, educational aspiration, external factors, enrollment status, and area of study affected the likelihood of transfer. While Roksa (2006a) showed vocational training, student expectation, continuous enrollment, SES, external student factors, gender, and remedial course work were predictors of baccalaureate attainment.

College experience variables provided an indication of student college engagement and academic preparation (Wang, 2009). College experience variables included student type (transfer or native), college involvement, student major, last reported GPA, and transfer GPA.

Information on college involvement was gathered from archived NSSE data related to student engagement at the participating institution. College engagement was defined by a positive response provided by the student to NSSE questions related to fraternity or sorority, student athletics, or co-curricular activity involvement. A positive student response was recorded if the student spent any time participating in one or more of these activities. The survey results were linked with the archived student record data and associated with individual students. Further affecting student academic outcome were environmental factors. According to Wang, external environmental factors affected the time students devoted toward their education and impacted baccalaureate attainment and persistence. To remain consistent with Wang's model, an examination of the student environmental conditions were required. The archived student engagement survey results provided the average number of hours worked, as well as the average number of hours committed to caring for dependents. Dependents were defined as children, spouse, or parents. The covariates and their descriptions are presented in Table 2.

Independent variables for research question three differed from questions one and two. The independent variables for question three addressed changes in baccalaureate attainment rates and time to degree completion for transfer students based on policy implementation. Two independent variables were used and included student type and policy implementation. Each independent variable included two levels; policy implementation included pre and post-policy and student type included transfer students with an associate's degree and transfer students without an associate's degree. Pre-policy implementation corresponded to academic years 2008-2009. Post-policy implementation corresponds to academic years 2010-2012.

Table 2

Description of student characteristics used for logistic regression analysis

Student Characteristics	Description
<i>Pre-College</i>	
Gender	Coded 0 for males and 1 for females
Ethnicity	Applied to student's self-identified ethnicity. Variables coded 1 for Asian/Pacific Islander/Hawaiian, 2 for Black/African American, 3 for Caucasian/White, 4 for Hispanic/Latino, and 5 for other. Other included American Indian, international students, two or more races, and unknown
Parental Education Beyond High School	Applied to student's mother only. Variables coded 0 for high school education or below, 1 for college education but did not finish, 2 for completion of an associate's, 3 for completion of a bachelor's, 4 for completion of a master's, and 5 for completion of a doctorate
High School GPA	GPA upon entry into college. Coded into a range: 0-1.0 = 1, 1.01-2.0 = 2, 2.01-3.0 = 3, and 3.01-4.0 = 4
<i>College Experience</i>	
College Involvement	Determined by student participate in fraternity or sorority, athletics, and co-curricular activities. Coded 0 for no participation and 1 for participation.
Top Five Student Majors by Student Type	Determined by institutional data identifying student major. A total of 27 different majors were identified coded sequentially. Top majors across the levels of student type were Business coded 1, Art coded 4, Government and Public Affairs coded 15, Biology coded 5, Psychology coded 22, Education coded 16, and Mass communication coded 18.
Last Reported GPA	Student's last reported GPA at the senior institution. Coded into a range: 0-1.0 = 1, 1.01-2.0 = 2, 2.01-3.0 = 3, and 3.01-4.0 = 4
Transfer GPA	Applies to transfer students. Coded into a range: 0-1.0 = 1, 1.01-2.0 = 2, 2.01-3.0 = 3, and 3.01-4.0 = 4
<i>External Factors</i>	
Dependent Status	Determined by NSSE responses related amount of time student spends taking care of dependents. Coded 0 for no dependents and 1 for dependents.
Employment status	Determined by NSSE responses related to amount of time student spends working. Coded 0 for not working and 1 for working.

Dependent variables. There were two dependent variables in this study. The first was baccalaureate attainment rates. Baccalaureate attainment was categorical and defined based on the student's status, "graduated" or "not enrolled." To calculate the rate of baccalaureate attainment or graduation rate, the number of students graduating from the study institution during the specified time period was divided by the total number in the sample of interest and subsequently converted to a percent. Attainment rates were calculated for the overall sample and each of the sub-samples. For example, the calculated graduation rate for transfer students with an associate's degree in the sub-sample for research question one was generated by dividing 564, the number of graduates, by 827, the total number of transfer students with an associate's degree, and multiplying by 100. This provided a graduation rate of 68%.

The second dependent variable was the time to degree completion. Time to degree was a continuous variable. Time to degree completion was calculated by subtracting the "cohort term" from the "graduation term." The cohort term was defined as the term a student was identified as a full-time junior. Graduation term was defined as the term graduation from the study institution. The first junior standing cohort was identified in the spring 2008 semester. The final graduation term was the fall 2012 semester. Assuming a three semester calendar year, 13 semesters were identified. The semesters were coded in sequential order beginning with the initial cohort date. For example, the spring 2008 semester was coded as 1, the fall 2008 semester was coded as 2, the spring 2009 semester was coded as 3, etc. Time to degree was calculated by subtracting the graduation semester code from the cohort semester code and dividing by 3. This provided the total number of years to degree completion once the student obtained a junior standing. Three represented the number of semesters per academic year. As an example, fall 2008 cohort term (coded 2) was subtracted from spring 2011 graduation term (coded 9) equaling

7 (number of semester to graduate). Seven was divided by 3 which provided the number of years to degree completion. Time to degree completion was reviewed in research questions one and three. Baccalaureate attainment and time to degree completion were obtained from archived student records since these data are considered to be more reliable than student self-report (Melguizo et al., 2011).

Procedures

This study used individual student data gathered from archived records and the NSSE survey results. The data sources were maintained by the university's Office of Assessment and Institutional Effectiveness (OAIE). Following approval by the institutional review board (IRB) a data request was submitted to the OAIE. The OAIE compiled the raw data and provided a summary spread sheet for all requested covariates and the student's linked NSSE results. The data spanned five years beginning in the spring semester of 2008 and ending in the fall semester of 2012.

The sample consisted of students that were still enrolled, graduated, or no longer enrolled. All students labelled "enrolled" were excluded from the analysis. Subsequently, the remainder of the data were organized into three categories by student type: native four-year student, transfer with an associate's degree, or transfer without an associate's degree. Once the sample was grouped according to student type the data were further divided into sub-samples for each research question. For research question one, a random sample of native students was taken and compared to transfer students with an associate's degree and transfer students without an associate's degree. Due to the limited number of transfer cases, the full sample of transfer students were used for analysis. The second research question used a second, unique sub-sample. This sample was drawn from students who completed the NSSE. All students

completing the survey were included in the second sub-sample. Finally, research question three examined the relationship between students who transferred prior to and after articulation policy implementation. Only transfer students were used for the third sub-sample analysis. All transfer students cases were used for analysis of research question three. The third sub-sample was divided by transfer student type and whether the student transferred pre or post-policy implementation. The pre-policy group consisted of student who graduated between the spring semester of 2008 and the end of the fall semester of 2009. The post-policy group consisted of students who graduated between the spring semester of 2010 and the fall semester of 2012. Transfer students were compared pre and post articulation policy implementation. In addition, this study included results of the 2010 and 2011 NSSE survey. These data were used to determine student engagement, parental education level, and student external demands. Only data reported by seniors was relevant to this study. NSSE data was linked to specific students for the provided survey years. These data in conjunction with student record data generated the list of covariates necessary for the logistic regression analysis conducted in research question two.

Data Analysis

Transfer students were compared to native four-year students to determine the effectiveness of Virginia's guaranteed admission policy and how transfer students compare to their four-year counterparts based on bachelor's degree attainment rates and time to degree completion. These aggregate data covered a five-year span beginning in 2008 and ending at the conclusion of the fall 2012 semester. Research questions one and two examined native and transfer students for the five-year period. Research question three was developed to examine transfer students based on policy implementation. The study institution implemented the guaranteed articulation agreement mandated by HERA in the spring of 2009. Students who

transferred after the spring of 2009 were designated post-policy students. Having the a pre and post-policy date ranges allowed for the comparison of transfer students before and after policy implementation and subsequently determine the impact of legislative action on transfer and graduation rates at the institution. These data were compared for changes in baccalaureate attainment rates and time to degree completion. Data analyses for the study was three-fold and involved the use of chi-square analysis, ANOVA, and logistic regression. Descriptive statistics were provided for the overall sample and for each sub-sample. All data were analyzed using IBM SPSS Statistics 21.

Sub-samples for data analysis. Prior to conducting statistical analyses, a random sample ($n = 3,264$) of native students were selected to make the number of individuals in the transfer group and the native groups were relatively equal. Due to the limited number of individuals in the transfer population ($n = 3,146$), the entire sample of transfer students was utilized in the data analysis of research question one. The demographic break down of research question one's sub-sample is described in Chapter Four. A second student sub-sample was selected for logistic regression analysis. This sub-sample was used to address research question two. The second sub-sample was required to obtain all the necessary student characteristics for the logistic regression analysis. The NSSE was required to acquire several of the covariates used to predict the likelihood of baccalaureate attainment. Because there were a limited number of students who took the NSSE during the 2010 and 2011 academic years all students completing the survey were utilized. This second sub-sample of students consisted of 1,079 cases. The sub-sample characteristics are described in Chapter four and presented in Table 5. A third student sub-sample was gathered to answer research question three. This sub-sample included transfer students only. The data obtained for sub-sample three covered two sampling frames. The first

frame covered academic years 2008-2009, while the second frame covered academic years 2010 through 2012. Graduation from the four-year institution must have occurred within five years of achieving junior status. Students who did not graduate by the end of 2012 were considered not to have graduated. Students who graduated between 2008 and 2009 made up the pre-policy cohort ($n = 1,469$) with those graduating between 2010 and 2012 comprising the post-policy transfer students ($n = 1,677$). The study institution did not implement the guaranteed articulation agreement mandated by HERA until 2009 (Virginia Commonwealth University, 2013). Therefore, 2009 became the cut-off point for pre and post-policy transfer students. The demographic characteristics of the third sub-sample are described in Chapter four and presented in Table 8. All sub-samples are compared to the overall research sample in Table 11 found at the end of Chapter four.

Differences in degree attainment and time to degree. Two analytical approaches were used to address graduation rates and time to degree completion of native and transfer students. Student type was the independent variable for the analysis of graduation rates and time to degree. Student type had three levels: native students, transfer students with an associate's degree, and transfer students without an associate's degree. A chi-square analysis using standardized residuals was used to determine if transfer and native students differed in graduation rates. According to Coolidge (2006, p. 336), "Chi-square statistics are designed to determine whether an observed number differs either from chance or from what was expected." The standardized residuals allowed for the determination of which group of students contributed the most to the significant chi-square result. Student graduation was a dichotomous categorical dependent variables which required an analysis of the magnitude of discrepancy between the expected outcome and the actual outcome across the levels of student type. A one-way ANOVA was used

to determine mean differences for transfer and native student time to degree completion.

“ANOVA is concerned with analyzing the variance produced in multiple mean comparisons to determine whether genuine differences exist among the means of a response variable as the result of some independent variable” (Coolidge, 2006, p. 242). For research question one, a comparison of the means was conducted to determine if a significant difference existed in student time to degree across the three levels of student type. Time to degree was a continuous dependent variable which was assumed to follow a normal distribution. Using a one-way ANOVA allowed for the comparison of mean time to degree completion between native and both groups of transfer students. Significant findings were measured at an a priori alpha of $p < 0.05$. A significant ANOVA F-ratio was followed by a post-hoc analysis.

The analytical approaches used to compare graduation rates were consistent with others (McGrath & Burd, 2012; Malik, 2011; Ganzet, 2012; Allen, 2009; Goodman, 2012).

Comparison of academic outcomes using chi-square analysis at the college level has been used by a several authors. McGrath and Burd (2012) used chi-square analysis to compare college freshman placed on academic probation after their first semester. Their study compared freshman student return to good academic standing; persistence to the 2nd, 3rd, and 4th years of college; and baccalaureate attainment within four to five years. The students were compared based on participation or non-participation in a mandatory success course for students on academic probation. Furthermore, Malik (2011) used chi-square analysis to examine retention rates of students who attended or did not attend a first year seminar course designed to assist students integrate into post-secondary education. Using chi-square, an independent sample t-test, and ANOVA, Ganzert (2012) examined college persistence and graduation rates of students enrolled in two different dual enrollment programs. Based on the use of chi-square analysis in

similar works, the use of chi-square analysis to examine native and transfer student graduation rates in this study was justified. Standardized residuals were used to further describe the significant findings of the chi-square analysis. Standardized residuals are the difference between the observed count and expected count in the chi-square statistic. In general, the residuals are an observed frequency for the particular category within a contingency table. It compares the expected frequency to the observed frequency. Standardized residuals are a measure of strength for a significant chi-square outcome and identify which cells contribute the most to a significant chi-square finding. Standardized residuals are comparable to z-scores. The z-score is a measure of how many standard deviations a population is above or below the average raw score. Z-scores follow a normal distribution. A standardized residual with an absolute value of 2.0 or greater are considered significant contributors to the chi-square finding. Those less than -2.0 are significantly less than the expected values while those exceeding 2.0 are significantly greater than the expected values (Statistics How To, 2014). Negative two and 2.0 approximate two standard deviation away from the mean for an alpha level of 0.05 (Coolidge, 2006, pp. 91-113). The standardized residual equation is $(f_o - f_e) / \sqrt{f_e}$ where f_o is the frequency of the observed outcomes and f_e is the frequency of the expected outcome (Britestat, 2014). Using standardized residuals as a post-hoc analysis following a significant chi-square finding is appropriate as showed by Allen (2009) and Goodman (2010). Allen used standardized residuals following a significant chi-square analysis during the examination of community college student characteristics and their relationship to retention, attendance, and funding. Goodman used standardized residual following a significant chi-square while examining first-time, full-time community and technical college student persistence.

Comparing transfer and native four-year students using one-way ANOVA has been used by several authors to analyze academic performance (Buckle, 2010; Glass & Harrington, 2002; Johnson, 2005). Buckle (2010) used GPA, baccalaureate attainment, and time to degree completion as a proxy for academic performance. Using one-way ANOVA, Buckle compared the academic performance of Jamaican community college transfer students to native four-year students who had obtained junior status at Jamaican universities with a collaborative transfer program. Glass and Harrington (2002) used ANOVA to compare the academic performance of transfer students to native university students following transfer to a large state institution. The authors were comparing student GPA. Johnson (2005) examined academic preparation of transfer and native students by comparing the GPA and residency status of these two groups of students. Based on similar works, the use of ANOVA to compare transfer and native four-year student time to degree completion was justified.

To effectively evaluate Virginia's guaranteed admission policy a comparison of academic outcomes between native and transfer students was conducted. The evaluation of graduation rates and time to degree completion based on student type determined if the academic outcomes at the study institution compared with those across the Commonwealth. Furthermore, this comparison was used to build a case for the efficacy of Virginia's guaranteed admission policy and to determine if the policy requirement to obtain an associate's degree prior to transfer had a significant impact over students who transferred without an associate's degree. Chi-square analysis was used to determine if a significant difference existed in graduation rates across the three levels of student type. The ANOVA analysis was used to identify mean differences between time to degree completion for native four-year and transfer students who achieved junior status. The results from these analyses indicated whether community college, as a means

to baccalaureate attainment, was a viable path for students with four-year degree aspirations and if, obtaining an associate's degree prior to transfer significantly improved the student's odds of obtaining a degree. Obtaining an associate's degree prior to transfer been shown to increase baccalaureate attainment (Crook et al., 2012).

Given the large sample size in this study, the likelihood of a statistically significant finding was probable and as such, effect sizes were examined. For the chi-square analysis a phi-coefficient was calculated. For the ANOVA an eta-squared was generated. The effect size determines the strength of the influence of the independent variable on the dependent variable and offers a measure of practical significance which is different from statistical significance. Large samples can produce a statistically significant outcome even if the differences or association is small or weak. Using effect size in addition to the statistical findings will offer a measure of practical significance. The magnitude of effect size will determine if the statistically significant finding is practically significant. The magnitude of effect size was compared to the guidelines provided by Cohen (1988) where a small effect size is 0.01, medium effect size is 0.06, and a large effect size is 0.14. With large samples, a statistically significant finding and a small effect size indicates a difference exists but the finding is probably not practically important or attributed to the independent variables in the study (Leech, Barrett, & Morgan, 2005, pp. 53-58).

Student characteristics and baccalaureate attainment. To better understand what factors influenced transfer and native student graduation, a logistic regression was conducted to identify those student characteristics that influence the likelihood of baccalaureate attainment. The list of student characteristics can be found in Table 2. The selected characteristics were consistent with Wang's model of baccalaureate attainment and student persistence. Several

authors have used logistic regression in their analyses of transfer and degree completion (Dougherty & Kienzl, 2006; Roksa, 2006; Wang, 2009). Data were gathered from archived student records and NSSE senior survey results. The NSSE was used to provide information about college involvement, parental education level, and number of hours dedicated to external demands. Logistic regression analysis is designed to project the outcome of binary dependent variables based on one or more predictive variables. Baccalaureate attainment is a binary outcome variable. The categorical covariates or predictor variables in Table 2 were coded for logistic regression analysis using dummy coding procedures. Individual archived student data provided the predictor variables used to generate two logistic regression models. Model one examined student characteristics that predict the likelihood of baccalaureate attainment and included student type as part of the analysis. This model examined if student type (native, transfer with an associate's, and transfer without an associates) was a predictor of baccalaureate attainment. By comparison, model two examined student characteristics predictive of transfer student baccalaureate attainment. The primary difference between the two models was the use of transfer GPA and the exclusion of native students in the analysis of model two. Logistic regression analysis was used to identify the student characteristics that influenced baccalaureate attainment at the study institution for all graduating students.

The focus of research question two was to identify individual student characteristics that predict baccalaureate degree completion. In addition, central to research question two was the predictive value of student type on baccalaureate attainment. The effects of individual characteristics have been documented in the literature. Specifically, difference in the characteristics that predicted the likelihood of baccalaureate attainment existed between students who enter community college and those who entered at four-year institutions (Alfonso, 2006;

Doyle, 2009; Gonzalez & Hilmer, 2006; Leigh & Gill, 2003; Long & Kurlaender, 2009; Melguizo et al., 2011). However, there was little evidence to show if these same differences exist between community college students who transfer and native four-year students who achieve junior status and what the impact of those characteristics were on baccalaureate attainment.

The logistic regression model is presented below (Moore & McCabe, 2005):

$$y_i = \log \left[\frac{P_i}{1 - P_i} \right] = \beta_0 + \beta_1 \text{Transfer without}_t + \beta_2 \text{Transfer with}_t + \beta_3 \text{Native}_t + \beta_{4-16} X_{it}$$

Where y_i is the log odds of graduating with a bachelor's degree and P_i is the probability of this dichotomous outcome (1 = yes). β_0 is the equation constant. $\beta_1 \text{Transfer without}_t$ refers to the proportion of students who transferred without an associate's degree and achieved junior status that graduated with a bachelor's degree. $\beta_2 \text{Transfer with}_t$ is the proportion of students who transferred with an associate's degree and achieved junior status that graduated with a bachelor's degree. $\beta_3 \text{Native}_t$ refers to the proportion of native students who achieved junior status that graduated with a bachelor's degree. $\beta_{4-16} X_{it}$ represents individual student characteristics described in Table 1. Where "i" represents the individual student and "t" represents the type of student (transfer with an associate's, transfer without an associate's, or native). Logistic regression results are presented as an odds ratio. The odds ratio indicates that for every one unit change in the explanatory/predictor variable a proportional unit change is observed on the outcome variable.

Impact of articulation policy on academic outcomes. To understand how articulation policy impacted community college transfer and academic outcomes in Virginia an analysis of pre and post HERA student data was conducted. The goal of question three was to determine if

community college transfer policy improved academic outcomes for students transferring with an associate's degree following implementation of the guaranteed admission policy. Multiple means of comparison were used to determine if the enacted policy had increased baccalaureate attainment and reduced time to degree completion for students transferring with an associate's degree in the Commonwealth. In question three, only community college transfer students were utilized. As a proxy for policy effectiveness, time to degree completion and baccalaureate attainment rates before and after policy implementation were examined. Time to degree completion and baccalaureate attainment were obtained through archived student records. Like research question one, baccalaureate attainment was analyzed through chi-square analysis with standardized residuals. Time to degree completion was analyzed using a 2 x 2 factorial ANOVA. The independent variables for the factorial ANOVA included student type and policy implementation. Research question three used a separate sub-sample than the previous two research questions. All transfer students were examined due to the limited number of cases. A comparison of this sub-sample to the previous two sub-samples can be found in Table 11 at the end of Chapter four.

A 2 x 4 contingency table was generated to examine the categorical relationship between transfer student graduation rates pre and post-policy implementation. The dichotomous categories for the chi-square analysis were "graduated" and "not enrolled." Significant chi-square findings were further examined using standardized residuals. The residuals identified the cells contributing the most to the significant chi-square finding. In addition, the residuals allowed for comparison across the four groups of student type. Student type was divided into pre-policy transfer students with an associate's degree, pre-policy transfer student without an associate's degree, post-policy transfer students with an associate's degree, and post-policy

transfer student without an associate's degree. To test for sample size effects a phi coefficient was generated using measures of magnitude defined by Cohen (1988). Significance was established at an alpha level $p < 0.05$.

The 2 x 2 factorial ANOVA examined pre/post-policy and transfer student type mean time to degree completion. Pre-policy students were compared to post-policy student mean time to degree completion. In addition, transfer students with an associate's degree were compared to transfer students without an associate's degree mean time to degree completion. "A factorial ANOVA evaluates the effects of two or more independent variables simultaneously on a single dependent variable. The simplest factorial ANOVA design is the 2 x 2 design where there are two or more factors (or treatments) that each have two or more levels " (Coolidge, 2006, p. 283). The 2 x 2 design has two independent variables with each having two levels. The factorial design test for significance for each independent variable alone, also called the simple main effect, but also produces a measure of interaction between the two independent variables. "The interaction between the two factors allows the experimenter to determine what the effect is of both independent variables simultaneously on the dependent variable" (Coolidge, 2006, p. 283). Each independent variable could be examined independently using two separate ANOVA's; however, this approach would not provide the interaction effect. The strength of the factorial design is the production of an interaction. The assumptions for a factorial ANOVA are the same as those for a one-way ANOVA; normal distribution of the population, homogeneity of variance, and independent measures across the levels of the independent variables (Coolidge, 2006).

Kracher (2009) examined academic and non-academic factors that influenced student retention using a factorial ANOVA. The impact of personality type on undergraduate college student success at Oklahoma State University was examined by Ehlers (2008). Specifically, a

factorial ANOVA was used to examine the relationship between the student's first and last semester GPA and their resulting scores on an internet based personality assessment. Although not measured by Ehlers, student academic outcomes are often associated with their GPA. The use of a factorial ANOVA was justified in this study based on the use in the literature to evaluate student academic outcomes.

The findings from the factorial ANOVA were three-fold. First, the factorial ANOVA identified differences in mean time to degree completion pre and post policy implementation. Next the factorial ANOVA identified differences in mean time to degree for transfer students with an associate's degree and transfer students without an associate's degree. Finally, the factorial ANOVA identified if an interaction occurred between the two independent variables. The interaction determined if the observed differences in time to degree completion of transfer students was a result of policy implementation. Time to degree completion has been utilized by SCHEV when examining transfer student graduation rates. In conjunction with graduation rates, time to degree was used to determine the effectiveness of Virginia's articulation policy. Significant findings will be measured at an alpha rate of $p < 0.05$. Significant results were followed by a post-hoc analysis.

Delimitations

The data gathered in this study was delimited to a single Commonwealth of Virginia public, four-year institution. Institutional archived student record data were gathered on transfer and native students during the specified time from 2008 to the 2012 academic year delimited by the total number of years included in the post-policy sample. The NSSE data was delimited by incomplete survey results. Classifications of transfer students were delimited to those students transferring from a VCCS institution.

Virginia Commonwealth University's Institutional Review Board (IRB)

Following approval by the dissertation committee a study plan was generated and submitted to VCU IRB for review. Exempt status was requested due to the minimal risk to human subjects and the lack of personal identifiers in the data received from OAIE. Exempt status approval was granted by VCU IRB on July 22, 2013. The IRB approval number was IRB#HM15417.

Chapter 4

Results

Introduction to Results

The focus of this study was to examine the effectiveness of the Commonwealth of Virginia's guaranteed admission policy between the state's public two-year and four-year institutions. Examination of the policy involved a review and comparison of community college transfer and native four-year students. Review of the policy used both descriptive and correlational analyses including chi-square, ANOVA and logistic regression. The analyses were conducted to compare baccalaureate attainment, time to degree completion, and student characteristics to determine if individual student characteristics and state policy impacted baccalaureate attainment. The results are organized by the research questions that guided the study. As described in Chapter 3, several different samples of student record data were used to address the research questions, as such each section includes a brief description of the cases used in each analysis. The analyses were designed to answer the following research questions:

- 1) How do transfer student graduation rates and time to degree completion compare to those of native four-year students who have achieved junior status at a Virginia four-year public institution?
- 2) What individual student characteristics and college engagement factors are associated with transfer and native student baccalaureate degree completion in the Commonwealth of Virginia?

- 3) To what extent is Virginia's articulation policy associated with baccalaureate attainment rates and time to baccalaureate degree completion following community college transfer?

Student Academic Outcomes

To determine the efficacy of Virginia's articulation policy a comparison of academic outcomes between the native and transfer students was required to explore the impact of policy implementation on transfer student academic outcomes. Initial exploration of the effectiveness of the articulation policy involved comparing the graduation rates and the time to degree completion among three groups of students: transfer students with an associate's degree, transfer students without an associate's degree, and native four-year student's following attainment of junior standing at the senior institution. The analysis of graduation data was two-fold. First, graduation rates were compared between native and both groups of transfer students using chi-square analysis. Subsequently, time to degree completion was examined using a one-way ANOVA. Time to degree completion was a derived variable, calculated based on the difference between the graduation date and the date the institution identified the student as a junior. Both the time to degree and baccalaureate attainment variables are commonly used indicators for academic outcomes as noted in the literature. Because of the categorical nature of student graduation rates (e.g., graduated or did not graduate) and the continuous nature of time to degree completion two separate analytical approaches were used.

Graduation rates. Graduation rates were calculated for a five-year period beginning with the spring 2008 semester and ending at the conclusion of the fall 2012 semester. These rates are presented in Table 2 found in Chapter 3. As shown, the graduation rate differed across the three groups of students. Native students graduated (85%) in larger percentages than both

groups of transfer student (68% with an associate's degree, $n = 827$; 74% without an associate's degree, $n = 2,270$).

The graduation status for each case in the sample was coded "graduated" or "not enrolled." These codes were designated by the study institution and provided in the student record data. Not enrolled indicated, at the time the sample was taken, the student dropped out prior to graduation or the student was not taking classes at the time the sample was collected. For this study, not enrolled, indicates the student withdrew before graduation. The sub-sample used for chi-square analysis was 51% native students ($n = 3,264$) and 49% transfer students ($n = 3,146$). The total graduation rate for the sub-sample was 78%. This is slightly lower than the overall sample presented in Table 1. The graduation rate for native students was 85%, for transfer students with an associate's degree was 68%, and for transfer students without an associate's degree was 74%. Chi-square analysis of graduation rates found a significant relationship between the graduation rate of native and transfer students, $\chi^2 (2, n = 6,410) = 156.13, p < 0.001$. There was a small but significant positive correlation between graduation and student type in this sub-sample, $r = 0.156, p < 0.001$. This correlation indicated that native students graduated in significantly higher rates than either of the two groups of transfer students. However, the small correlational coefficient indicates other factors, in addition to student type, may be contributing the difference in graduation rates. Of the graduating students, almost 55% of the students in the sub-sample who graduated with a baccalaureate started college at the four-year institution. Of the graduating transfer students, 25% transferred with an associate's degree and 75% transferred without an associate's degree. In comparison, native students comprised 37% of the non-graduating students. Of the 63% of the total non-graduating transfer students; students who transferred with an associate's degree comprised 30% while student's without an

associates accounted for 70% of cases. These findings suggest that students who start college at the four-year institution have a slight advantage over transfer students in the attainment of a bachelor's degree. This may be a result of more effective advising throughout their early college years or better academic preparation prior to college (Johnson, 2011; Cullinane, 2014). Transfer student advisors at students' original non-four year institution, may not be as familiar with the requirements for degree completion at the senior institution and, as such, transfer students may be required to take more courses after enrolling, resulting in lower rates degree completion.

The findings of the chi-square analysis required further evaluation to determine if significant differences existed in graduation rates across the different levels of the independent variable. The purpose for examining the relationship was to determine if variations existed among the different student types. Published data by SCHEV (2012) showed a difference in graduation rates among transfer students with an associate's degree and those without. SCHEV's data showed a graduation rate for transfer students with an associate's degree of 70% while the graduation rate for transfer students without an associate's degree was 58%. Graduation data reported by SCHEV demonstrated that students who transfer with an associate's degree graduated at higher rates than students who transferred without an associate's degree. However, the calculated graduation rate for the study institution showed students without an associate's degree graduated at a higher rate than their associate's degree counterparts.

Standardized residuals were used to determine the influence of individual student type on the overall significance of the chi-square. Examining the standardized residuals in Table 3 showed the frequency of native students was 12 standard errors higher than would be expected if there was an association between graduation and student type. The values for the standardized residuals indicate the native student graduation rates made the greatest contribution to the

significant chi-square findings. Furthermore, the standardized residuals for transfer students were 2.6 standard errors lower than would be expected. In addition, the minimal difference in the standardized residual, less than one standard error, of the two types of transfer students indicated students with an associate's degree do not graduate at significantly higher rates than students without an associate's degree. All residuals were less than or greater than the critical value (-2.0 or 2.0) supporting the finding that native students graduated at higher rates than either of the transfer groups. The findings are consistent with published results by SCHEV and suggest transfer had a negative impact on the likelihood of baccalaureate attainment for students who began their college careers at the community college. However, the significant chi-square outcomes may be the result of the differences in cell sizes between native, transfer students with an associate's degree, and transfer students without an associate's degree rather than a true difference in graduation rates. Chi-square results are summarized in Table 3.

Table 3

Chi-squared comparison of graduation status based on student type (n = 6,410)

Graduation Status	Student Type			χ^2	p
	Native (n = 3,264)	Transfer w/ (n = 827)	Transfer w/o (n = 2,270)		
Not Enrolled	15%	32%	26%	156.13*	0.156
Std. Residual	-7.5	6.4	6.4		
Graduated	85%	68%	74%	12	-2.6
Std. Residual	12	-2.6	-3.4		

Note . * = $p < 0.001$

Time to degree completion. To further understand how transfer and native students compared on academic outcomes a one-way ANOVA was conducted to determine if student time to degree completion following attainment of junior status at the four-year institution differed across the three student groups. Only students who were identified as “graduated” were included in the analysis. Native students (n = 2,759) made up approximately 55% of the sample.

Students who transferred without an associate's degree ($n = 1,707$) composed 34% of the sample, while the transfer with an associate's degree ($n = 563$) students accounted for approximately 11% of the sample. Time to degree completion was calculated based on the difference between the date each student reached junior status and the individual's graduation date. Junior status is based on academic credits earned (60 credits) by the student. Time to degree ranged from as little as a year to as long as five years following attainment of junior standing. The mode for the sample's time to degree was two years. Approximately 47% of the sample completed their degree within the two-year period following achievement of junior standing. The average total time to degree completion was 2.40 years for the sample as a whole. Native students graduated, on average, in 2.41 years while all transfer students graduated, on average, in 2.45 years from the time they were classified as juniors.

ANOVA results showed a significant main effect indicated there is a difference in time to degree completion, $F(2,5,029) = 5.69, p = 0.003$. Statistical significance was established at a $p < 0.05$. *Post hoc* analysis showed native students ($\bar{x} = 2.4, SD = 0.79$) graduated in significantly less time than students who transferred with an associate's degree ($\bar{x} = 2.55, SD = 0.97$), $p = 0.002$. Furthermore, *post hoc* analysis showed mean time to degree for transfer students without ($\bar{x} = 2.45, SD = 0.99$) an associate's was statistically the same as the mean time to degree for transfer students with an associate's degree once a junior standing was achieved. Moreover, no significant differences existed between native students and transfer students without an associate's degree mean time to degree completion. The ANOVA result and descriptive statistics can be found in Table 4. Although the ANOVA results were significant, the effect size for the main effect for student type was small as measured by eta squared, which equaled 0.002. This means the type of student by itself accounted for 0.2% of the overall variance in mean

Table 4

Descriptive and ANOVA results for time to degree completion among native and transfer students who achieved junior-level status

	<i>Mean (SD)</i>	<i>Std. Error</i>	<i>df</i>	<i>F</i>	<i>p-value</i>	η^2
Overall	2.44 (0.89)	0.013	2	5.69	0.003	0.002
Student Type						
Native	2.41 (0.79)*	0.015				
Transfer w/	2.55 (0.97)*	0.041				
Transfer w/o	2.45 (0.99)	0.024				

Note. * = $p < 0.001$ means were determined to be statistically significant by Tukey's HSD post hoc analysis.

graduation time; thus, indicating factors other than student type may be influencing the observed difference in student time to degree. These findings contradicted the expected outcome that student who transfer with an associate's degree would graduate in the same amount of time as native students and a faster rates than students who transfer without an associate's degree. Deviation from the expected outcome may be the result of loss of course credit following transfer or transfer shock resulting in the repeat of failed courses (Turk, 2012; Alfonso, 2006; Dougherty, 1987; Dougherty, 1992; Ishitani, 2008; Pennigton, 2006).

Factors affecting graduation

The literature has shown students beginning post-secondary education at a community college have different demographic backgrounds than their four-year counterparts. The purpose of research question two was to examine individual student characteristics and their influence on the likelihood of baccalaureate attainment. Using the covariates (e.g., ethnicity, GPA, college involvement, etc.) listed in Table 2, two models of graduation were examined to determine the factors that most influenced the likelihood of graduation. The logistic regression analysis was limited to students who had completed the NSSE during their senior year and was a different sub-sample of the overall sample. The sub-sample used for the logistic regression analysis was

also different from the sub-sample used to analyze academic outcomes between native and transfer students. The NSSE data was used to link the student academic outcome data with the background characteristics and institutional variables used in the study. These covariates were used to reflect Wang's model on baccalaureate attainment and persistence. The NSSE was administered randomly to all seniors during the 2010 and 2011 academic years and resulted in a total sub-sample of 1,079 cases. The sample demographics were slightly different than those of the overall sample. The sub-sample consisted of senior-level students only. The logistic regression sub-sample demographics are presented in Table 5.

The logistic regression sub-sample included 65% native students ($n = 698$). Students transferring with an associate's degree made up an additional 10% of cases ($n = 109$), while students transferring without an associate's degree composed the rest of the sub-sample at 25% ($n = 272$). The sub-sample proportions were consistent with the overall sample. See Table 11 at the end of this chapter for a comparison of all sub-samples. The logistic regression sample had a higher percentage of female students compared to the overall sample, 65% vs. 58%. The ethnic breakdown was consistent with the overall sample. Caucasian students comprised the largest percentage at 55%. African Americans accounted for approximately 15%, while Asian/Pacific Islander/Hawaiian students made up an additional 14%. Hispanic cases composed the smallest percentage at 3%. Graduation rates for the logistic regression sub-sample were higher than the overall study sample.

Native, transfer with an associate's degree, and transfer without an associate's degree students had graduation rates of 97%, 90%, and 95%, respectively. These rates were approximately 17, 22, and 21 percentage points higher than the overall study sample. The

Table 5

Descriptive table for the sub-sample used for logistic regression analysis

	Full sub-sample	Native	Transfer w/	Transfer w/o
Total number of sub-sample cases	1,079	698	109	272
Covariates				
<i>Pre-College</i>				
Gender				
Female	65%	68%	65%	58%
Ethnicity				
Asian/Pacific Islander/Hawaiian (n = 151)	14%	17%	6%	10%
Black/African American (n = 162)	15%	15%	12%	16%
Caucasian/White (n = 594)	55%	53%	63%	57%
Hispanic/Latino (n = 32)	3%	3%	3%	4%
Other** (n = 140)	13%	12%	17%	13%
% Parental education beyond high school	70%	73%	63%	67%
Average High School GPA	3.6	3.6	3.2	3.2
<i>College Experience</i>				
% College Involvement	54%	74%	6%	20%
Top Five Majors				
Art	15%	20%	7%	8%
Business	14%	12%	20%	17%
Biology	11%	12%	NA	10%
Government and Public Affairs	9%	9%	7%	10%
Engineering	9%	11%	NA	6%*
Psychology	NA	NA	7%	NA
Education	NA	NA	7%	6%
Last Reported GPA	3.2	3.3	3.2	3.1
Transfer GPA	NA	NA	3.2	3.2
Graduation Rate	96%	97%	90%	95%
<i>External</i>				
Dependents	28%	20%	46%	44%
Average time commitment	11 to 15	6 to 10	16 to 20	11 to 15
Employment	74%	72%	84%	75%
Average hours worked	16 to 20	16 to 20	16 to 20	16 to 20

** "Other" consists of American Indian, international students, two or more races, and unknown

difference in graduation rate may be a result of student withdrawal between their junior and senior years. Senior level students, as a whole, have higher odds of graduating than junior level students (Olagunju, 1981). Furthermore, differences may be a side effect of the smaller logistic regression sample. These results differed from those published by SCHEV. SCHEV reported higher graduation rates for students who transferred with an associate's degree than those who transferred without (SCHEV, 2011c). The present study revealed a different relationship for transfer student graduation rates. Students who transferred without an associate's degree graduated at higher rates than those who transferred with an associate's degree. This was similar to the graduation rates observed for the sub-sample in the first analysis.

Logistic regression results. A logistic regression was conducted to determine the predictive capacity of student characteristics on the likelihood of baccalaureate attainment. Model one focused on student type: native, transfer with an associates, and transfer without an associate's degree. Model two examined the same student characteristics as in model one, except the model included transfer students only. The purpose for conducting two models was two-fold. First, model one allowed the comparison of all three student types and to identify if student type was a likely predictor of baccalaureate attainment. Second, the difference in graduation rate between students who transferred with an associate's degree and those without an associate's degree warranted further study which involved including GPA at the time of transfer in the analysis. Logistic regression results are reported as an odds ratio, which indicates the odds of an outcome occurring based on a single unit change in any of the significant covariates used for this study. Only significant odds ratios were reported for each model. Only cases with complete data were included in the analysis.

Influences of student type on baccalaureate attainment. Model one estimated the likelihood of attaining a baccalaureate among all students who obtained junior status at the senior institution. The results of the analysis are presented in Table 6. The primary focus of model one was to determine if student type was predictive of baccalaureate attainment. A secondary focus of model one was to determine whether the additional covariates in listed in Table 2 influenced the likelihood of baccalaureate attainment and to provide insight into student characteristics that may contribute to the graduation disparity between transfer and native students. Of the students who attained junior status and completed the NSSE between 2010 and 2011, only high school GPA, college GPA, and ethnicity were statistically significant predictors of baccalaureate attainment. For every one point increase in high school GPA, the college student increased their likelihood of baccalaureate attainment by 0.23 times. Being Caucasian increased the odds of obtaining a bachelor's degree by 7.70 times compared to other ethnicities when holding all other variables constant. However, the significance of ethnicity as a predictor of baccalaureate attainment should be viewed with caution since Caucasians made up a larger percentage of the sub-sample. The larger percentage may have contributed the significant result for the Caucasian classification as a predictor of baccalaureate attainment. Finally, the student's last reported GPA was used as an indicator of student success throughout college. The outcome of the logistic regression analysis showed students who maintained a higher GPA increased their odds of graduation. For every one point increase in student GPA the student increased their odds of graduation by 3.54 times, holding all else constant. The logistic regression results for model one are presented in Table 6.

These findings are consistent with the published literature and suggest students who begin their college careers at the community college have an equal likelihood of baccalaureate

attainment as native four-year students once achieving junior status at the senior institution (Melguizo et al., 2011; Crook et al., 2012). Despite the type of institution where the student begins college, the most important factor contributing to baccalaureate attainment was a solid academic foundation. Although student type was not a predictor of baccalaureate attainment it should be noted transfer students in this sub-sample had lower high school GPAs, lower last reported GPAs, lower parental education levels, and increased external demands compared to native students. Native student's parental education levels were 6 to 10% higher than transfer students with and without an associate's degree. Native student average high school GPA was 0.4 points higher than

Table 6

Logistic regression parameter estimates for all students reaching junior status and the likelihood of baccalaureate attainment (n = 702)

Covariates	b	S.E.	Odds Ratio
<i>Pre-College</i>			
Gender			
Female	0.913	0.559	
Ethnicity			
Asian/Pacific Islander/Hawaiian	0.842	0.924	
Black/African American	0.688	0.938	
Caucasian/White	2.041*	0.861	7.701
Hispanic/Latino	19.172	0.288	
Mother's Education Level	-0.236	0.217	
Average High School GPA	-1.478*	0.65	0.29
<i>College Experience</i>			
Student Type	12.132	0.532	
College Involvement	0.521	0.603	
Major	-0.12	0.038	
Last Reported GPA	1.264**	0.219	3.54
<i>External</i>			
Dependents	-0.387	0.655	
Employment	-0.616	0.655	

Note. * = $p < 0.05$, ** = $p < 0.01$

Influence of transfer student type on baccalaureate attainment. Model two further examined the characteristics of transfer students, both with and without an associate's degree, and how these characteristics predicted the likelihood of baccalaureate attainment. The results of model two are presented in Table 7. Similar to model one, ethnicity and GPA at graduation were significant predictors of baccalaureate attainment for the two transfer student groups. Furthermore, the student's transfer GPA was significant. For every one point increase in transfer GPA, the odds of baccalaureate attainment increased by 2.42 times. No observed difference in transfer GPA existed between the two types of transfer students, indicating each group of student had an equal likelihood of baccalaureate attainment. The likelihood of baccalaureate attainment was 8.46 times greater for Caucasian students, but as mentioned previously, the significant finding for ethnicity may be the result of the greater number of Caucasian cases compared to the other ethnicities categories. For every one point increase in college GPA, transfer students increased their likelihood of graduating by 5.81 times. It is important to note the lack of impact student type played in predicting baccalaureate attainment. These results suggest regardless of when the student transferred, with or without an associate's degree, they had an equal likelihood of baccalaureate attainment depending on background characteristics and GPA.

These data predicted the impact of individual student characteristics on the likelihood of graduation. Alone, these elements may not explain the observed difference in student academic outcome between transfer students with an associate's degree and transfer student's without an associate's degree. Examining the descriptive data presented in Table 5 showed students who transferred without an associate's degree had higher levels of college involvement and less external commitment than students who transferred with an associate's degree. The lower external demands and transferring sooner may have allowed these students more time to become

involved with extra-curricular activities at the four-year institution. This increased involvement may have provided a more positive college experience which led to the increased graduation rates.

Table 7

Logistic regression parameter estimates for transfer students reaching junior status and the likelihood of baccalaureate attainment (n = 332)

Covariates	b	S.E.	Odds Ratio
<i>Pre-College</i>			
Gender			
Female	-0.42	0.766	
Ethnicity			
Asian/Pacific Islander/Hawaiian	-0.13	1.158	
Black/African American	1.916	0.983	
Caucasian/White	2.135*	0.983	8.457
Hispanic/Latino	17.768	0.570	
Mother's Education Level	-0.114	0.231	
<i>College Experience</i>			
Student Type	0.907	0.715	
College Involvement	0.986	0.784	
Major	-0.065	0.045	
Last Reported GPA	1.759**	0.322	5.808
Transfer GPA	0.883**	0.18	2.417
<i>External</i>			
Dependents	-1.116	0.721	
Employment	-0.321	0.322	

Note. * = $p < 0.05$, ** = $p < 0.01$

Effects of articulation policy on transfer student academic outcomes

Research question three examined the State of Virginia's articulation policy pre and post implementation. The purpose of research question three was to ascertain the impact of guaranteed admission on the academic outcomes of transfer students, pre and post-policy implementation. By comparing transfer student academic outcomes prior to and after policy

implementation the impact or effectiveness of the policy was determined. Policy effectiveness was examined by comparing graduation rates and time to degree completion. Similar to question one, graduation rates were examined through the use of chi-square analysis. Time to degree completion was examined using a factorial ANOVA. The analysis for research question three examined the effects of policy implementation on graduation rates and time to degree completion for transfer students. The analysis for research question three used a sub-sample from the overall sample. The transfer student sub-sample was divided into a pre-policy group, students graduating before the 2010 spring semester, and a post-policy group, students graduating after the 2010 spring semester. The demographic characteristics of this sub-sample are listed below and presented in Table 8. The sub-sample for research question three was different from the previous two sub-samples examined in research questions one and two. The descriptive statistics for the three sub-samples are compared in Table 11.

The sub-sample for question three consisted of 3,146 cases. Pre-policy students composed 47% of the sub-sample while post-policy students composed 53% of the sub-sample. Students transferring with an associate's (n = 339) made up 23% of the cases in the pre-policy group. Pre-policy students transferring without an associate's (n = 1,130) composed 77% of cases. The post-policy students transferring with an associate's degree (n = 488) consisted of 29% while the post-policy students transferring without an associate's degree (n = 1,189) made up 71% of cases. An increase in transfer students were observed pre and post-policy implementation. The overall transfer student population increased by approximately 14%. Students who transferred without an associate's degree grew by approximately 5% while students who transferred with an associate's degree grew by approximately 44%. As a

Table 8

Descriptive statistics for transfer students pre and post articulation policy implementation

	Pre-policy			Post-Policy		
	Total	Transfer w/	Transfer w/o	Total	Transfer w/	Transfer w/o
Sample	1,469	339	1,130	1,677	488	1,189
Gender*						
Female	52%	56%	51%	51%	50%	51%
Ethnicity						
Asian/Pacific Islander/Hawaiian	10%	9%	11%	10%	9%	11%
Black/African American	15%	18%	14%	16%	18%	15%
Caucasian/White	57%	56%	56%	59%	56%	60%
Hispanic/Latino	6%	16%	6%	7%	16%	4%
Other**	13%	8%	13%	8%	8%	8%
Last Reported GPA	3.04	3.09	3.03	3.06	3.09	3.04
Transfer GPA	3.15	3.08	3.17	3.03	3.06	3.02
Graduation Rate	79.0%	75.5%	80.0%	66.1%	62.9%	67.5%

Note. * = 14 students did not report gender

** = "Other" consists of American Indian, international students, two or more races, and unknown

comparison, native student populations increased by approximately 34% during the same time

period. It was unclear whether the large increase in transfer students with an associate's degree

could be attributed to articulation policy changes or the general increase of transfer students pre

and post-policy implementation. Female students comprised 52% (pre-policy) and 51% (post-

policy) of the sample. The pre-policy sample consisted of 57% Caucasian students while the

post-policy sample consisted of 59%. The transfer GPA for post-policy students was slightly

lower when compared to the pre-policy group. There was a sharp decrease in the graduation

rates between the two groups. Pre-policy graduation rate was approximately 79% while the post-

policy cohort graduation rate was approximately 66%. For comparison purposes native students

at the study institution during the same time period had graduation rates of 91% before policy implementation and 82% after implementation once achieving a junior standing.

Pre/post-policy transfer student graduation rates. If articulation policies are designed to increase the ease of transfer between community college and four-year institutions then an increase in transfer would be expected and subsequently, an increase in baccalaureate degree attainment. Central to Virginia's guaranteed admission policy is the requirement of obtaining an associate's degree prior to transfer. Associate's degree attainment has been shown to increase baccalaureate attainment following transfer (Crook et al., 2012). Therefore, an increase in the percentage of baccalaureate degrees awarded would be expected after policy implementation. However, this was not observed. To determine if the decline in graduation rate was statistically significant a chi-square analysis was conducted on transfer student graduation rates pre and post-policy implementation. Like the chi-square analysis in research question one, each individual was coded "graduated" or "not enrolled." The results of the chi-square analysis with standardized residuals are presented in Table 9.

Using chi-square analysis allowed for the comparison of student graduation rates across the four levels of transfer students; transfer with an associate's prior to policy implementation, transfer without an associate's prior to policy implementation, transfer with an associate's after policy implementation, and transfer without an associate's after policy implementation. The four student types were compared using the standardized residuals associated with the chi-square analysis. This allowed for the comparison of transfer groups to determine which group was contributing most to the chi-square outcome. Chi-square analysis of graduation rates showed a significant relationship for transfer students before and after policy implementation, $\chi^2(3, N = 3,146) = 69.9, p < 0.001$. There was a small but significant positive correlation between

graduation and student type in this sub-sample, $\eta^2 = 0.15$, $p < 0.001$, of students who graduated from the participating institution before and after policy implementation. Of the graduating transfer students in this sub-sample, 51% of the bachelor's degrees were obtained prior to policy implementation while 49% were obtained for those transferring after policy implementation. Although small, the relationship as measured by the overall chi-square statistic was significant. These findings indicated students transferring to the study institution prior to articulation policy implementation had an increased likelihood of baccalaureate attainment when compared to students who transferred following policy implementation. This may have been the result of institutional changes or academically underprepared students (SCHEV, 2013; Bound et al., 2012) before and after policy implementation.

Comparison of residuals across the levels of transfer students revealed large differences in the standard errors between groups. When residuals for transfer students with an associate's degree were compared pre and post-policy, it was observed that transfer student with an associate's degree prior to policy implementation had an increased likelihood of baccalaureate attainment. This was opposite of the expected result based on Roksa and Bruce's (2008) suggesting articulation policies are designed for credit preservation. A similar result was observed for pre and post-policy transfer students without an associate's degree. In Virginia, the current articulation policy does not have a provision for assuring credit preservation for transfer students without an associate's degree and as such, no change in graduation rates would be expected following policy implementation. This result indicated the observed differences in baccalaureate attainment rates extended beyond the articulation policy and the result of factors outside the scope of this study.

Table 9

Chi-squared comparison of transfer student's graduation rates pre/post-policy implementation (n = 3,146)

Graduation Status	Student Type				χ^2	
	Pre w/ (n = 339)	Pre w/o (n = 1130)	Post w/ (n = 488)	Post w/o (n = 1189)		
Not Enrolled	25%	20%	37%	33%	69.60*	0.15
Std. Residual	-1.2	-5.0	3.9	3.0		
Graduated	75%	80%	63%	67%		
Std. Residual	0.7	3.1	-2.4	-1.9		

Note. * = $p < 0.001$

Pre/post-policy transfer student time to degree. Pre and post-policy transfer student time to degree completion was examined using a 2 x 2 factorial ANOVA. If the state's articulation policy was working as attended and eased transition for student's transferring with an associate's degree, then a decrease in the transfer students with an associate's degree time to degree completion would be observed following the implementation of the policy. In addition, if the articulation policy preserves academic credit then students with an associate's degree time to degree should be less than transfer students who do not possess an associate's degree. The examination of transfer student time to degree completion utilized the same sub-sample used for the pre/post-policy implementation chi-square analysis. The independent variables for the 2 x 2 factorial ANOVA included implementation status (e.g., pre and post-policy) and transfer student type.

The results of the factorial ANOVA showed a significant difference in the average time required to complete a degree between the pre-policy and post-policy groups, $F(1, 2,270) = 108.4, p < 0.001$, indicating that the mean time to degree completion post-policy implementation ($\bar{x} = 2.22$, $SD = 0.72$) was significantly shorter than for the pre-policy time to degree ($\bar{x} = 2.72$, $SD = 1.13$). The main effect of transfer student type on time to degree completion was statistically significant, $F(1, 2,270) = 8.51, p < 0.05$, indicating that the mean time to degree

completion for transfer students without an associate's degree ($\bar{x} = 2.45$, $SD = 0.99$) was significantly less than the mean time to degree for transfer student's with an associate's degree ($\bar{x} = 2.55$, $SD = 0.97$). The interaction between policy and transfer student type was not statistically significant, $(1, 2,270) = 1.47$, $p > 0.05$, indicating the observed reduction in mean time to degree completion was consistent across the pre and post-policy groups. The results of the 2 x 2 factorial ANOVA are summarized in table 10.

A reduction in transfer student, with an associate's degree, time to degree was expected since articulation policies are designed to preserve student credits following transfer (Roksa and Bruce, 2008). However, not expected, was students transferring without an associate's degree graduating in less time than students who transferred with an associate's degree. The reduction in average time to degree for students without an associate's indicates the requirement in Virginia's articulation policy requiring an associate's degree may not be necessary. However, the significant main effect for student type should be viewed with caution and not over interpreted. The partial eta-squared for the significant main effect for student type was 0.004 indicating that student type had a 0.04% effect on the overall variance in student reduction of time to degree. This implied additional factors, other than the type of student, may be contributing to the observed difference between transfer students with an associate's degree and transfer students without an associate's degree mean time to degree completion. If the guaranteed admission policy requirement to possess an associate's degree prior to transfer was designed to preserve credits then the results should have shown transfer students with an associate's degree graduating in less time than transfer students without an associate's degree once both groups of students obtained junior status.

Although the ANOVA results showed a significant finding for the pre and post-policy transfer students the effect size for the main effects was moderate in magnitude (Cohen, 1988). The measured partial eta squared equaled 0.046 for the pre and post-policy transfer students. This means policy implementation, by itself, accounted for nearly 5% of the overall variance in the reduction of mean graduation time following policy implementation. To verify if the articulation policy was the reason for the reduction in time to degree native students were examined. Native student time to degree was significantly lower after policy implementation as measured by an independent sample t-test, $t(5,5221) = 23.92, p < 0.001$). Pre-policy native students graduated, on average, 2.75 (SD = 0.95) years after achieving junior status while post-policy native students graduated, on average, 2.23 (SD = 0.63) years after achieving junior status. This finding, in addition, to the non-significant interaction results indicate additional factors contributing to the observed reduction in student time to degree.

Table 10

Transfer student type x policy implementation factorial analysis of variance for transfer student time to degree completion implementation

	<i>Mean (SD)</i>	<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
Transfer Student(A)		1	8.51	.004	.004
with	2.55(.97)				
without	2.45(.99)				
Pre/post-policy(B)		1	108.40	< .001	.046
pre	2.72(1.13)				
post	2.22(.72)				
A x B interaction		1	1.45	.226	.001
Error within groups		2,266			

Summary of findings

The analysis of these data yielded several significant findings. These findings were used to characterize the effectiveness of Virginia's guaranteed admission policy. This examination consisted of three separate analyses with each offering a different element to understanding articulation in Virginia. Student characteristics and graduation data were used to understand the impact of policy on articulation in Virginia.

Step one examined the graduation rate and the time required to complete a bachelor's degree for native and transfer students. Results showed significant differences in graduation rates across all levels of the independent variable. Furthermore, the mean time to degree completion was significantly different between native students and those who transferred with an associate's degree. The next step in understanding articulation was to identify individual student characteristics that had an impact on graduation. Two logistic regression models were examined. The first showed high school GPA, college GPA, and ethnicity were significant predictors of graduation. The second logistic analysis examined transfer students only and showed transfer GPA, college GPA, and ethnicity were significant predictors of graduation. Finally, transfer student graduation rates and time to degree were examined pre and post-policy implementation. The results showed a significant difference in graduation rates pre and post-policy across all levels of transfer students. The amount of time required to complete a bachelor's degree was found to be significantly reduced among transfer students pre and post-policy implementation. The implication of these findings will be discussed further in chapter five.

Table 11

Demographic comparison table for research sub-samples

	Full Sample (N = 9,286)				Academic Outcome Sub-sample (n = 6140)				Logistic Regression Sub-sample (n = 1,079)				Pre/Post-Policy Sub-sample (n = 3,146)			
	Overall	Native	Trans w/	Trans w/o	Overall	Native	Trans w/	Trans w/o	Overall	Native	Trans w/	Trans w/o	Trans w/ pre	Trans w/o pre	Trans w/ post	Trans w/o post
Gender*																
Female	58%	61%	52%	51%	58%	61%	52%	51%	65%	68%	65%	58%	56%	51%	50%	51%
Ethnicity																
Asian/Pacific Islander/Hawaiian	13%	14%	8%	11%	13%	14%	8%	11%	14%	17%	6%	10%	9%	11%	9%	11%
Black/African American	18%	19%	17%	15%	18%	19%	17%	15%	15%	15%	12%	16%	18%	14%	18%	15%
Caucasian/White	53%	51%	57%	58%	53%	51%	57%	58%	55%	53%	63%	57%	56%	56%	56%	60%
Hispanic/Latino	6%	5%	67%	6%	6%	5%	67%	6%	3%	3%	3%	4%	16%	6%	16%	4%
Other**	10%	11%	11%	10%	10%	11%	11%	10%	13%	12%	17%	13%	8%	13%	8%	8%
% Parental education beyond high school	71%	75%	63.0%	66.0%	71%	75%	63%	66%	70%	73%	63%	67%	63%	67%	-	-
% College Involvement***	54%	74%	6%	20%	54%	74%	6%	20%	54%	74%	6%	20%	6%	20%	-	-
Average High School GPA	3.4	3.4	3.0	2.9	3.4	3.4	3.0	2.9	3.6	3.6	3.2	3.2	3.0	3.0	3.1	2.9
Last Reported GPA	3.1	3.2	3.1	3.1	3.1	3.2	3.1	3.1	3.2	3.3	3.2	3.1	3.1	3.0	3.1	3.0
Transfer GPA	NA	NA	3.07	3.09	NA	NA	3.1	3.1	NA	NA	3.2	3.2	3.1	3.2	3.1	3.0
Graduation Rate	80%	85%	68%	74%	78%	85%	68%	74%	96%	97%	90%	95%	76%	80%	66%	68%

Note. * = Sixty five students did not report gender.

** = "Other" consists of American Indian, international students, two or more races, and unknown.

*** = Based on random student sample of NSSE results (N = 1,033).

Chapter Five

Discussion and Conclusion

Significance of Study and Summary of Findings

The goal of this study was to examine the effectiveness of the Commonwealth of Virginia's articulation policy, as defined by the Higher Education Restructuring Act of 2005 (HERA), which grants students with an associate's degree from any Virginia Community College System two-year institution guaranteed admission to any of the state's publicly-funded four-year institutions. The study involved three analytical components. First, a comparison of native and transfer students was conducted to determine if there were differences in their academic outcomes. Second, the study examined differences in the student characteristics for native and transfer students. Finally, a comparison of the enrollment of transfer students pre and post articulation policy implementation was conducted. In combination, these comparisons were used to determine if the guaranteed admission component of Higher Education and Reauthorization Act was effective at increasing baccalaureate degrees for transfer students with an associate's degrees. A variety of statistical approaches were used to examine student record data for a five year period beginning with the 2008 spring semester and ending with the 2012 fall semester at a single state institution. The data for native and transfer students were examined in this process. Policy makers in Virginia have emphasized the need to increase the number of bachelor's degrees in the Commonwealth by 2025 (McDonnell, 2010). Therefore, to achieve

this goal a more detailed understanding of the impact of community college on academic outcomes was necessary. The significance of this study was three-fold. First, the available peer reviewed literature identified which factors influenced transfer and baccalaureate attainment of community college students. However, these studies either had mixed results or compare two-year student populations to four-year student populations directly (Adelman, 1999; Lee & Frank, 1990; Pascarella & Terenzini 2005; Roksa, 2006a; Wang, 2009; Velez & Javalgi, 1987). These studies examining community college student factors that influence transfer and baccalaureate attainment did not account for the numerous reasons a person may attend community college. Not all who enroll in community college have transfer or baccalaureate degree aspirations. Wang (2009) proposed a model of baccalaureate attainment for community college transfer students. However, the research design did not specifically identify students with baccalaureate aspiration, nor did it compare transfer students to native students. This research sought to expand on Wang's model by examining which factors influenced baccalaureate attainment and time to degree completion following transfer, and if a difference existed between native and four year students. Second, this study sought to expand on Melguizo et al.'s work. Melguizo and colleagues' work compared junior level transfer and native four year students and identified transfer students with baccalaureate aspiration and compared them directly to students who began college at the four-year institution. However, their work did not account for all the variables identified in Wang's model, nor did it distinguish whether transfer and subsequently baccalaureate attainment was affected by state policy. This study expanded on Melguizo et al. by examining degree attainment based on state articulation, as well as compared transfer and native students using Wang's model for attainment and persistence.

Articulation policy and its effect on community college transfer and educational outcome have been examined (Roksa & Keith, 2008; Roksa, 2006a; Roksa, 2009). However, many of these studies examined the impact of policy based on national statistics. Roksa and Keith (2008), as well as Roksa (2009) reviewed the impact of state specific articulation policy on transfer and educational outcomes but used data that existed prior to the implementation of stronger articulation policies that arose in the mid-2000s. To effectively examine articulation policy, data must be compared pre and post-policy implementation. The current study aimed to compare institutional student data pre and post-policy implementation. Unlike the previous works examining articulation policy, the current study examines policy impact on educational outcomes pre and post-policy implementation using institutional data. Understanding how policy affects baccalaureate attainment and time to degree completion will aid in crafting better policy in the Commonwealth that will identify students at the community college and target directed action to facilitate their attainment of a baccalaureate degree. Crafted policies will aid students with baccalaureate aspiration and foster a more effective transition from community college to the four-year institution. Using community college as a path to a four-year degree increases educational equality, reduced financial burden on the student, and a reduction in cost for the state.

Academic outcomes were analyzed for native and transfer students by examining graduation rates and time to degree completion. Two assumptions guided this comparison. First, native and transfers students would show subtle difference in academic outcomes. Two, students obtaining an associate's degree prior to transfer would have higher baccalaureate rates than those students who transferred without an associate's degree and have similar academic outcomes compared to native students upon achievement of a junior standing. These

assumptions were based on descriptive data published by the State Council of Higher Education for Virginia (SCHEV) and the works of Melguizo et al. (2011) and Crook et al. (2012). The findings of the current study were consistent with the data published by SCHEV showing native students graduate at higher rates than transfer students but deviated from the findings of Melguizo et al. who showed transfer students achieving a junior standing had academic outcomes similar to native students. Furthermore, obtaining an associate's degree prior to transfer did not improve academic outcomes when compared to transfer student without an associate's degree which differed from Crook et al.'s findings.

The second comparison examined student characteristics in combination with student type (e.g., native, transfer with an associate's degree, and transfer without an associate's degree) predicted the likelihood of baccalaureate attainment. Student high school GPA, ethnicity, and college GPA were predictive of degree attainment. The findings of GPA and ethnicity as the most significant predictors of baccalaureate degree attainment in the current study were consistent with others (Velez & Javalgi, 1987; Lee & Frank, 1990; Reason, 2003; Pascarella & Terenzini, 2005; Wang, 2009; Melguizo et al., 2011). Student type was not shown to be a predictor of baccalaureate attainment which was important because it suggested the route to a baccalaureate degree was less important than student academic efforts (e.g. high school GPA, transfer GPA, and college GPA).

The third comparison determined if the requirements of Virginia's guaranteed admission portion of HERA had an impact on student academic outcomes and whether the articulation policy, as written, was effective in increasing positive academic outcomes and easing the transition process for students transferring with an associate's degree at one Virginia institution. If Virginia's guaranteed admission policy was effective an increase in graduation rates and a

decrease in average student time to degree post-policy implementation would be expected for transfer students with an associate's degree. The findings showed a significantly lower graduation post-policy implementation. In addition, graduation rates for post-policy students transferring with an associate's degree were not statistically different than post-policy students transferring without an associate's degree. Time to degree completion was significantly reduced after policy implementation. However, the observed reduction in transfer student time to degree completion was not the result of policy implementation since the interaction between policy and transfer student type was consistent across the pre and post-policy groups. This finding was unexpected and contradicted previous studies (Crook et al., 2012; Melguizo et al., 2011) but supported the findings of Turk (2012). Underlying the assumption that transfer students with an associate's degree time to degree would be reduced post-policy was based on the proposal by Roksa and Bruce (2008) who suggested articulation policies were designed to preserve credits upon transfer. Virginia's articulation policy allows students completing an associate's degree at Virginia community colleges guaranteed admission to a state-funded four-year institution assuming the institution's academic thresholds have been met (e.g., GPA). These students transfer in as a junior and receive credit for all general education courses. If articulation agreements are designed to preserve credits as Roksa and Bruce suggested then students transferring after policy implementation should have reduced time to degree compared to transfers students with an associate's degree who transfer prior to policy implementation because credits are preserved. If the student losses credit following transfer then an increase in time to degree would be expected. This study found student time to degree post-policy implementation supported Roksa and Bruce's claim.

Discussion of Results

Native and transfer student academic outcomes in Virginia. The six-year graduation rate for the first-time, full-time freshman cohort beginning college in 2007 was 69% (SCHEV, 2014). Community college students transferring to Virginia four-year public institution showed a six-year graduation rate of 61% for all transfer students (SCHEV 2012). SCHEV (2012) reported transfer student, both with and without an associate's degree, were more likely to complete their bachelor's degree within three years following transfer. Thirty-two percent of students transferring with an associate's degree completed a bachelor's two years following transfer while 48% completed a degree in three years, and 20% completed a bachelor's in four years. Twenty-four percent of students transferring without an associate's degree completed a bachelor's degree in two years while 47% completed the degree in three years, and 29% completed the degree in four years. Seventy-four percent of graduating native students at Virginia public four-year institution did so within four years, 22% in five years, and 4% in six years (SCHEV, 2014). Native students graduated in less time than either group of transfer students. SCHEV (2012) showed transfer students with an associate's degree graduate more students within two years and at higher rates following transfer compared to students without an associate's degree. SCHEV's data suggested attending community college had a negative impact on academic outcomes for transfer students as a whole but transfer students with an associate's degree benefited more academically than students without an associate's degree. The current study differed from the expected results and showed transfers students with an associate's degree had statistically similar graduation rates and time to degree than students who transfer without an associate's degree.

The SCHEV reports showed transfer students with an associate's degree have higher graduation rates and graduate greater percentage of students within two years following transfer than students who transfer without an associate's degree, but native student still have better academic outcomes than either transfer student groups. State data would suggest Virginia's articulation policy requiring transfer students to obtain an associate's degree prior to transfer is beneficial but not equal to starting college at a four-year institution. However, the results of the current study suggest otherwise.

The current study supported the previous research that showed native students have significantly higher graduation rates and spend less time working on a baccalaureate (Dougherty, 1992; Alfonso, 2006; Long & Kurlaender, 2009; Cullinane, 2014; SCHEV, 2014). Dougherty (1992) showed native student graduate at rates 20-23% higher than transfer students. Long and Kurlaender's (2009) findings showed native students have a graduation rate approximately 14.5% higher than transfer students. Furthermore, Cullinane showed transfer from community college decreases baccalaureate completion by almost 17% compared to native students. The current study showed native students had graduation rates between 9 and 12% greater than the two transfer student groups.

The results of the current study were inconsistent with the findings of others who showed academic outcomes of native and transfer students were similar (Arnold, 2001; Melguizo & Dowd, 2009; Melguizo et al., 2011; Lichtenberger & Dietrich, 2013). Arnold (2001) showed community college students retained approximately 90% of their credits at transfer and had a graduation rate of 62% compared to 65% for native students. Arnold used a broad definition of transfer which included reverse transfer students, co-enrolled students, and graduate students enrolled at the community college. Arnold's study did not classify transfer students as two

distinct groups and this may be the reason for the contradiction in findings. Melguizo and Dowd (2009), as well as, Melguizo et al. (2011) used a nationally represented sample with specific observed variables and showed native and transfer students have similar academic outcomes. The variables used by Melguizo and Dowd and Melguizo et al. were not reviewed in the current study. The use of different variables may explain the difference in findings. Finally, the findings for the current study differ from the findings published by Lichtenberger & Dietrich (2013). Lichtenberger & Dietrich methodological approach reveals students were matched and compared students based on observed high school characteristics. The lack of student matching in the current study may explain the difference in results.

The results of the current study support the findings of Turk (2012) who showed academic outcomes for students without an associate's degree were not affected by the lack of degree upon transfer. In addition, Turk showed students graduating with a bachelor's degree and completing their general education (44 credits) requirements at the community college prior to transfer had taken less credits than students completing an associate's degree post transfer. Turk suggested students transferring with an associate's degree were impacted by associate's degree requirements resulting in additional course work. Following transfer, the students with an associate's degree received credit for the additional classwork; however, the additional work was not applicable toward degree completion requirements for specific fields of study. The students in Turk's study who transfer without an associate's degree but complete the general education requirements had increased flexibility to enroll in the required major specific pre-requisites which led to lower credit hours taken at the senior institution. Similarly, Cullinane (2014) showed community college transfer students increased their time to degree completion by about one semester by adding approximately 7.6 additional credits. This may explain why transfer

student time to degree in this study was similar for students with and without an associate's degree and departs from the expected outcome suggested by SCHEV (2012).

Furthermore, the findings of the current study showed no difference in graduation rates or time to degree completion between transfer students with an associate's degree and transfer students without an associate's degree. This finding deviated from the findings of Crook et al. (2012), Shapiro et al. (2013), and Crosta & Kopko (2014). Crook et al. showed students who transfer with an associate's degree had increased likelihood of baccalaureate attainment compared to students who transferred without an associate's degree. The difference in findings between the current study and Crook et al. may be a side effect of scale. Crook and colleagues used a large regional sample compared to a single institutional sample.

The current study measured graduations rates following transfer for a period of up to five years. Students were tracked beginning with the spring 2008 semester to the end of the 2012 fall semester. Therefore, student's transferring during the 2008 fall semester would have a maximum of five years to graduate; students transferring during the fall 2009 would have a maximum time to graduate of four years, etc. Shapiro et al. (2013) found students who transfer with an associate's degree have a 16% higher graduation rate than students transferring without an associate's degree. Shapiro and colleagues examined students up to six years post transfer while the current study had a maximum graduation time frame of five years. The difference in transfer student graduation rates between Shapiro et al. and the current study may be attributed to the differences in maximum time to degree following transfer. Crosta and Kopko (2014) showed students earning an associate's degree increased the likelihood of baccalaureate attainment over students who do not possess an associate's degree. Crosta and Kopko's study monitored students upon entry into the community college and obtained a bachelor's degree within six

years of first entering the two-year institution. By tracking the students who specifically transfer they were able to follow students with baccalaureate aspirations. However, many students, with or without an associate's degree, may not transfer immediately. As stated, "[l]ater transferees are much less likely to be observed with four-year outcomes such as earning the baccalaureate than those who transfer early. This could bias our comparisons if there are systematic and unaccountable differences between students who transfer earlier and later" (pp. 12-13). The bias was reduced in the current study by tracking transfer students at the senior institution post transfer and not at the point entry into higher education. This difference in tracking may account for the observed difference between the study outcomes. Student characteristics may also explain why the current study's finding differ from previous research.

Impact of student characteristics on academic outcomes. The predictive nature of individual student characteristics on baccalaureate attainment were consistent with the published literature and showed GPA , college and high school, was most likely to affect student academic outcomes. This study showed students who graduated had increased high school GPA, a higher college GPA, and were most likely to be Caucasian. In addition, transfer students who graduated with a bachelor's degree had higher transfer GPAs. Therefore, the likelihood of obtaining a bachelor's degree was not necessarily dependent on the first institution attended. However, this established finding in the literature was different from the results of the current study that showed baccalaureate attainment and time to degree were not affected by starting at a community college. Furthermore, others showed transfer students are penalized academically for starting college at the two-year institution compared to native students (Dougherty, 1992; Alfonso, 2006; Long & Kurlaender, 2009; Reynolds, 2012; SCHEV, 2012). Native students were shown to graduate at significantly higher rates and have a shorter time to degree completion

than transfer students. The findings for the current study suggest factors other than GPA are contributing to the lower graduation rates and longer time to degree completion for transfer students. Although other student characteristics (e.g. parental education, dependent care, college involvement, employment) were not found to be predicative of baccalaureate attainment, they may explain the observed differences in graduation rates and time to degree completion for students in this study. Each student characteristic, examined individually and alone, did not predict baccalaureate attainment. In combination these factors may contribute to the observed difference in degree completion rates and time to degree in this study.

Several explanations have been proposed for the apparent differences in academic outcomes between native and transfer students. These include decreased academic motivation for transfer students, transfer student academic under preparation, loss of credit at transfer, difficulties with social integration, and lack of financial resources (Dougherty, 1992; Alfonso, 2006; Long & Kurlaender, 2009; Cullinane, 2014). Several factors have been suggested to explain the differences in time to bachelor's degree for native and transfer students and include the loss of credit upon transfer, remedial course work, enrollment intensity, academic preparation, social integration, financial resources, and external student demands (Lehman, 2002; Hilmer, 1999; Lam, 1999; DesJardins, 2002; Turk, 2012; Cullinane, 2014; Horn & Neville, 2006; U.S. Department of Education, 2013; U.S. Department of Education NCES, 1998; U.S. Department of Education, NCES, 2006; Adelman, 2005; Dougherty, 1992; Alfonso, 2006; Long & Kurlaender, 2009; Bahr et al., 2012; Townsend & Wilson, 2009; Townsend, 2008; Reyes, 2011). Enrollment intensity and social integration were connected with student external demands (Bahr et al., 2013). The factors proposed by others may be contributing to the observed differences of native and transfer student academic outcomes in the current study. The evidence

in this study suggests transfer students who matriculated into the senior institutions may not be as academically prepared as native students, have lower social integration than native students, and loose credits following transfer. A review of predictive factors associated with baccalaureate attainment, demographic data, graduation rates, and student time to baccalaureate degree completion between transfer and native students, as well as transfer students with and without an associate's degree. These factors offer insight into the observed academic outcome disparities between native students, transfer students with an associate's degree, and transfer students without an associate's degree.

The effects of GPA on graduation rates and time to degree completion. GPA has been shown to be a strong predictor of transfer and native student academic success (Tinto, 1975; Pascarella & Terenzini, 2005; Reason, 2003; Wang, 2009; Hagedorn et al., 2008; Hagedorn et al., 2010; Carlan & Byxbe, 2000). SCHEV (2012, 2014) showed native students spend less time completing a bachelor's degree than community college transfer students. Cullinane (2014) and Bound et al., (2012) found students transferring from a community college have increased time to degree than native students. Native students in this study completed a bachelor's degree in significantly less time than transfer student's with an associate's degree but not those without an associate's degree. Research has shown native and transfer students have different academic and demographic characteristics (Adelman, 2005; Hagedorn, 2009) which impact academic outcomes. The current study showed GPA during high school, college, and at transfer were significant predictors of baccalaureate attainment. Therefore, differences in the GPA of native and transfer students may explain the observed differences in graduation rates and time to degree completion.

Transfer students in the current study, on average, had a lower high school GPA than native students. The lower high school GPA may indicate a decreased level of academic ability prior to college and contributed to enrollment in community college. The open door admission policies of the community college system provide many students, who may be underprepared for enrollment in a four-year institution, the opportunity to continue their education after high school. Academic under preparations may impact students long-term. Furthermore, academic under preparation may impact transfer students' academic outcomes post transfer which can be attributed to lack of academic rigor at the community college level resulting in a reduction in their GPA following transfer, also known as "transfer shock" (Alfonso, 2006; Dougherty, 1987; Dougherty, 1992; Ishitani, 2008; Pennigton, 2006). Academically underprepared students are required to enroll in remedial courses. Remedial course work has been shown to reduce college persistence, time to degree completion and reduced baccalaureate attainment rates (Adelman, 1999; Bailey & Alfonso, 2005; Pascarella & Terinzini, 2005; Grimes, 1997; Hagedorn et al., 2008; Wang, 2009). Bailey et al. (2005b) showed 42% of community college students enrolled in at least one remedial course, which was more than twice the rate of native student enrollment. Bailey and colleagues showed nearly two-thirds of community college students spent over one year in remediation and that 91% of community college students enrolled in remedial course work were in an associate's degree program. The lack of academic preparation during high school subsequently led to remedial course work at the community college; thus leading to increased financial expenses, increased credit hours, lower baccalaureate attainment rates, and increased time to baccalaureate degree (Adelman, 1999; Bailey & Alfonso, 2005; Pascarella & Terinzini, 2005; Grimes, 1997; Hagedorn et al., 2008; Wang, 2009).

Financial constraints of community college students are likely to affect enrollment intensity and increase external demands. Financial constraints may lead students to community college self-selection when seeking post-secondary education (Townsend, 2007). Transfer students with an associate's degree were statistically shown to take longer to complete a bachelor's degree than their native counterparts. Although remediation was not measured in this study, students with a lower high school GPA may be forced to enroll at the two-year institution due to lack of acceptance at the four-year college and the lack of academic preparation at the high school level. This may negatively affect community college transfer students at the four-year institution. Enrollment in remedial classes impedes the student's progression toward baccalaureate attainment and increases time to degree (Adelman, 1999; Bailey & Alfonso, 2005; Pascarella & Terinzini, 2005; Grimes, 1997; Hagedorn et al., 2008; Wang, 2009). This suggests the observed difference in graduation rates and time to degree may be the results of remedial course work due to academic under preparation.

Although not measured in this study, current research shows a loss of accumulated credits or additional coursework at the senior institution for transfer students was a contributing factor for increased time to degree completion (Cullinane, 2014, Turk, 2012). Losing credits at the time of transfer increases the amount of time required for degree attainment. Many articulation policies, including Virginia's, are designed for credit preservation and a seamless transfer between the two and four-year institution (Roksa & Bruce, 2008). When course credit is not accepted due to lack of equivalency or when the completed course does not apply toward the transfer student's intended major, students are required to replace or retake course work to satisfy institutional graduation requirements (Lehman, 2002; Hilmer, 1999; Lam, 1999; DesJardins, 2002; Cullinane, 2014). Bound et al. (2012) suggests increased time to degree

completions was disproportionally increased for students who started at a two-year institution rather than starting college at a more prestigious institution. The loss of accumulated credits had a negative impact on transfer student's time to degree completion (Cullinane, 2014). The difference in time to degree completion between native and transfer students without an associate's degree may be the result of loss of credit at transfer do to institutional differences in degree requirements.

Turk (2012) showed transfer students with an associate's degree accumulated more credits than students who transfer without an associate's degree. This accumulation of additional credits was the result of differences in program requirements at the four-year institution and elective requirements for the completion of an associate's degree. Turk also found students without an associate's degree had accumulated less credits at graduation than transfer students with an associate's degree. The increased time to degree completion for students with an associate's degree, in the current study are consistent with Turk's findings. The finding in the current study showed the rate of time to degree completion for transfer students' without an associate's was not statistically different from native students. This result suggests associate's degree earning transfer students may not necessarily lose accumulated academic credits but the coursework for an associate's degree does not align with the student's intended area of study following transfer resulting in additional coursework at the senior institution. The student transferring with an associate's degree does. Early integration may benefit transfer students without an associate's degree due to familiarity with the requirements necessary for completion of a degree program. Early integration, in this study, was defined student involvement (e.g., extracurricular activities, advising, and course work) at the senior institution prior to obtaining a

junior standing. By waiting to transfer, students with an associate's degree did not have the same level of familiarity with their degree program of choice resulting in negative academic outcomes.

At graduation, both groups of transfer students in the study had a similar GPAs to native students. Furthermore, the GPAs between native and transfer students were similar. This suggests transfer students with baccalaureate aspirations are able to overcome academic under preparation resulting in similar academic outcomes as native students. However this was not observed in the current study. Transfer shock was first proposed in 1965 by Hill. Transfer shock is a reduction in GPA following transfer from a community college to a four-year institution. The last reported GPA data suggests graduating transfer students, if they experienced transfer shock, recovered from the initial drop in GPA. More recent evidence suggests the reduction in GPA following transfer is modest and short lived and observed in the first or second semester following transfer (Diaz, 1992; Carlan & Byxbe, 2000; Glass & Harrington, 2002; Thurmond, 2007). Furthermore, transfer shock may be specific to certain academic disciplines like mathematics, business, and the physical sciences (e.g. biology, chemistry, physics); the result of a few difficult courses; or the academic standing at transfer, e.g. sophomore or junior (Cejada et al., 1998; Thurmond, 2007; Quanty, Dixon, & Ridley, 1999; Bahr et al., 2013).

The lower graduation rate of transfer students may be a result of transfer shock. Transfer shock has been negatively associated with persistence and degree completion following transfer (Dougherty, 1987; Ishitani, 2008; Pennigton, 2006). The loss of transfer students as a result of transfer shock explains the observed differences in graduation rates between native and transfer students. In addition, transfer students in this sample had a higher percentage of students majoring in business. Cejada (1997), Cejada et al. (1998), and Thurmond (2007) showed transfer shock may be limited to certain academic disciplines. Twenty-one to 24% of transfer

students in this sample majored in business. The higher percentage of transfer students majoring in business may have increased the prevalence of transfer shock for these students. The reduction in graduation rates and the increase in time to degree for transfer students, despite similarly last reported GPA's, suggested transfer shock may have impacted transfer student academic outcomes. The loss of transfer students as a result of transfer shock may be a contributing factor to the difference in graduation rates between native and transfer students.

The effects of integration on graduation rates and time to degree completion. The idea of social integration can be linked Tinto (1975) in his seminal work relating to college persistence. Tinto described social integration as a “state or perception of fit” (Wolf-Wendel, Ward, & Kinzie, 2009, p. 419). Integration is often associated with college involvement. As addressed by Bahr et al. (2013), “the fundamental differences between integration and involvement is one of subjective perceptions versus objective behavior” (p.466). Integration is the student’s perception of fitting into the institutional culture while involvement focuses on student behavior (e.g. student organization, athletics, faculty interaction). Bahr and colleagues continue their discussion by stating “the conflation of these two concepts is understandable in some respects because the behaviors that encompass involvement could be conceived (and seemingly often have conceived) as indirect indicators that a student is experiencing the sense of fit that characterizes integration” (p. 467). Due to their close association, integration and involvement will be discussed as a single item.

Integration of transfer students at the four-year institution is important for academic success (Townsend & Wilson, 2009). While examining the social integration of persisting community college students Townsend and Wilson showed transfer students can be overwhelmed with institutional size, larger classes, and lack of time for integration. Not all

factors associated with integration were measured in this study and the ones examined (college involvement, taking care of dependent, and working) were not shown to be significant predictors of baccalaureate attainment. However, the lack of predictive value for these factors does not warrant their lack of consideration as an explanation for the observed academic disparities between native and transfer students in this study. Townsend and Wilson (2009) stated transfer students may be overwhelmed by the new academic environment. The overwhelming feeling many transfer students feel leads to less integration which negatively affects academic outcomes.

Native students had higher involvement rates and less external commitments than either group of transfer students. Furthermore, transfer students without an associate's degree had higher levels of college involvement and less external demands than transfer students with an associate's degree. The differences in observed percentages of college involvement were possibly the result of increased external demands which may be contributing to decreased graduation rates and increased time to degree completion compared to native students. The lack of observed differences in graduation rates and time to degree between the two groups of transfer students may be attributed to social integration.

Student involvement on campus has been shown to increase positive academic outcomes (Pascarella & Terenzini, 2005). Positive outcomes associated with involvement include increased academic presentence, satisfaction at the four-year institution, integration, and adjustment (Wang, 2009; Berger & Malaney, 2003; Flaga, 2006; Townsend & Wilson, 2009; Laanan, 2007; Laanan & Starobin, 2004). Pascarella & Terenzini suggested native students benefit more from academic and social integration as a result of living on campus. Integration benefits student academic outcomes, but transfer students are less likely to be socially integrate post transfer than native students. Instead of integration transfer student were more likely to

devote their limited time toward academic endeavors (Ishitani & McKittrick, 2010; Bahr et al., 2012; Townsend & Wilson, 2009). Community college students, as a whole have less time and energy to devote toward college than native students which is unlikely to change post transfer (Caporrimo, 2008, Bahr et al., 2013). The literature proposed integration for transfer students was limited due to enrollment intensity, living off campus, employment, family responsibilities, and being of non-traditional age (Ishitani & McKittrick, 2010; Bahr et al., 2012; Townsend & Wilson, 2009; Flaga, 2006; Harbin, 1997; Berger & Malaney, 2003; Owens, 2010; Reyes, 2011). Native students are more likely to be of traditional age and have less external demand than transfer students (Bahr et al., 2012; Townsend & Wilson, 2009; Townsend, 2008; Reyes, 2011). As a result of competing responsibilities, transfer students have limited ability or interest in committing to additional time on campus and subsequently, reducing integration (Bahr et al., 2012; Townsend & Wilson, 2009; Townsend, 2008; Reyes, 2011). Furthermore, external demands impact the amount of time transfer students have for social integration (Bahr et al., 2012; Townsend, 2008; Reyes, 2011; Townsend & Wilson, 2009; Owens, 2010; Bahr et al., 2013). The increase in external demands resulted in lower levels of social integration may lead to less than desired academic outcomes resulting in repeated course work and a reduction in enrollment intensity. These factors would contribute to decreased transfer student graduation rates and increased time to degree.

This study found native students have more time on campus and less external responsibilities than transfer students; this is consistent with the work of others. As such, native students had more time to devote to social involvement and integration as a result of lower external demands. As reported by the senior NSSE survey results, native student showed a 67% increase in college involvement over transfer student with an associate's degree and a 53%

increase in college involvement over transfer students without an associate's degree. The higher level of college involvement by native students may contribute to higher graduation rates and reduced time to degree in this study. If native students benefit more from social involvement as Pascarella & Terenzini suggested, then they would be less likely to repeat courses and be better informed about course option than transfer students which reduces time to degree and increases baccalaureate rates. The results in this study suggest lower levels of integration may have affected transfer students academically.

Transfer students with an associate's degree in this study had an increased commitment to family than either native or transfer students without an associate's degree. In addition, a greater percentage of transfer students with an associate's had work commitments. These increased external demands for transfer student with an associate's degree resulted in lower college involvement than transfer students without an associate's degree. Transfer students without an associate's degree may have increased college involvement due to earlier transfer to the four-year institution which benefits them academically. The difference in time on campus and the lower external responsibilities afforded transfer students without an associate's degree an academic advantage over students who transfer with an associate's degree. The academic advantage provided by an increase in time on campus resulted in more time for integration leading to better academic outcomes. The increased social integration may explain why transfer students without an associate's degree graduate statistically at the same rate and require the same amount of time to complete a bachelor's degree as students who transfer with an associate's degree. The associate's degree advantage reported by Crook et al. (2012) and the results of transfer published by SCHEV (2012) may be negated by increased social involvement of transfer students without an associate's degree resulting in similar academic outcomes as students who

transfer with an associates' degree. Therefore, with lower levels of social integration, transfer students with an associate's degree at the study institution may suffer academically. Social integration and external commitments may be the cause of the increase in time to degree for transfer students with an associate's degree. Transfer students without an associate's degree spend less time at the community college and have lower levels of external demands compared to transfer student with an associate's degree. The lack of external demands and increased time on campus for transfer students without an associate's degree may have allowed for more social integration which resulted in a time to degree similar to native students and similar graduation rates as transfer students with an associate's degree.

Academic outcomes before and after Virginia's articulation policy. Anderson et al. (2006a) suggested the importance of statewide articulation agreements were a way for governments to manage competing economic interest without increasing funding to higher education. Articulation agreements may be a way for the U.S. and state officials to promote the benefits of higher education while keeping expenditures to a minimum, keeping higher education equitable, and reducing the financial burden of higher education for individuals and the state. Government involvement in higher education enrollment is important for increased access and affordability (Boswell, 2001). Specifically, government involvement in articulation policy reduced costs, accelerated progress toward a degree, increased student aspirations, increased academic opportunities in rural communities, and promoted stronger community relationships. However, determining the impact or success of articulation policies are difficult. Government officials often want to measure articulation policy success by transfer rates rather than academic outcomes (Roksa & Bruce, 2008). Focusing on transfer rates fails to provide a complete measure of policy effectiveness since a large portion of community college student never intend

to transfer (Roksa, 2009; Roksa & Burce, 2008). According to Roksa and Bruce, evaluating articulation policies should focus on academic outcomes following transfer; thus, capturing students with baccalaureate aspirations (Melguizo et al., 2011). Roksa and Bruce (2008) suggested that state supported articulation agreements were designed to preserve credits at transfer and these policies were ineffective at promoting transfer or easing the transition from community college to the four-year institution. An essential component of many articulation policies is the requirement to obtain an associate's degree prior to transfer (Commonwealth of Virginia, 2005, Crook et al., 2012). The findings of a recent study showed students in North Carolina transferring under the state's articulation policy with an associate's degree loose credit at transfer, but graduate with more credits than students that transfer without an associate's degree; thus, supporting Roksa and Bruce's claim that articulation policies are ineffective since the goal is credit preservation and not academic outcomes (Turk, 2012). The lack of focus on academic outcomes in articulation policies may be contradictory to the intended goals of increasing baccalaureate degree completion rates and reducing time to degree completion for transfer students. Roksa (2009) suggested, to effectively examine articulation policies, they must be evaluated based on academic outcomes pre and post-policy implementation. This study evaluated Virginia's guaranteed admission policy as defined by the Higher Education Restructuring Act of 2005 and the Higher Education and Opportunity Act of 2011 by examining academic outcomes for transfer students with an associate's degree, of junior standing, before and after policy implementation.

If the guaranteed admission policy in Virginia was designed to improve graduation rates by easing the transfer process then an increase in baccalaureate degree completions rates would be expected for transfer students with an associate's degree after post-policy implementation.

This rational is supported by the works of Crosta and Kopko (2014) and Crook et al. (2012).

However, graduation rates for transfer students with an associate's degree, in this study, showed a significant reduction following policy implantation. Graduation rates for post-policy students with an associate's degree decreased by 13% compared to pre-policy transfer students with an associate's degree. Based on these findings from one Virginia institution, one could conclude that Virginia's guaranteed admission policy seem ineffective at promoting higher degree completion rates for transfer students with an associate's degree. However, drawing this conclusion without examining graduation rates as a whole at the study institution or across multiple state four-year institutions would be premature.

Transfer students without an associate's degree showed a reduction in graduation rates following policy transfer. Students who transfer without an associate's degree are not covered by Virginia's guaranteed admission policy. Therefore, graduation rates would be expected to remain stable when comparing graduation rates pre and post-policy implementation. Like transfer students without an associate's degree, graduation rates for native students would be expected to remain constant pre and post-policy implementation, but were reduced when compared pre and post-policy. Native and transfer students without an associate's degree provide a baseline for comparison of transfer students with an associate's degree. Having these groups for comparison would indicate whether factors other than the articulation policy may be affecting academic outcomes. Transfer students without an associate's degree showed a 12% reduction in baccalaureate attainment rates once achieving a junior standing post-policy implementation. This reduction was similar to the reduction seen in transfer students with an associate's degree. Native students showed a 9% reduction in graduation rates post-policy implementation but was not significantly below the expected outcome as measured by the

standardized residuals. The overall reduction in baccalaureate rates following attainment of junior standing would suggest factors outside the policy are affecting academic outcomes for transfer students with an associate's degree. Rising college costs, changes in faculty composition, or less academically prepared college students may be contributing factors to the observed outcomes.

Decreased state funding for higher education and increased operating cost for colleges in Virginia have resulted in institutional changes that may explain the reduction in graduation rates observed for students in this study post-policy implementation. Virginia has reduced funding for higher education by 54% between 1980 and 2011 (ACE, 2012). Virginia has begun to reinvest in higher education (SCHEV, 2013). However, tuition and fees continue to rise for Virginia public institutions. Tuition rates, adjusted for inflation, at Virginia public four-year institutions have increased 44% between 1988 and 2014. The cost of tuition at the study institution increased for incoming freshman by 21% and 4% for currently enrolled students between the 2012-2013 and 2013-2014 academic year (SCHEV, 2013). Reduced state funding to higher education has resulted in increasing student/faculty ratios for some undergraduate disciplines at the study institution (VCU, 2013). Increasing student/faculty ratios may have an impact on academic achievement (Diaz, 2003). The rising cost of college education in Virginia, for both students and institution, may have a negative impact on academic outcomes. Some have reported the rising cost of college has resulted in increased employment for students as a means for paying for college (Higher Education Research Institute, 2002). The increase in external demands may contribute negatively to academic outcomes (Bean & Metzner, 1985). The decrease in graduation rates at the study institution suggests Virginia's articulation policy is ineffective. However, drawing this conclusion from a single state institution would be

premature. The overall decline in graduation rates at this institution suggests other contributing factors may be influencing graduation rates. The decrease in graduation rates may be the result of the rising cost of college operations and increasing tuition which are contributing to a decrease in positive academic outcomes, not just for transfer student with an associate's degree but all students at the institution.

Bound et al. (2012) examined time to degree completion based on first academic institution attended. Time to degree is associated with persistence and persistence has been shown to affect baccalaureate attainment. Bound and colleagues examined time to degree completion for a nationally representative sample and found an overall decrease in student time to bachelor's degree completion. According to the study, students starting at a community college had a 21% reduction in the likelihood of baccalaureate attainment and were 16% less likely than students starting at four-year colleges to complete a bachelor's degree in four years. Bound and colleagues proposed changes in college student composition, over time, may be affecting student time to degree completions and students entering college, today, are less academically prepared than in years passed. Others have supported Bound and colleagues by suggesting high school graduates are less prepared for the rigors college academics (Hart, 2005; Hansen, 2013). Hansen (2013) cited results from the 2012 ACT college readiness test that 1 in 4 high school seniors meet the skills necessary for success at the college level. The results of the graduation rates pre and post-policy implementation suggest the decrease in overall baccalaureate attainment rates in this study may be a result of less academically prepared students. Therefore, the decrease in graduation rates for transfer students with an associate's degree should not be attributed to Virginia's articulation policy guaranteeing admission to the four-year institution.

The second component used to examine the effectiveness of Virginia's articulation policy was student time to degree completion. Students were measured based on the amount of time required to complete their bachelor's degree following attainment of junior standing. It was expected students transferring with an associate's degree would complete a degree in less time following the implementation of the articulation policy. The rationale behind the expected outcome was based on Roksa and Bruce's conclusion that articulation policies should be designed for credit preservation. If articulation policies preserve credits at transfer then a decrease in time to degree would be expected. The Virginia articulation policy preserves credits for students transferring with an associate's degree; therefore, the preservation of credits for associate's degree holding transfer students should result in a mean reduction in time to degree that is less than transfer students following policy implementation. Furthermore, students without an associate's degree time to degree should remain unchanged pre and post-policy implementation since the guaranteed admission does not impact transfer students without an associate's degree.

The findings for mean time to degree completion contradicted the expected outcome that student who transfer with an associate's degree would graduate in less time than students who transfer without an associate's degree following policy implementation. This expectation was predicated on credit preservation by the transfer student with an associate's degree and the potential loss of credits at transfer for students without an associate's degree. The results of mean time to degree completion showed student without a transfer degree graduate in less time than student with an associate's degree.

The findings of this study are consistent with the results of Turk (2012) who showed transfer students with an associate's degree accumulate more credits than students without an

associate's degree. Accumulation of more credits indicates an increased time to degree completion. Turk stated the accumulation of additional credits was the result of differences in program requirements at the four-year institution and elective requirements for the completion of an associate's degree. Similar outcomes may be at play in the current study and explain the unexpected outcome of transfer students without an associate's degree requiring more time to complete a bachelor's degree than their associate's degree counterparts. Furthermore, students without an associate's degree may have integrated into the four-year institution better than students with an associate's degree. These students, in theory, arrived earlier to the four-year campus which would allow for better social and academic integration leading to an increase in positive academic outcomes (Bahr et al., 2013). As a result of early integration, students without an associate's degree may have received better advising toward their academic major's degree requirements than transfer students with an associate's degree. Better advising is "one of the best ways to reduce students' time to degree and improve the odds of success as well...to ensure that the courses they take are the ones they need to stay on track to finish their degrees" (Johnson, 2011, p. 3). Advising at the community college is often directed toward associate degree completion requirements that may not contribute toward an academic major at the senior institution which results in additional coursework for students that transfer with an associate's degree. The additional courses increase the time to degree for students transferring with an associate's degree. The findings of this study suggest the requirement for an associate's degree is not an essential component of Virginia's articulation policy.

Transfer student average time to degree was significantly less following articulation policy implementation but the reduction was not associated with student type. The transfer student time to degree completion findings would suggest Virginia's guaranteed admission

policy was ineffective with regard to this single institution. However, further examination of student time to degree completion showed a general reduction in the average time to degree for all students at the study institution. The general reduction in time to degree for all students suggested institutional changes, not necessarily the articulation policy, may be the cause of the general reductions in time to degree for transfer students. Like graduation rates, the across the board reduction in student time to degree may be the result of changes in institutional practices. As discussed, improved advising may be contributing to the overall reduction in student mean time to degree after policy implementation. The overall reduction in the average student time to degree completion adds further evidence that the provision for attaining an associate's degree is not necessary to reduce transfer student time to degree completion.

Limitations

Several limitations may have impacted the outcomes of this study. First and foremost, this study was conducted at a single institutions with a limited sample; thus limiting generalizability of these results to other institutions around the country and within the State of Virginia. Second, the sample was limited to students enrolled at the study institution after 2007. This limited the amount of pre and post-policy cases for comparison. The limited number of cases may have impacted the analysis resulting in an inconclusive finding for the effectiveness of Virginia's articulation policy. Furthermore, the inability of the study institution to identify whether students enrolled under the policies governing transfer prior to the current articulation policy may have resulted in overlapping student data which may have affected the analysis of academic outcomes pre and post-policy implementation.

Sample bias is an additional concern for this study. As a result of institutional database constraints the sample was limited to a set number of transfer and native students confined to a

five year period. The five year time-frame in this study is less than the commonly used six-year graduation rate data reported to IPEDS following transfer. The time constraints limited the number of cases in the study and contributed to sample bias. Although the native student sample was large enough to select a random sample, the transfer student sample was about 50% smaller and the limited number of transfer student cases required the use of the entire transfer student sample in the analyses. Contributing further to possible sample bias was the inability to generate equal cell sizes for native students, transfer students with an associate's degree, and transfer students without an associate's degree. The unequal number of cases across the three student types may have biased the results which led to statistically different findings between native and transfer students. The use of all transfer students and the unequal number of cases may have provided a sample that was not representative of the entire transfer population at the study institution or across the state.

Furthermore, the sample characteristics were limited to the available student data collected by the study institutions upon student enrollment. The collected information was not the same student characteristics used by Wang (2009). Therefore, the predictive nature of student characteristics associated with baccalaureate attainment may not be as representative of Wang's model. Finally, students in this study were not matched according to observable characteristics, further reducing the generalizability of the study outcomes. It would be interesting to replicate this study with a larger random sample of students, both transfer and native, across multiple institutions, and match student based on observable characteristics. Reducing the limitations of this study will strengthen the outcomes of this research approach and would result in a more accurate description of the efficacy of Virginia's articulation policy.

Conclusions

The purpose of transfer policy and articulation agreements is to allow students to seamlessly transfer credits from one institution to a second institution for the completion of a degree (Roksa, 2009; O'Meara, Hall & Carmichael, 2007). The current study examined academic outcomes for community college students that transferred to a four-year institution. Given the findings and limitations of this study, this research was timely and is potentially useful to the Commonwealth of Virginia. As Virginia begins to reinvest into higher education an understanding of contributing student factor to baccalaureate attainment and the effectiveness of Virginia's articulation policy is crucial to reaching the proposed goal of 100,000 new baccalaureate degrees by 2025. To date, much of the research has focused on transfer and the effectiveness of articulation policies nationally, student characteristics that predict transfer, and comparison of transfer and native student academic outcome. Limited work has examined the effectiveness of articulation policy at the state level. Moreover, the literature associated with effective articulation policies at the state level suggests obtaining an associate's degree prior to transfer is beneficial to the transfer student's academic success at the four-year institution (Crook et al, 2012; Arnold, 2001; Lichenberger & Dietrich, 2013; Wellman, 2002). Fewer studies have examined the benefits of transferring without an associate's degree (Turk, 2012).

This study examined the effectiveness of Virginia's articulation policy. Currently Virginia's policy provides guaranteed admission for students attaining an associate's degree prior to transfer to any public four-year institution provided certain academic thresholds are met by the transferring student. The associate's degree transfer students are assured junior standing following transfer and all general education requirements have been satisfied. This concept is

predicated on the idea that an associate's degree student is better prepared for the academic challenges provided at the senior institution and should have better academic outcomes than students without an associate's degree. SCHEV's collection of raw numbers do not necessarily provide a complete picture of the effects of transfer in the Commonwealth of Virginia. The results of this study suggest Virginia's articulation policy may benefit by modifying the guaranteed admission policy through the alignment of associate's degree requirements with the transfer student's intended area of study at the four-year institution. This study does not suggest articulation agreements or transfer policies are not necessary, but does indicate more attention is needed to ensure policies and articulation agreements are promoting transfer student academic success.

In the present study, Virginia's articulation policy was examined on the basis of academic outcomes rather than according to transfer rates because guaranteed transfer does not necessarily equal academic success. Similar to other works (Dougherty, 1992; Alfonso, 2006; Long & Kurlaender, 2009; Reynolds, 2012; SCHEV, 2012), the current study showed transfer students, regardless of associate's degree status, do not perform as well as native students. Findings from this study suggest the component of Virginia's articulation policy that guarantees admission of transfer students with an associate's degree to the four-year institution may require modification to promote more positive academic outcomes for transfer students. Specific findings for this study include:

- 1) Transfer students, as a whole, have lower graduation rates than native students;
- 2) Transfer students, as a whole, have increased average time to bachelor's degree completion;
- 3) Transfer students with an associate's degree have similar time to degree completion and graduation rates as transfer students without an associate's degree;

- 4) Native and transfer student academic outcomes may differ as a result of pre-college characteristics, social integration, and loss of credit upon transfer;
- 5) Native and transfer student, regardless of associate's degree status, graduation rates and time to degree completion are reduced following articulation policy implementation.

The results of the current study suggest institutional factors, such as tuition increases; academic loss of credit; and additional coursework at the senior institution may be impacting academic outcomes for transfer students, both with and without an associate's degree. Furthermore, transfer students with an associate's degree may be at a greater disadvantage following transfer than their non-associate's degree counterparts as a result of additional coursework at the senior institution due to lack of programmatic alignment for an associate's degree and the student's intended major at the senior institution. This is not surprising given academic majors continue to evolve and prerequisite courses may not be satisfied by students transferring with an associate's degree. The academic requirements required for associate's degree completion may not align with the student's major area of study after transfer. This results in additional course work for students transferring with an associate's degree. The additional coursework following transfer may increase the student's financial burdens which may require the student with an associate's degree to seek employment. The increased external demand by students transferring with an associate's degree reduces college integration and involvement which have been shown to have negative impacts on transfer student academic outcomes (Bahr et al., 2013). Moreover, transfer students academic outcomes may be disproportionately impacted due to increased familial obligation, financial burdens, and external demands when compared to native students (U.S. Department of Education, 2013; U.S. Department of Education NCES, 1998; U.S. Department of Education, NCES, 2006; Adelman,

2005; Bahr et al., 2013). These factors further contribute to the transfer student's lack of integration at the four-year institution resulting in decreased academic outcomes.

The effectiveness of Virginia's articulation policy is inconclusive but suggests modification is warranted. It was expected transfer students with an associate's degree would have higher graduation rates post-policy implementation compared to transfer student's with an associate's degree prior to policy implementation. However, this was not the case and does not indicate policy ineffectiveness because graduation rates for native and transfer students without an associate's degree were also reduced following policy implementation. Furthermore, the reduction in time to degree completion following policy implementation for transfer students with an associate's degree should not be attributed to policy effectiveness since native and transfer students without an associate's also showed a reduction in time to degree completion. This may be attributed to student academic under preparation pre and post-policy implementation or changes to institutional policy (Cullinane, 2014). The difference in time to degree completion for transfer students with an associate's degree and transfer students without an associate's degree may be a result of differences in course requirements for an associate's degree and the pre-requisite requirements for selected major. Transfer student's without an associate's degree transfer earlier, in theory, and have the opportunity to take the required pre-requisites for the intended track of study as a result of increased integration and earlier exposure to academic advising at the senior institution.

Implication for Policy and Future Research

Policy implications. The findings of this study do not suggest the current articulation model in Virginia is ineffective but suggest a modification may be required which may include an alignment of associate degree course requirements with academic major requirements. Roksa

and Bruce (2008) suggested articulation policies are designed to preserve credit upon transfer and provide a seamless transfer to the senior institution. In addition, Roksa (2009) suggested state involvement prevents the senior institution from directing how students will transfer and simplifying the transfer process for community college students. Roksa suggested the problem with current articulation policies lay in the inability of policy makers and researchers to communicate the intended goals of the policy. Virginia policy makers established the goal of generating 100,000 new baccalaureate degrees in the Commonwealth by 2025. Therefore, based on this goal, Virginia's policy should serve to promote transfer and increase baccalaureate attainment rates for transfer students. Virginia should expand the scope of guaranteed admission by providing a provision for students transferring prior to associate's degree attainment, expand the scope of articulation agreements by decreasing the number excluded programs, and creating a more standardized course numbering system. This work, as well as others, supports the benefits of transferring without an associate's degree on academic success and expanding the scope of articulation agreements.

Virginia policy makers have moved toward implementing a more centralized higher education system designed to promote community college transfer and create a seamless transition to the state's four-year public institutions. The Higher Education Reauthorization Act of 2011 requires the development of a "Uniform Certificate of General Studies" (subdivision B § 23-9.2:3.02.). All credits earned under the one-year general certificate program at the community college will be transferrable to the four-year public institution. The general studies certificate program aids community college students who have no intention of completing an associate's degree but have baccalaureate aspirations. Improving the transfer of general education credits benefits Virginia's largest transfer population. Furthermore, policy makers

should consider the development of a universal course numbering system. The universal course numbering system, in conjunction with articulation agreements that guarantee admission, would promote a seamless transition from community college to the four-year institution; thus, creating a simplified and easily understood transfer process for students and administrators. This approach would align baccalaureate degree requirements for Virginia's public four-year institutions with the general education certificate and associate's degree requirements at the two-year institutions. The benefit of this approach is the prevention of credit loss and a reduction in additional course work following transfer which in turn reduces time to baccalaureate degree completion and increased baccalaureate attainment. Ultimately, policy makers and community colleges in Virginia should consider the pathway to an associate's degree but also realize students with associate's degree aspiration may view the community college path as a means toward baccalaureate attainment. As such, new policies and articulation agreements should seek to capitalize on aligning degree requirements between the two and four-year institutions, preserving credits, and creating a seamless vertical transfer experience.

Ideas for promoting better articulation policies exist in the academic literature. Virginia policy makers would benefit by consultation with current research on articulation policies. Handel (2012) suggests the promotion of a transfer affirming culture at the state level improves academic outcomes for transfer students. Handel's suggestions include: 1) addressing transfer as a shared responsibility between two and four-year institution, 2) view transfer and baccalaureate attainment as expected and attainable, 3) affirm curricula and academic support services that make transfer and degree attainment possible, 4) leverage the social capital students bring to college in service to their educational goals, and 5) ensure that transfer is included as essential to the institutional mission and strategic plans of both two and four-year schools. Handel further

suggested the advantages to promoting a transfer culture include removal of the transfer stigma, obligation of the two and four-year schools to view transfer as a shared responsibility, and provides framework for researchers to investigate optimal structures that advance transfer student academic success.

Transfer culture should extend beyond easing transition for vertical transfer students and include a personal element that eases the psychological unrest that many transfer students feel when matriculating into the senior institution. Universities would benefit by understanding the psychological implication of transfer and how transfer students can positively impact the institution. Understanding the psychology of transfer would create a different relationship between the two and four-year institution that would ultimately benefit the transfer student's academic success. The relationship between the two and four-year institutions should engage the transfer student by providing more psychological, as well as, advising support to promote a more positive transition process. These policy suggestions would improve the quality of Virginia's articulation program and serve the goal of increasing baccalaureate attainment rates and reducing time to degree for transfer students in the Commonwealth.

Implications for future research. The findings from this study suggest more research is necessary to truly examine whether Virginia's articulation policy is improving academic outcomes for community college transfer students, specifically, with an associate's degree. Future research should expand the scope of this study to review all Virginia's publically funded four-year institutions. Each public four-year institution across the state of Virginia establishes individual academic thresholds for students seeking guaranteed admission following the completion of an associate's degree. This maintains institutional autonomy, but also establishes academic admission standards that represent their institutional mission and long-term strategic

goals. Therefore, it is reasonable to assume the students seeking admission at separate institution would exhibit different pre-college characteristics, college experiences, and external demands. The variation of student characteristics as a result of the variation in admission standards for transfer students with an associate's degree may lead to different academic outcomes for each institution. Therefore, the effectiveness of Virginia's guaranteed admission policy to improve academic outcomes for transfer students with an associate's degree may vary by institutions. Further research should be conducted at each public four-year institution and compared across the state to examine transfer student characteristic and how these student's academic outcomes compare to native students. In addition to examining student characteristics, transfer students should be examined pre and post-policy implementation to determine if students transferring with an associate's degree after policy implementation fair better academically than their pre-policy counterparts and students transferring without an associate's degree.

Community college student transfer and subsequently academic success at the four-year institution is complex. Student academic success is influenced by pre-college characteristics, the student's college experience, and the student's external demands. Furthermore, as shown in this study, transfer policies may impact student academic outcomes. To craft better policy and understand the transfer experience future research should involve a longitudinal qualitative element to further explore some of the findings in this study that are counter to the research literature. This qualitative component would track the transfer student experience and provide a more insightful, in-depth understanding of the transfer experience. As the community college population continues to grow and diversify more research is necessary to determine how these characteristics impact academic achievement. Future studies should capitalize on the increase in student diversity and the growth of the community college population to examine different

student characteristics (e.g. proximity to four-year institution, financial aid requirements, first-generation college student, number of credits earned at transfer, number of credits earned at graduation, etc.) and their impact on academic outcomes in the context of Virginia's articulation policy. Examining these additional student characteristics would provide policy makers and public institutions the necessary information to serve an increasingly diverse community college student body transferring to the state's four-year institutions.

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Vita

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