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Is This My Place? Contributing Factors to Community College Students' Longitudinal Sense of Belonging and the Connection of Sense of Belonging to Student Success

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Sense of Belonging and the Connection of Sense of Belonging to Student Success

by

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ABSTRACT

Community colleges serve a large percentage of historically under-represented populations including students of color, low-income, and first-generation students. Unfortunately, less than half of students who begin at a community college return the following Fall and only about one-fourth of students eventually graduate. Previous research indicates that students' sense of belonging may be a key factor in retention and completion rates. However, large-scale datasets have yet to comprehensively explore students' sense of belonging in the community college setting. To address that issue, the purpose of this quantitative exploratory study was to examine individual and institutional variables associated with a measure of students' institutional sense of belonging in their first and third years of school. Additionally, the research assessed how sense of belonging was related to measures of student academic success. The data are a subset of community college students who participated in the nationally representative NCES 2012-17 Beginning Postsecondary Students Longitudinal Study (BPS) (n=6,700).

Analyses revealed that student perceptions of faculty and peer interactions, satisfaction with academic and social experience, and academic confidence were most related to student sense of belonging. Differences were found between contributors to first- and third-year sense of belonging and between student demographic groups. Sense of belonging was found to increase the likelihood of students being retained at an institution and of completing a degree or certificate. By focusing on factors most related to community college students' sense of belonging, institutions can leverage resources to support student retention and degree completion.

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CHAPTER 1: INTRODUCTION

Ideally, a student who enters college would be able to reach their goal and complete the program or degree they set out to achieve. However, for the majority of students attending community colleges, the reality is far different. In public two-year institutions, most new students who begin school each term will stop attending before completing their goal. The six-year completion rate for community college students finishing a two-year credential continues to hover around 40% (Causey et al., 2022; Shapiro et al., 2014). While over 80% of students enrolling at a community college report that they plan to earn at least a bachelor's degree, six years later, only 14% have earned that degree (Horn & Skomsvoid, 2011; Jenkins & Fink, 2016). Many students do not even return for a second year of education. In 2020, only 52.4% of students who started at a two-year public institution returned the following fall, a rate far lower than that at four-year institutions (National Student Clearinghouse Research Center, 2022b).

These statistics are even more troubling when considering the demographics of those who attend community colleges. Community colleges serve a higher percentage of first-generation students as well as Latinx and African American students (Monaghan et al., 2018). The students who attend community colleges are, on average, older than students who attend four-year schools and have lower incomes, work more hours per week, and are more likely to be caring for children or other family members (Center for Community College Student Engagement, 2013; Juszkiewicz, 2014). Moreover, a higher percentage of international students and non-native English speakers are represented in this setting (Bergey et al., 2018).

Community colleges can provide significant benefits to both the students who attend as well as to surrounding communities. They are open-access institutions that typically offer not only transfer pathways to four-year institutions and vocational programs, but also developmental education, courses for English language learners, and non-credit offerings (Dowd, 2007). Community colleges significantly increase the educational attainment of individuals who would be unlikely to attend another type of institution (Brand et al., 2014; Leigh & Gill, 2003). Educational services are also provided at these institutions at a relatively low cost (American Association of Community Colleges, 2022). Moreover, economic analyses suggest that the presence of a community college increases local employment growth (Crookston & Hooks, 2012).

A college credential can positively impact not only the student but also their family and community. However, community college students have complex lives and academic trajectories that can increase students' need for guidance and support. Unfortunately, community colleges can be difficult to navigate and may provide less comprehensive student support than many four-year institutions (Anderson, 2019; Bailey et al., 2015; McKinney et al., 2022). Additionally, community college students may have fewer opportunities to learn college-success knowledge and skills than students attending four-year colleges and universities. Community colleges receive relatively low funding when compared to public four-year schools (Hendrick et al., 2006). Thus, with limited resources to implement interventions, leaders must carefully weigh implementing changes and initiatives to increase retention as adding employee and financial resources to an initiative can mean reducing services in another area. In this environment, clear

guidance is needed for leaders to be able to determine how to best allocate resources to impact retention and completion.

This chapter will start by reviewing the historical and ongoing challenges and complexities of improving retention in community colleges as well as the financial impact and equity impact of low completion rates. Next, theoretical approaches to understanding retention will be summarized and sense of belonging will be introduced as a lens to improve community college student retention and success. Then, the chapter concludes by establishing the purpose and significance of proposing a study that explores the factors that contribute to sense of belonging specifically in the community college setting as well as longitudinal outcomes related to this construct.

Background of the Problem

Community colleges are defined as public open-access institutions with few barriers to enrollment that primarily offer two-year associate degrees, certificates, transfer coursework, and non-degree classes (Cohen et al., 2014). Additionally, these colleges are almost exclusively commuter campuses without dormitories or other on-campus residences. While retention is an important area of focus for all types of institutions, community colleges have long had lower rates of retention compared to four-year institutions (Astin, 1972). In 1960, Clark noted that only a third of students in programs eligible for transfer actually did so. Even when controlling for student characteristics, retention at the community college level was found to be lower than would otherwise be predicted (Astin, 1972). Tinto (1975) concluded that, while it is known that the "quality" and institutional type influence retention, "…how these differences come about or for

which types of persons the differences are greater, smaller, or even reversed is, thus far, beyond our reach" (p.115). While Tinto noted this disparity 45 years ago, community college retention has proven remarkably hard to influence. A recent analysis of longitudinal data recently concluded that, when controlling for student and family characteristics, students incur a significant penalty for beginning their education at a community college (Voss et al., 2022). In 2022, the six-year completion rate for public four-year completion rate of 68.0%, whereas the completion rate for public two-year institutions was only 43.1% (National Student Clearinghouse Research Center, 2022a figure 1, p.2).

Equity Issues in Completion Rates

Community colleges comprise a significant percentage of overall college enrollment. In 2019, the National Center for Education Statistics reported that 32% of undergraduates were attending a public two-year college. The demographics of students attending community colleges differ from the demographics of students in four-year colleges and universities. In 2020, public four-year institutions in the United States on average had 54% White students, 21% Hispanic students, and 11% Black students while public two-year institutions had 48% White students, 28% Hispanic students, and 13% Black students (National Center for Education Statistics, 2022). Public two-year institutions also serve a higher percentage of students in poverty than public four-year institutions (Fry & Cilluffo, 2019). Moreover, first-generation students are more likely to attend a community college than their peers with college-educated parents (Cataldi et al., 2018) and community colleges tend to attract high numbers of English-language learners

and international students (Bergey et al., 2018). Even within the community college setting, outcomes are stratified by demographics. In 2016, the national six-year completion rate for White students was 50.6%, while for Hispanic students it was 37.9%, and for Black students it was 31.1% (National Student Clearinghouse Research Center, 2022a). Because community colleges serve a more diverse population than four-year colleges, the failure of these schools to retain and graduate students, particularly students of color, reflects a significant equity issue.

Financial Impact of College Completion and Early Departure

Earning a college degree has a significant economic impact. On average, women have a net lifetime earnings increase from a college degree of $390,000 and men have an increase of $590,000 (Autor, 2014). Individuals who are the least likely to earn a college degree based on their social background obtain the highest economic impact from completing a degree (Brand & Xie, 2010). Conversely, college departures pose a significant detriment to both the individual and society. Students who enter community college but do not complete a degree earn, on average, far less than those who graduate (Belfield & Bailey, 2017). Students who borrow money for college but do not complete experience higher levels of unemployment and triple the default rate on their student loans (Council of Economic Advisers, 2016). On a national level, a study that modeled a scenario of increasing the college completion rates nationally predicted that, in the short term, an increase in completion would result in improved productivity and employment rates and, over the long term, would increase GDP growth and decrease the deficit (Koropeckyj et al., 2017). Therefore, addressing retention and completion in the

community college setting is key not only because of equity issues but also because of the financial impact on an individual, community, and national level.

Access and Retention in Community Colleges

Community colleges were crafted with the intent of being open-access entry points into higher education (Monaghan et al., 2018). Students who attend them tend to live nearby and often would not otherwise access post-secondary education. Community colleges frequently strive to provide comprehensive programming to support students' diverse needs and interests, often offering preparatory coursework for students intending to transfer to four-year institutions, a diverse array of vocational degrees and certificates, as well as community education (Bragg, 2001; Cohen et al., 2014). The combination of low access barriers and comparatively low-cost options may counteract the goal of increased completion rates as community colleges explicitly do not "screen out" students with a lower likelihood of completion who would be denied admission at four-year colleges and universities (Dowd, 2007; Monaghan et al., 2018). Unfortunately, state cost-cutting measures have further stymied community colleges from supporting students with quality services that facilitate completions (Belfield & Jenkins, 2014). In this resource-constrained environment, it is imperative to elucidate what factors best influence outcomes as leaders must carefully assess the benefits and costs of an intervention before implementation.

Student Retention and Persistence Theories

Theories of student persistence posited models to explain both student and institutional factors that can impact retention. Chickering (1969) focused on the process

of college student development and then later developed best practices for institutional effectiveness based on those developmental factors. Focusing on student actions, Astin (1984, 1993) postulated the key factor in student success hinged on the amount of time and energy that students committed to engage in being involved in their institution. The importance of involvement is also a key theoretical foundation for Tinto's (1975, 1993) work in creating a model of student departures predicated on students separating from their pre-college community. This interactionist theory postulated that students' individual characteristics interact with the college environment to influence how integrated the student becomes with the institution. Additionally, students' interactions between peers, and faculty were crucial. This involvement with community members and the institution was seen as a catalyst that would increase the amount of effort they expended. This effort, in turn, would increase learning and persistence. Tinto's work proved fundamental for the field of student retention and helped herald what has been termed the "age of involvement" (Study Group on the Conditions of Excellence in American Higher Education, 1984; Tinto, 2006).

While Tinto's model became prevalent and was studied extensively, questions remained about its efficacy. Braxton et al. (1997) developed 15 testable propositions from Tinto's interactionist theory and concluded that research on these propositions provided only partial support for the model. Additionally, numerous theorists have critiqued Tinto's conception of student populations as being overly homogeneous and focusing on the experience of white male students (Braxton, 2000, 2019). These critiques formed the basis for a number of expansions and modifications to involvement theories to include

social, cultural, and environmental factors (Kuh & Love, 2000; Rendón et al., 2000; W. Tierney, 1992). Moreover, Braxton et al. (1997, 2014) suggested that theories of persistence and completion developed in the four-year setting may not be applicable to non-residential community colleges.

Overall, challenges with previous theories mean challenges remain in understanding college student success and retention and translating theories into meaningful guidance for institutional improvements. While research has documented the relatively low completion rates of community college students since the 1960s, completions have not meaningfully improved while, during the same time period, four-year colleges and universities have seen improvements (Astin, 1972; Causey et al., 2022). Tinto himself (2006) summarized, "Unfortunately, most institutions have not been able to translate what we know about student retention into forms of action that have led to substantial gains in student persistence and graduation" (p. 5).

Sense of Belonging

Approaching retention through a lens that considers the psychological and environmental factors that cause students to persist in college may be a method to better elucidate how to improve student outcomes. Tierney (2000; 1999) argued that approaching student retention through a model that focuses on the ability of the student to fit into an institution places the onus on the individual student and ignores the power of an organization's culture in influencing student success. In this view, high school preparation and financial support for students will not be sufficient if the influence of culture is ignored. Students must feel like their backgrounds and identities are affirmed to

be successful. Tierney (2000) postulated further that without systemic change, programs intended to prevent student dropouts put well-intentioned staff in the role of "emergency-room medics" trying to treat a problem that should have been prevented in the first place (p. 217).

Over recent decades, research in student retention has begun to shift to better integrate the importance of culture and student perceptions in academic success. In particular, the concept of students' sense of belonging at an institution has been identified as a key concept (Hausmann et al., 2007; Strayhorn, 2018). Sense of belonging is defined as encompassing feelings of connectedness, mattering, and social support on a college campus. Hurtado et al. (2015) distinguish the construct as being the "psychological dimension of student integration" (p. 62). Rooted in Maslow's concept of the hierarchy of needs, sense of belonging is conceptualized as a fundamental prerequisite need that must be satisfied for students before they can focus on higher-order needs related to college success such as self-actualization.

Sense of belonging has been shown to be an important factor for retention and completion for non-majority group students including students from minoritized racial groups, English language learners, and LGBTQ students (Booker, 2016; Garza et al., 2021; S. Hurtado & Carter, 1997; Lau et al., 2019; Parker, 2021; Strayhorn, 2018; Vaccaro & Newman, 2017). Additionally, a difference in sense of belonging may partially explain differential outcomes in the community college and four-year college settings. Surveys have found that students at four-year colleges report a higher sense of belonging than at two-year institutions (Gopalan & Brady, 2020). Moreover, because

community colleges serve a higher proportion of students frequently marginalized in the college environment and who are at increased risk of departure before completion, sense of belonging may be particularly important.

Studies mainly conducted at the four-year level have revealed contributory factors that can influence sense of belonging. For instance, Maestas et al. (2007) developed a model of student background characteristics associated with sense of belonging and how integration factors at the institution can mediate that association. Likewise, Ribera et al. (2017) found that institutional belonging and measures of peer acceptance differed for students of different identity groups but that participation in high-impact practices mediated those associations. Unfortunately, the vast majority of research on sense of belonging has centered on four-year institutions (Carales & Hooker, 2019). Findings made at the university level may not be applicable in the community college setting as the student bodies and experiences are not equivalent. Additionally, increasing sense of belonging for community college students who commute can also be more challenging than for students who live on campus and the strategies that work in one setting may not work in the other setting (Jacoby & Garland, 2004). Therefore, it is important to conduct studies utilizing datasets collected at the community college level.

Purpose and Significance of the Study

A large body of research has shown associations between sense of belonging and outcomes such as academic motivation, positive peer interactions, and student-faculty interactions (Freeman et al., 2007; Goodenow, 1993). Additionally, sense of belonging is an important predictor of more explicit measures of student success such as student

retention and positive academic progress (Berger, 1997; Booker, 2016; Hausmann et al., 2007). A lack of sense of belonging is also a reason often cited by students "dropping out" of an institution (Goodenow, 1993). While important for all students, sense of belonging may be particularly key for students marginalized in the college setting based on their race or ethnicity, sexual orientation, gender, or socioeconomic status (Strayhorn, 2018). Unfortunately, most research on sense of belonging has centered on students in the four-year setting (Carales & Hooker, 2019; Martinez & Munsch, 2019). While recent studies have begun to highlight the importance of sense of belonging for specific groups in the community college setting, little large-scale research exists that considers sense of belonging across demographic groups.

The purpose of this study was to explore the factors that may contribute to students' sense of belonging in the community college setting and whether institutional belonging predicts student outcomes. Because community college students and campuses differ considerably, it is important to conduct research in this setting rather than utilizing the results of research in the four-year setting for guidance. By utilizing national data to examine the elements that contribute to sense of belonging, the present study utilized an exploratory approach to explore contributory factors. This study also assessed what longitudinal outcomes are associated with students' sense of belonging to an institution.

The research that exists on sense of belonging in the community college setting often focuses on individual student identity groups (e.g., García et al., 2019; Maramba & Museus, 2013; Newman et al., 2015). These lines of inquiry are valuable and contribute important knowledge to supporting students. In a complementary approach, this study

examined a sample of community college students across gender and demographic groups, in order to determine factors that are important for all groups, as well as making between-group comparisons. By doing so, the research expands knowledge regarding factors contributing to community college students' sense of belonging and the relationship of their sense of belonging to student outcomes and changes in students' self-perceptions. Additionally, this research has the potential to increase student success outcomes in community colleges by allowing institutional leaders and policies to focus limited resources on areas that are identified as being key to increasing sense of belonging. Because of the breadth of factors considered, this research has the potential to influence several spheres including high school preparation, academic and support programs, outreach, curriculum, and policy. Moreover, because sense of belonging has been shown in previous research to be key in the retention and academic success of underserved student populations including students from minoritized racial groups, English language learners, and LGBTQ students, the study has important implications for increasing equitable outcomes.

Chapter Summary

Community colleges serve diverse populations of students across the country and serve the important function of providing affordable access to students who would otherwise be challenged to access higher education. However, the retention and completion rates of community colleges are relatively low and have been persistently resistant to improvement for decades. Previous research on student success and retention theories introduced questions as to the efficacy of those theories as well as their

applicability to diverse student populations and community college students. The concept

of sense of belonging may be an approach to improving student success in the community

college setting. The significance of this study was to provide research on contributory

factors to sense of belonging as well as identify longitudinal outcomes associated with

sense of belonging.

Organization of the Dissertation

This dissertation contains five chapters. This current chapter reviewed the

background of the problem and core concepts that are key to the research. Additionally,

the problem of practice as well as the purpose and significance of the research was

explicated. Chapter 2 provides an overview of pertinent literature including a review of

prominent student development and retention theories, sense of belonging, and related

concepts, as well as an overview of the community college setting. Chapter 3 reviews the

study's research questions, methodology, and study design. Chapter 4 summarizes the

findings of the research. The final Chapter provides a discussion of the results in addition

to the implications of the research, recommendations, and suggestions for future research.

CHAPTER 2: LITERATURE REVIEW

Community colleges provide a diverse array of coursework and programs with significantly lower average tuition than most four-year institutions. Additionally, these institutions offer open enrollment and provide individuals who might otherwise not be able to access higher education the opportunity to receive a college education. However, the issue of low rates of retention and completion in the community college setting suggests that students who might most benefit from receiving a degree or credential are likely not to do so. This chapter will build a case that focusing on sense of belonging in the community college setting may be key to improving outcomes.

Chapter 2 examines the literature relating to theories of post-secondary student success with a focus on how the addition of the construct of sense of belonging helps better explain student retention and departures. Sense of belonging is differentiated from related constructs. Additionally, the review examines the existing research on antecedents to sense of belonging and the subsequent outcomes predicted by sense of belonging. The second section of this chapter examines research on community colleges and how the setting of community colleges and students who attend may differ from four-year institutions. The chapter concludes with a summary of the research that exists on sense of belonging in community colleges.

Student Development and Retention Theories

Initial research in the field of student retention examined how individual student characteristics increase or decrease a student's likelihood of success in school (Tinto, 2006). A student's success was viewed as a product of their motivation and attributes and

research did not address the interplay of external influences. While a student's characteristics may indeed be predictive of the likelihood they will persist, this line of work borders on victim blaming. Moreover, this approach ignores institutional influence and yields little that colleges can use in terms of actionable interventions (Reason, 2009; Tinto, 2006). In the 1970s, the field began to consider how environmental factors such as the social and academic systems in institutions might have an impact on student retention (Tinto, 1975, 2006). Since that time, a number of foundational theories have emerged to serve as a theoretical basis for understanding student development, experience, and outcomes.

Chickering's Theory of College Student Development

Based on Erik Erikson's psychological theories on ego development theory, Arthur Chickering (1969) examined how student development might also progress through psychological stages. Chickering and Reisser (1993) conceptualized seven vectors of student identity development that students progress through while developing as college students and that are key to students' educational outcomes. These vectors include developing competence, managing emotions, moving towards interdependence, developing mature interpersonal relationships, establishing their identity, developing purpose, and developing integrity. These factors were non-linear, with students being able to progress through more than one simultaneously and at different points during their higher education experience. These theories were later used as the basis to develop a set of seven principles that colleges could employ in order to improve teaching and student learning and when employed in aggregation would have increased effectiveness

(Chickering & Gamson, 1987). By focusing work on supporting student growth and learning within the seven vectors, Chickering suggested that institutions can subsequently influence retention and completion.

Self-Authorship

Like Chickering, Marcia Baxter Magolda (2004, 2008) emphasized that identity development is a crucial part of the college-going process. This theory posits that young adults transition from a child to adult identity and move from externally defined beliefs and knowledge, a stage known as external formulas, through a crossroads stage, and finally, in the self-authorship stage, to internal, or self-authored understandings. These changes occur along three dimensions, epistemological, intrapersonal, and interpersonal. In the epistemological dimension, students move from understanding truth as being fixed and consistent to an understanding of truth as being contextual and, with that shift, the development of their own internal belief system. Intrapersonally, students shift from a need for external approval to having a strong identity and developing a personal value system. Finally, interpersonal development moves from relationships based on external approval and friendships based on surface-level similarities to the ability to engage in interdependent and mutually supportive relationships with others.

Shifts in these dimensions occur over time and are facilitated by interactions with peers and faculty as well as the process of moving from parental supervision to autonomous exploration and independent decision-making (Baxter Magolda & King, 2004). Self-authorship theory posits that the skills developed are key both in academics and the work world and that the process of self-authorship is intrinsically linked to

students' academic success. While self-authorship theory has been seen to place equal emphasis on all three dimensions, Patricia King (2010) posited that the epistemological or cognitive dimension was fundamental and essential to growth in the other two dimensions. The development of what King termed "cognitive complexity" in this area was required in order to be able to move towards intrapersonal and interpersonal self-authorship.

Self-authorship theory has been criticized as being originally based on research that looked solely at the experiences of white students. Researchers attempting to apply the theory to non-White students found that Students of Color must also engage in the process of seeing and making meaning of their experiences of racism while moving through the self-authorship dimensions (Hernández, 2016; Torres, 2009). Moreover, Kutten's (2020) work on exploring how Black students engage in the process of self-authorship and identity development suggested that an amendment to self-authorship theory may not be sufficient. In this study, the author found that many participants in the study had transitioned from adolescence to adulthood by the time they enrolled in college and already demonstrated indications of self-authorship at the time of matriculation.

Astin's Involvement Theory

Astin (1984, 1993) theorized that students' learning and success hinged on their campus involvement. Involvement is defined as "the amount of physical and psychological energy that the student devotes to the academic experience" (Astin, 1999, p. 518). Crucially for Astin, involvement is not solely the psychological experience of motivation, it is also the behavioral action of investing both time and commitment. In this

approach, students' development and academic performance occur proportionally to their involvement. Because students have a limited amount of time, how their time is spent will impact outcomes. Student-faculty involvement, peer involvement, and academic involvement are all considered key to academic success, with faculty involvement being the most impactful (Astin, 1993). Additionally, Astin proposed the inputs-environment-outcome (I-E-O) model to represent the interaction of the student and the college experience. In this framework, each student's individual characteristics they possess when they enter the institution are considered the "inputs." The experiences that the student has while they are in school are considered the "environment," which interacts with the "inputs" to produce the "outcomes," conceptualized by yields such as credential completion, grades, and learning. This model was notable because it integrated both the influence and interactions that students' backgrounds and experiences within an institution can have on learning outcomes. Empirical studies have supported the connection between students' effort and involvement to retention and learning (Astin, 1993; Pascarella & Terenzini, 1991). Additionally, the I-E-O model helps to explain why students' outcomes may differ within the same environment (Strayhorn, 2008).

Tinto's Interactionalist Theory of Student Departures

In his text first published in 1987, *Leaving College: Rethinking the Causes and Cures of Student Attrition*, Tinto (1993) theorized that departing college before completion is an interaction between the student and their institution. In Tinto's original conceptualization, students must integrate into their institution and its culture in order to be successful. Student persistence "hinges on the construction of educational

communities in college, program, and classroom levels which integrate students into the ongoing social and intellectual life of the institution" (Tinto, 1993, p. 188). Like Astin, Tinto saw students' involvement as a crucial element of their success (Milem & Berger, 1997). *Leaving College* advanced a model that was intended to both serve as a guide to institutions to increase retention and to frame future research (Bean, 1988). The seminal text is particularly significant because it challenged institutions to see departures as a function of their own behavior and not only the responsibility of the individual student. The field has debated the accuracy and utility of Tinto's model since the text was first published (Braxton, 2019). Braxton et al. (1997) developed an approach to empirically test Tinto's theories by translating the theory into testable propositions. Their research concluded that, there was only partial support for Tinto's model of attrition at university and residential institutions and that the model was not sufficient for the non-residential and two-year settings. Moreover, the authors identified issues with the internal consistency of the theory.

Extensions and Alternate Approaches

Numerous researchers, including Tinto himself, have also faulted Tinto's original theory for not taking into account cultural, economic, and social factors as contributors that influence student success and retention (Berger, 2001; W. G. Tierney, 1999; Tinto, 2006). Critiques have also highlighted that the majority of research underlying fundamental theories in the field was founded on the study of white male college students in four-year institutions (A. Hurtado, 1997; Rendón et al., 2000; W. Tierney, 1992). Moreover, theorists viewed students' success as being predicated on their ability to

assimilate to this setting. Both extensions and alternate theories were proposed to better account for diverse student experiences. Rendón, Jalomo, and Nora (2000) proposed a biculturalism theory to add to Tinto's framework to help elucidate what causes can influence minority student departures. Kuh and Love (2000) proposed the use of a cultural perspective as a lens to see departure as a sociocultural phenomenon instead of an individual action. Tierney (1992, 2000), in contrast, argued that Tinto's framework was based on an inherently flawed framework and proposed an alternate approach predicated on the concepts of power and community that emphasized how an institution's culture is key to student success, particularly for historically marginalized students.

In their assessment of Tinto's overall theories, Braxton et al. (1997) also concluded that there was not sufficient empirical support for Tinto's model to explain retention at commuter institutions and that a separate model was needed in this context. Based on this finding, an enhanced commuter college model of student retention was later developed that included factors such as motivation, cost of attendance, and support from significant others that impact persistence (Braxton et al., 2004). Findings included an emphasis on the importance of the academic dimension of the college experience for non-residential students, in contrast to the importance of the social experience for residential students. The report suggested that student success practices including assessment and course placement, models of academic advising, and first-year transition programs, as well as faculty practices, such as learning communities and active learning practices could all boost the academic and intellectual development of students in these

institutions. However, the authors conclude that further research is needed and that "no template of a successful retention program exists" (p. 81).

Reason (2009) also extended Tinto's work with a framework that attempted to comprehensively represent elements that can influence student learning and persistence in higher education. First developed by Terenzini and Reason (2005), the comprehensive model includes characteristics of students before entering the institution, organizational context, peer environment, and individual student experiences as factors that interact and influence persistence. Reason highlighted "no existing models specifically included internal organizational features such as policies affecting course sizes, promotion, and tenure, or budgetary and staffing arrangements" (p. 662). The authors argued that a model examining the interaction of all these factors is important because any intervention's impact can vary depending on the characteristics of the institution, the student, and the individual experience of the student in that context. In this model, community college students who commute to campus will inherently need different supports than those at residential four-year institutions because of the divergent characteristics of both the institution and the students.

Research-Based Theory

In addition to creating theoretical models of student retention and success, the field also attempted to identify approaches to impact retention by evaluating effective interventions already in practice. One significant attempt was Kuh and colleagues' (2005) Documenting Effective Educational Practice (DEEP) project. This study performed a correlative analysis utilizing data from the National Survey of Student Engagement

(NSSE) to identify factors associated with high-performing colleges, defined as colleges that produce better outcomes in terms of student engagement and graduation rates than would be expected based on their student population's characteristics. The results identified six common characteristics of such institutions including a continual focus on student learning, a shared institutional commitment to the quality of education, a utilization of the campus' location for education, pathways for student success that are clearly delineated, and a "'living' mission, and a 'lived' educational philosophy" (p. 24). Based on their analysis, Kuh et al. (2005) suggested institutions could potentially employ strategies such as first-year seminars, early alert systems, and advising strategies to increase engagement and completions. However, the research was correlative and did not make causal inferences regarding whether the identified characteristics were increasing student success.

Despite research such as DEEP, the field has struggled with the challenge of translating research on student persistence into actionable guidance for improvement for institutions (Tinto, 2006). Indeed, Kuh et al. (2005) summarized their belief that "the foundation of strong performance is a multilayered tapestry of enacted mission, coherent operating philosophy, and promising practices woven together" (p. xvii), raising the question of how institutions can clearly determine what they should focus on when engaging in success efforts. Research on less complex interventions for schools to implement has found limited success. For example, Patton (2006) conducted a meta-analysis to test the effectiveness of programs designed to enhance retention and persistence and found either only weak or small to moderate levels of positive evidence

for most of the interventions tested. Patton and colleagues concluded, "Overall our findings demonstrate that academe is without a core set of documents upon which administrators can rely when seeking retention models to employ at their own institutions" (p. 20-21).

Section Summary

In addition to the foundational theories of the field, numerous approaches have been proposed to account for the diversity of student experiences and to develop practical guidance for institutions to utilize to better retain students. These approaches include extensions on existing theories as well as new approaches based on theoretical foundations of culture, power, and developing theory based on research data. Unfortunately, while improvements in retention have occurred over the past decades in four-year institutions, community colleges have not seen significant improvements. The lack of research showing demonstrable results and continued disparities suggests that past perspectives and intervention approaches to improve retention may not be sufficient for the community college setting.

Sense of Belonging

Chickering (1969) and later Chickering and Reisser (1993) theorized that the identity development experienced by college students involves the growth of not only intellectual competencies but also emotional competencies. These emotional areas include developing skills to successfully navigate interpersonal relationships, shifting from being autonomous to more interdependent, learning to manage one's emotions, and finding a feeling of purpose. The development of these capabilities depends both on

academic factors and on environmental influences including students' relationships with faculty and peers and their learning community. While Chickering focused on seven vectors of identity development, Baxter Magolda (2004, 2008) described student development processes as occurring within the dimensions of epistemological, intrapersonal, and interpersonal meaning-making. Within each area, development moves from the stage where decision-making and identity are shaped by external influences, to a stage where the individual is guided by a strong internal voice. Growth along each of these dimensions was seen to foster both academic success as well as broader identity development and the ability to navigate the adult world. King (2010) underscored the importance of the cognitive or epistemological area as being fundamental to being able to progress in the other two dimensions. Astin (1984) extended the concept of student competency development by emphasizing the importance of understanding the mechanisms of what facilitates student development. Critically, how students are involved in their own learning environment was identified as key. In this theory, students' involvement in college, both in academics and extracurriculars, predicted their learning and retention (Astin, 1993).

While much of involvement theory focused on the behavior actions of students, Schlossberg (1989) stressed that in order for students to be able to engage with their institution, they must feel like they matter within that context. In contrast, when students feel insignificant, or marginalized, they are unlikely to persist. The concept of mattering emphasizes that students' perceptions and subjective experiences can be a crucial factor in whether they persist in school. While academic ability may be one factor in students'

success, students' behaviors, engagement, and actions also play a crucial role. Students' perceptions and beliefs impact their behavior and decisions, including the small daily decisions students need to make to be successful in their coursework as well as major decisions such as whether to enroll the following term.

Tierney (2000; 1999) looked beyond the individual student and argued that instead of asking a student to integrate into an institution, educational providers must focus on changing and expanding their culture to include their students. Students' communities, strengths, and backgrounds should be honored, accommodated, and incorporated into the practices and pedagogies of the institution. He posits that, without this work, student academic supports and financial aid will not be sufficient. In contrast, focusing on how institutions can transform themselves and make students' identities and backgrounds a part of the college culture will subsequently open more possibilities for student success.

A key question, then, is how to capture how students perceive whether they are a part of an institution. Strayhorn (2018) identified the concept of sense of belonging as a way to capture this feeling. He defined sense of belonging as encompassing "students' perceived social support on campus, a feeling or sensation of connectedness, and experiences of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff and peers" (p. 4). In other words, students have a sense of belonging when they feel connected to and valued by the institution they attend. Crucially, sense of belonging is comprised of both cognitive and affective components (S. Hurtado & Carter, 1997).

Sense of belonging may be particularly important because of its fundamental importance to human nature. Maslow (1962) theorized that belongingness was a basic human need that must be satisfied before individuals can focus on higher-level needs of esteem and self-actualization. Strayhorn (2018) grounded his work in Maslow's hierarchy of needs theory and posits that a student cannot achieve the higher-level needs related to college success without first having their need for belonging satisfied. Additionally, because sense of belonging is a basic human need, it can be a powerful motivator that can drive human behavior to try to satisfy this need. The example of a student who feels disconnected and stops attending classes despite the academic and financial consequences illustrates how powerful sense of belonging can be. Moreover, conditions typical to the college setting may heighten the importance of sense of belonging. Strayhorn (2018) emphasized that sense of belonging takes on heightened salience in certain contexts, such as being a newcomer to a group or during an individual's late adolescence, characteristics both typical of many college students.

Sense of Belonging and Student Success

Research in the college setting suggests connections between sense of belonging and indicators of success. A sense of belonging promotes both students' motivation and academic achievement (Freeman et al., 2007; Goodenow, 1993). Research has found associations between sense of belonging and students' intrinsic motivation, self-efficacy, and perceptions of the value of academic activities (Freeman et al., 2007). Moreover, sense of belonging is also positively linked with students' intentions to persist as well as their positive academic progress (Berger, 1997; Booker, 2016; Hausmann et al., 2007;

Morrow & Ackermann, 2012). In contrast, surveys of students contemplating leaving an institution have identified a lack of a sense of belonging as the top reason students identify as to why they consider leaving school (Strayhorn, 2018). Declining sense of belonging over time is linked to student attrition before graduation (Hausmann et al., 2007; Miller et al., 2019). Jacoby and Garland (2004) highlight why feeling connected to an institution is crucial for student retention, "Students who do not have a sense of belonging complain that their college experience is like 'stopping by the mall' to get what they need on the way to somewhere else" (p. 65). In short, feeling a lack of a sense of belonging leaves students with the underlying question of why they should continue to attend school (Soria & Stebleton, 2013).

Sense of belonging may be particularly crucial for students who belong to groups that have historically been marginalized in educational settings (S. Hurtado & Carter, 1997; Strayhorn, 2018). Recent studies have highlighted the importance of sense of belonging in retention and completion for diverse groups of students including African American women, Latino males, international students, and English language learners (Booker, 2016; García et al., 2019; García & Garza, 2016; Garza et al., 2021; Maestas et al., 2007). Likewise, sense of belonging may be crucial for other students who have risk factors associated with non-completion such as mental health concerns, low socioeconomic status, being the first in the family to attend college, and being on academic probation (O'Keeffe, 2013).

Sense of Belonging and Identity

Studies suggest that student demographics and identity factors can impact their sense of belonging. In general, students who were historically excluded from higher education often have a lower sense of belonging than white middle-class students. For example, low-income students may have a lower sense of belonging than middle- and upper-income students (Berger, 1997; Soria & Stebleton, 2013). First-generation students also tend to have a lower sense of belonging than their counterparts (Miller et al., 2019; Ribera et al., 2017). White students also tend to have a higher sense of belonging than students of color (Berger, 1997; Ribera et al., 2017). The context may also be important for the belonging of marginalized groups. For instance, faced with discrimination and marginalization, Black students are often challenged to feel like they belong at predominately White institutions (Quaye et al., 2014).

Constructs Related to Sense of Belonging

While mattering, marginalization, involvement, integration, and engagement all have connections to sense of belonging, they are distinct and separate constructs. The following sections will help to delineate sense of belonging from related concepts as well as discuss the connections between sense of belonging and other phenomena related to student retention and success.

Mattering

Mattering is an important component of sense of belonging. Rosenberg and McCullough (1981) conceived of mattering as, "Do we believe that we count in other's lives, loom large in their thoughts, make a difference to them? Are we an object of

another's concern, interest, or attention?" (164). Mattering is understood to be crucial to individuals' mental health, self-esteem, and social adjustment and a key part of individual self-concept. Mattering includes feeling noticed, important, appreciated, and feeling that others depend on us. Mattering can be a motive and can influence individuals' behavior. Students have a higher likelihood of persisting at an institution when they experience feeling cared for and valued by a college community (Gossett et al., 1996; Schlossberg, 1989). While the concepts of mattering and sense of belonging are similar, Strayhorn (2018) concludes that the feeling of mattering is a component of sense of belonging; however, a feeling of mattering alone is not equivalent to feeling a sense of belonging. Additionally, having a sense of belonging can be a consequence that follows from the experience of mattering. Like sense of belonging, mattering can take on heightened importance in times of transition and individuals who do not feel that they matter in a setting may search elsewhere to find a community in which they perceive they do matter (Rosenberg & McCullough, 1981; Strayhorn, 2018).

Marginalization

Strayhorn (2018) and Schlossberg (1989) both define the experience of marginalization as the polar opposite of sense of belonging. Marginality is "a sense of not fitting in," a sense that can be a fleeting experience or longstanding condition (Schlossberg, 1989, p. 5). Individuals experiencing change may often simultaneously feel "marginal and that they do not matter" (Schlossberg, 1989, p. 5). Additionally, when individuals feel or experience being marginalized, having a sense of belonging becomes of heightened importance (Goodenow, 1993; Strayhorn, 2018). It is important to note that

students who belong to groups who have historically experienced marginalization in the United States frequently have encountered similar experiences of marginalization on college campuses (Cole, 2021).

Involvement and Integration

Sense of belonging is also associated and related to the concepts of involvement and integration; constructs that have both been frequently identified as key to positive student outcomes. For example, Astin (1984, 1999) stressed the importance of student involvement, the amount of energy that students devote to academic and social pursuits at their institution, in being key to student development and learning. Correspondingly, Tinto's (1975, 1993) theory of student departures highlighted students' integration or involvement at the institution. Research has highlighted integration as an indicator connected to student persistence (Bean & Metzner, 1985; S. Hurtado & Carter, 1997; Tinto, 1975). In research, integration measures have looked both at student perceptions of integration and have also been conceptualized behaviorally, measured by the time that students spent on academic activities (academic integration) and on being socially involved (social integration) (Berger & Milem, 1999).

Strayhorn (2018) specified that involvement is defined as what students actually *do* instead of what they are *thinking* or *feeling.* Involvement is positively associated with sense of belonging and, in most contexts, increasing the time students spend being involved will result in increases in students' sense of belonging. However, it is possible that a student may spend a significant of time on school-related tasks without experiencing an internal sense of belonging. Whereas previous theorists, including Tinto,

have focused on involvement often demanding assimilation and severing previous familial and cultural connections, Strayhorn stressed that a sense of belonging to an institution does not require students to differentiate from their family and community (Rendón et al., 2000). He elaborated, "I consciously melded an alternative conceptualization that connected retention with sense of belonging by focusing on perceived membership and 'fit' rather than integration" (Strayhorn, 2018, p. 52). Additionally, in this framework, it is possible for a student to spend a significant amount of time on behaviors that would define them as being integrated without experiencing an internal sense of belonging (S. Hurtado et al., 2015). This difference is particularly key for students whose backgrounds and characteristics may result in feelings of marginalization despite significant time spent participating in academic and social integration activities.

Engagement

While engagement and involvement have at times been used interchangeably, there are key distinctions between the terms (Strayhorn, 2018; Wolf-Wendel et al., 2009). While involvement focuses only on the student, engagement includes two distinct components—the energy and time that students put towards educational and extracurricular activities on campus and also the efforts of the institution to cultivate the conditions that encourage students to become involved (Kezar & Kinzie, 2006; Schroeder & Kuh, 2003). Both of these factors come together to serve as a mechanism that subsequently leads to student learning and determines how much students gain from their college experience (Kuh et al., 2001). Wolf-Wendel et al. (2009) contend that

"engagement differs from involvement in that it links more directly to the desired educational processes and outcomes and emphasizes action that the institution can take to increase student engagement" (p. 414).

Institutions can focus on enhancing engagement as a way to increase students' sense of belonging (Strayhorn, 2018). Additionally, sense of belonging can be a mechanism to influence engagement. Strayhorn elaborates, "Sense of belonging engenders other positive outcomes. Satisfying the need to belong leads to a plethora of positive and/or prosocial outcomes such as achievement, engagement, wellbeing, happiness, and optimal functioning in a particular context or domain, to name a few" (2018, p. 39).

Factors that Influence Sense of Belonging

Because of the importance of sense of belonging, it is necessary to elucidate the antecedents to developing a sense of belonging. Research, predominantly conducted in the four-year setting, has identified a number of different factors that are associated with students' sense of belonging. Influences on sense of belonging can include being a member of some groups of historically disadvantaged students, students' support systems, college climate, interactions with peers, experiences in the classroom, support services on campus, and students' involvement. Studies point to specifics within these categories that can both positively and negatively impact belonging both for students as a whole and for subgroups of students.

Student Pre-Entry Characteristics

As previously reviewed, students' identity characteristics such as race and socioeconomic background can impact their sense of belonging (Berger, 1997; Ribera et al., 2017; Soria & Stebleton, 2013). White students tend to have a higher sense of belonging than students of color (Johnson et al., 2007). However, increasing sense of belonging may be particularly impactful for minority students (Maramba & Museus, 2013; Strayhorn, 2018). In some studies, gender predicts sense of belonging with males reporting lower levels of belonging than females (Gopalan & Brady, 2020; Kuh et al., 2008; Soria & Stebleton, 2013). However, other research has found no significant associations between gender and belonging (Hausmann et al., 2007). Research has also begun to explore how students with other minoritized identities including students with disabilities and LGBTQ students may develop a sense of belonging in post-secondary education (Parker, 2021; Scholma, 2021; Vaccaro et al., 2015; Vaccaro & Newman, 2016, 2017). Students from these groups may identify different factors as impacting their experience of belonging than students not possessing minoritized identities.

Socioeconomic status may also be reflected in students' sense of belonging. Having the ability to afford one's college expenses has been shown to be associated with a higher sense of belonging (Maestas et al., 2007). Similarly, working-class students tend to have a lower sense of belonging compared to middle and upper-class students (Ostrove & Long, 2007; Soria & Stebleton, 2013).

Studies have also identified that high school academic performance, SAT or ACT, scores, and other pre-college characteristics can influence students' engagement and

persistence in college (Kuh et al., 2008; Nora, 2003; Porchea et al., 2010). Research is still unfolding to examine whether pre-college factors have a similar impact on sense of belonging in college. However, a recent study found that having a higher high school GPA was associated with having a higher sense of belonging in college (Singh, 2018). Parental college experience also impacts sense of belonging with first-generation students tending to have a lower sense of belonging than their peers (Miller et al., 2019; Ribera et al., 2017). A significant gap in time between high school and college can also impact belonging. Older nontraditional students often struggle to feel connected and develop a sense of belonging at their institution (Goncalves & Trunk, 2014; Meuleman et al., 2015).

Institutional Characteristics and Climate

Studies also point to the importance of college climate in influencing sense of belonging, both for students as a whole and for specific identity groups. Perceiving the environment as caring or supportive positively influences belonging (Cooner, 2019; O'Keeffe, 2013). Culturally engaging and diverse campus environments promote sense of belonging for all students (Maestas et al., 2007; Museus et al., 2017). In contrast, perceptions of racial tension on campus lead to reductions in sense of belonging (Locks et al., 2008).

Other research has looked specifically at how climate can influence belonging for subgroups of students. For students of color, diverse peer interactions and perceiving the institution as committed to diversity can both shield against potential negative impacts of discrimination and bias on feelings of belonging (Hussain & Jones, 2021). Museus and Chang (2021) found that perceptions of the environment as validating, as providing

opportunities to give back to the community, and as giving opportunities for students to connect with peers with whom they share common ground are all associated with a sense of belonging for first-generation students. For lesbian, gay, bisexual, pansexual, and queer (LGBPQ) students, both messaging and support regarding gender identity and sexual orientation on campus as well as the opportunity to have meaningful social interactions influence belonging (Vaccaro & Newman, 2017). Nuñez (2009) established that positive diversity experiences can support a sense of belonging for Latino/a students. Moreover, for Filipino American students, the racial climate on campus, cross-cultural interactions, as well as perceptions of ethnic group cohesion can all impact feelings of belonging (Maramba & Museus, 2013). Men of color have reported that while a welcoming environment facilitates belonging in the community college setting, it is not sufficient (Turner & Zepeda, 2021). Instead, these students also point to the importance of cultural representation and cultural celebration as important to the campus climate.

While institutional climate has been demonstrated to impact students' sense of belonging, other institutional characteristics can also have an impact. Less research in the United States has examined whether the location of an institution can be a factor in belonging; however, a recent study in the United Kingdom found differences in belonging based on the degree of urbanization of the institution (Ahn & Davis, 2022). Additionally, the ethnic diversity of a student body on a college campus can also impact the experience of belonging (Maestas et al., 2007; Strayhorn, 2009, 2018). An extensive body of research has demonstrated that attending a predominately White institution can

be an isolating and marginalizing experience for many students of color (Allen, 1992;

Bennett & Okinaka, 1990; Jones et al., 2002; Lopez, 2005; Nora & Cabrera, 1996).

External Environment

Belonging is also impacted by student's off-campus commitments and

environment. Living off campus is associated with having more competing demands that

tend to "pull" a student's focus away from school (Bean & Metzner, 1985; Christie &

Dinham, 1991). For commuter students, "going to college is more frequently seen as

obtaining a credential for achieving a different socioeconomic condition rather than

learning for the sake of learning" (Smith, 1989, p. 49). The limited research that exists on

sense of belonging for non-residential students suggests that commuter students often

report that they feel like outsiders and do not have a sense of belonging on campus

(Alcozer Garcia et al., 2020; Bloomquist, 2014; Holloway-Friesen, 2018; Moore, 2020).

Distance from campus may also impact belonging. Commuter students who lived within

walking distance from campus spent more time engaged in discussions with faculty than

those who lived farther away and tended to have a greater sense of belonging (Demcho,

2011; Dumford et al., 2019; Woodley, 2017).

Student employment may also impact belonging. Employment on campus is

positively associated with feelings of belonging, persistence, and academic success

(McCormick et al., 2010; Pike et al., 2008). While the relationship between off-campus

employment and sense of belonging needs to be further investigated, working off-

campus, particularly working more than 16-20 hours per week, can be detrimental to

engagement and academic achievement (Burlison, 2015; Kulm & Cramer, 2006; Perna, 2010; Pike et al., 2008).

Limited research exists on how enrollment intensity may influence students' sense of belonging. However, attending part-time instead of full-time is associated with lower levels of engagement and persistence (Kuh et al., 2008; National Student Clearinghouse Research Center, 2022b). Part-time students also have challenges with engagement and developing a sense of belonging because of their multiple life roles and limited time in the classroom. Kember and Leung (2004) found that part-time students who were willing to make personal sacrifices and added strategies such as developing study routines and negotiating time with their families for studying were able to develop a stronger sense of belonging than those who did not utilize such coping mechanisms. Additionally, students' perceptions of the level of support they receive from their families and communities can have an impact on feelings of institutional belonging. Feeling that one has support from family and friends is associated with a higher sense of belonging (Cooner, 2019). Likewise, for Latino/a students and part-time students, having a strong support system helps to foster a sense of belonging on campus (Kember & Leung, 2004; Passano, 2021).

Student Services and Institutional Involvement

Student services outside of the classroom may play an important role in sense of belonging, particularly for students historically marginalized in higher education. Using student support services can increase sense of belonging for black male college students (Wood & Harris, 2015). For international students, the use of academic advising appears

to play a key role in developing feelings of belonging on campus (Lau et al., 2019). For low-income, first-generation, first-year college students, Means and Pyne (2017) found that first-generation and low-income students named student centers based on student identities and learning centers as key locations that contributed to feelings of belonging.

Students can also take actions in college that influence their sense of belonging. Getting involved on campus is consistently identified as a positive contributor (Nuñez, 2009; Vaccaro & Newman, 2016). Both academic and social integration actions can increase sense of belonging (Maestas et al., 2007). Academic integration includes actions such as studying, getting help when needed, or talking with peers about class-related topics. Social integration could include joining a student organization or sports team as well as participating in other co-curricular activities. These processes may differ for students who are not attending a four-year school or living on campus. Differentiating social and academic integration may not be meaningful for community college students as the two areas are more closely interconnected in this setting (Deil-Amen, 2011; García & Garza, 2016; Garza et al., 2021). Because students often spend little time on campus outside of class, there may not be a clear separation between social and academic time and the idea of socio-academic integration may better capture how these factors together contribute to sense of belonging.

Peer and Faculty Interactions and School Satisfaction

As well as the general climate, the interactions and relationships that students have with peers are an important component of belonging (Vaccaro & Newman, 2016). Having supportive peer relationships positively contributes to sense of belonging for all

students (Hoffman et al., 2002; Tovar & Simon, 2010). Feeling socially accepted also predicted students' feelings of institutional belonging (Freeman et al., 2007). Positive contact with diverse peers on campus also has been found to positively influence feelings of belonging at an institution (Cooner, 2019; Locks et al., 2008). Wood and Harris (2015) also found that for black male community college students, having discussions with students who had differing beliefs or who were of other races positively influenced belonging.

Experiences in the classroom and with faculty have also been shown to influence belonging on campus. Perceiving one's instructors as caring is associated with feelings of institutional belonging (Freeman et al., 2007; Tovar & Simon, 2010). Feeling valued by faculty, having frequent interactions with faculty, and having strong relationships with faculty all positively influence sense of belonging (Cooner, 2019; Hoffman et al., 2002). Experiences of validation by faculty or staff have direct positive influences on students' sense of belonging and can also help to protect against negative impacts from experiences of discrimination and bias (S. Hurtado et al., 2015). Students feeling comfortable in the classroom and perceiving the space as supportive positively impacts belonging (Tovar & Simon, 2010; Zumbrunn et al., 2014). The use of established effective teaching practices in the classroom also increases feelings of belonging (Miller et al., 2019). First-generation students also name supportive relationships with faculty as key (Means & Pyne, 2017). For black male students, student-faculty interactions appear to be particularly key (Dancy & Brown, 2008). A positive classroom environment, faculty-student engagement, and being validated by faculty members are all significant

contributors to sense of belonging (Brooms, 2020; Newman et al., 2015; Wood & Harris, 2015).

Student Self-Perceptions

Students' internal perceptions of their academic beliefs as well as their motivation are associated with their sense of belonging. Within a course, feelings of belonging are associated with students' motivation, engagement, and academic achievement (Pedler et al., 2022; Zumbrunn et al., 2014). Studies have found associations between an individual's academic self-efficacy, a student's beliefs about their academic abilities and confidence, and feelings of belonging (Freeman et al., 2007; Sotardi, 2022). Having a higher sense of belonging is associated with an increased enjoyment of coursework (Pedler et al., 2022). Additionally, students who have higher intrinsic motivation and report they find inherent value in their course's content are more likely to have higher feelings of belonging. Moreover, having clear academic goals for oneself is also associated with having a greater sense of belonging (Fong et al., 2019; Kim et al., 2021).

Outcomes Connected to Sense of Belonging

Sense of belonging relates to a number of positive academic outcomes. An increase in sense of belonging is associated with increases in student engagement and in coursework mastery (Pittman & Richmond, 2007; Soria & Stebleton, 2013). Correlations have also been found between students' sense of belonging and college GPA (Hamann, 2022; Khalandi, 2021). Research within the high school setting has also suggested that increasing sense of belonging is associated with a subsequent increase in GPA (O'Connor, 2017). Institutional belonging at the college level is also associated with

students' general academic motivation and with their overall college satisfaction (Cooner, 2019; Freeman et al., 2007). Moreover, belonging predicts students' plans to remain at the institution (Green, 2020; Hausmann et al., 2007, 2009). Modeling has also shown that sense of belonging indirectly impacts persistence and declines in students' feelings of belonging over time are associated with college departure (Hausmann et al., 2007, 2009; Miller et al., 2019). Research has also found that utilizing a measure of sense of belonging in addition to students' current academic performance better predicts retention than academic measures alone (Davis et al., 2019). While research on longitudinal outcomes in higher education is still ongoing, a meta-analysis of studies in middle and high schools found positive correlations with sense of belonging and academic engagement, positive self-efficacy and self-concept, as well as academic motivation and achievement (Korpershoek et al., 2020). The study found that of belonging had a negative association with dropouts and absences.

Measuring Sense of Belonging

One important consideration in the study of sense of belonging is how to assess the construct of belonging. The measurement of belonging is rooted in the assessment of the constructs of involvement, engagement, and integration but is also theoretically distinct. Astin (1984) defined the concept of involvement as the amount of energy both physical and psychological that a student commits to their college experience. Activities that promoted involvement included living on campus and participating in college activities. In contrast, living or working off campus was seen as reducing engagement and, consequently, increasing dropouts. While involvement has been operationalized

differently depending on the researcher, the way the construct has been most frequently measured is by quantifying student time on task (Wolf-Wendel et al., 2009). Surveys ask students about the amount of time they spend doing tasks such as studying and being involved in student organizations with a differentiation in analysis between academic and extracurricular involvement.

Kuh (2009) defined engagement as signifying "constructs such as quality of effort and involvement in productive learning activities " (p. 6). Crucially, engagement is defined as encompassing not only the time and effort expended by students but also the efforts of institutions to provide opportunities for students to participate and be involved (Wolf-Wendel et al., 2009). Instruments such as the National Survey of Student Engagement (NSSE) and the Community College Survey of Student Engagement (CCSSE) examine student self-reported behaviors and perceptions in categories of questions including academic challenge, learning with peers, faculty experiences, and the environment on campus to represent and assess engagement across multiple dimensions.

Tinto's (1993) work on integration theorized that joining the culture of an institution and adopting the beliefs and norms of those at the institution. While feeling a part of the culture is similar to belonging, integration differs in both defining the behaviors and attitudes of the student that are needed and in prescribing a separation from the student's culture of origin. A scale developed by Pascarella and Terenzini (1980) that measures student perceptions and involvement has been commonly used to assess integration and measures five areas related to integration including interactions with peers, connections with faculty, the concern of faculty for student development,

commitment to the institution and goals, and intellectual development. While some research operationalized grades as a stand-in for integration, this method has been criticized and the five-pronged scale has been primarily favored (Wolf-Wendel et al., 2009).

Sense of belonging moves away from including behavioral indicators, assessments of others, a valuation of student goals, or adoption of institutional culture and instead focuses solely on students' internal perceptions. This concept is primarily operationalized utilizing two different approaches (Wood & Harris, 2015). Some researchers have utilized a three-part appraisal that assesses students' feelings of belonging with peers, instructors, and administrators at an institution and combines those to assess belonging (e.g. Schuetz, 2008). Hoffman et al. (2002) focused solely on peer and faculty measures and omitted institutional belonging completely. Other research has conceptualized sense of belonging assessments with a framework capturing students' perceptions of belonging to an institution. This approach fits with Tierney's (2000; 1999) contention that the culture of the institution and a student's experience with that institution are crucial factors as to whether that student succeeds. In this vein, Maestas et al. (2007) utilized a framework in which student background, academic integration, social integration, and perceptions of and experiences with diversity all influence students' institutional sense of belonging. Likewise, research by Ostrove and Long (2007) conceptualized sense of belonging to an institution as a mediating factor between students' backgrounds and academic outcomes. Freeman et al. (2007) examined both classroom belonging and institutional belonging and did not find support in their research

for directly connecting the two concepts, yielding further support for the idea of independently assessing institutional belonging.

Community College Setting

Early universities in the United States were designed to support the "gentleman scholar" and were open to White males mainly from wealthy Protestant families (Thelin & Gasman, 2016). Student bodies have gradually diversified since that early inception to allow women, people of color, and a somewhat greater swath of social classes to be admitted. Furthering this diversification, in the early 20th century, junior colleges were created particularly to serve a working-class population that had previously not had access to a college education (Thelin & Gasman, 2016). Junior colleges, now more frequently known as community colleges or two-year institutions, were envisioned to serve both as a pathway to a university education and to provide vocational training. Initially, community colleges served primarily white, male students and mainly focused on transfer students (Bragg, 2001). However, since that time, both the populations attending community colleges and the mission of the institutions themselves have shifted. Community college enrollment grew significantly in the 1960s, expanding at a faster pace than any other segment of higher education (Drury, 2003).

Community Colleges Today

There are over 1000 community colleges in the United States that collectively serve a significant proportion of college students in the United States (American Association of Community Colleges, 2022). According to the National Center for Education Statistics (2021), in the 2020-21 school year, over seven million students,

approximately one-third of the total number of undergraduate students, were enrolled in public two-year colleges. However, IPEDS data can incorrectly categorize community colleges because the estimates exclude community colleges that offer even a single bachelor's degree (Fink & Jenkins, 2020). Because of this discrepancy and the increasing number of community colleges offering bachelor's degrees, the actual percentage of undergraduate students enrolled in a community college may be closer to 44%.

Community colleges are typically open access, meaning they have few if any requirements to enroll (Dowd, 2007). Community colleges have expanded their missions since their inception to provide a broad number of services including vocational programs, transfer credits and degrees for students who intend to continue at four-year institutions, developmental education, classes for English language learners, and non-credit classes. Tuition is also on average significantly lower than at four-year institutions. In 2020-2021, the average cost of tuition and fees for a public two-year institution was under $4,000, while the average for a public four-year institution was nearly $10,000 and the average for private non-profit four-year institutions was over $37,000 (National Center for Education Statistics., 2022).

Many students who attend community colleges might not otherwise be able to access higher education due to factors such as the cost of tuition or the entrance requirements of four-year schools (Cohen et al., 2014). As Klein summarizes, "Quite frankly, for many students the choice was simple — community college or nothing" (2013, p. 19). Dowd (2007) argues that community colleges serve both as gateways and gatekeepers. The institutions provide higher education access to students who are

traditionally underrepresented in higher education and, simultaneously, their existence reduces the pressure on four-year institutions to expand access because the students they are excluding have another option.

Challenges of the Community College Design and Approach

While community colleges vary widely and their organization and approach to education cannot be characterized as a monolith, critics have identified ways in which many community colleges are not structured to promote student success. Bailey et al. (2015) argued that the schools are set up in a self-service cafeteria-style approach in which students are left to their own devices to choose from a wide range of programs, courses, and supports that have little clear connection to each other. The lack of cohesiveness results in students having difficulty navigating systems and making poor decisions that can result in wasted time, money, and, in many cases, dropping out. Additionally, colleges may offer little consistency from term to term, with unpredictable class schedules and courses that do not have clear linkages to each other. On the side of student services, advising and career planning are often optional and can be difficult to access even for students who proactively seek them out. Additionally, upon entry, students are frequently assessed using standardized tests and may be placed into developmental coursework focused primarily on English composition and mathematics which often do not provide credit towards the degree a student is seeking and may not feel relevant to the purpose why the student themself chose to attend college. Many schools also do not proactively monitor student progress or performance or step in to provide support when students are struggling.

The problems identified are not necessarily due to a specific failing on the part of community college faculty, staff, or administrators. The original design of the community college was to promote access and increase enrollments, not necessarily to support students to completion (Bailey et al., 2015). Since that time, community colleges have continued to attempt to provide an ever-expanding array of services to a wider range of students with funding that does not keep up with enrollment increases (Hagedorn, 2010). Instructors at community colleges are also, on average, paid significantly less than those at four-year colleges and universities while having a heavier instructional load (The Chronicle of Higher Education, 2011; Zeidenberg, 2008). Many community colleges have experienced continual financial challenges resulting in years of cost-cutting measures further trimming what are deemed to be non-essential services. These institutions are often also subject to the whim of legislators and the financial status of state budgets without the padding of significant reserves or endowments.

Community College Students

The demographics of students who attend community colleges differ from overall college enrollment. In 2020, public four-year institutions in the United States on average had 54% White students, 21% Hispanic students, and 11% Black students while public two-year institutions had 48% White students, 28% Hispanic students, and 12% Black students (National Center for Education Statistics, 2022). Public two-year institutions serve a higher percentage of students in poverty than public four-year institutions (Fry & Cilluffo, 2019). Moreover, first-generation students are more likely to attend a community college than their peers with college-educated parents (Cataldi et al., 2018)

and community colleges tend to attract high numbers of English-language learners and international students (Bergey et al., 2018).

Community college students tend to be older than students attending four-year schools with an average age of 27 but a median age of 23 (American Association of Community Colleges, 2022). Students within a classroom can often represent two or more generations with, on average, 56% of students being under age 22, 36% between age 22 and 39, and the remaining 8% being 40 or older Approximately 35% of community college students attend full-time and 65% attend part-time and 44% percent of students receive Federal grants. Additionally, 62% of full-time students and 72% of part-time students say they are employed at the same time they are attending school. Moreover, 29% of community college students report being first-generation college students, 15% report being single parents, and 20% report having a disability.

Community College Experience

In addition to differing in terms of factors such as age and demographics, community college students' experiences while in school may not resemble those of students attending four-year schools and residing on campus. Students remain a part of their home communities while simultaneously attempting to integrate into their undergraduate experience. This duality can present unique restrictions on students' time and attention while they are in school. In *The American Community College,* Cohen et. al (2014) elaborate,

> Unlike full-time students at residential, four-year universities, whose lives may
> revolve around classes, peers, and social events, community college students

often struggle to fit required courses, tutoring, and other educational activities into

schedules constrained by part- or full-time jobs, family commitments, child-

rearing responsibilities, long commutes, or other obligations. (p. 53)

Because of these differing experiences and challenges as well as the unique

demographics of community college students, theories and models that have been applied

to student success and retention in four-year settings may not be completely transferrable

to the community college setting (Deil-Amen, 2011; Jacoby & Garland, 2004).

Sense of Belonging in the Community College Setting

Sense of belonging may partially explain differential outcomes in the community

college and four-year college settings. Some studies have found that students at four-year

colleges report a higher sense of belonging than at two-year institutions (Gopalan &

Brady, 2020). Part of the disparity in sense of belonging may be because almost all

community college students commute to college instead of living on campus. Commuter

students often have multiple life roles and may be less able to get involved on campus.

Students who live on campus demonstrate more indicators of engagement, particularly

engagement outside of the classroom, than those who commute (Kuh et al., 2001).

Previous research has also indicated that commuter institutions tend to have less engaged

student bodies with lower persistence rates (Pike & Kuh, 2005). Commuter students are

also less likely to engage with faculty members, socialize with peers, and participate in

co-curricular activities—all metrics that are associated with sense of belonging (Christie

& Dinham, 1991; S. Hurtado & Carter, 1997; Nuñez, 2009). Additionally, increasing

sense of belonging for students who commute may be more challenging than for students

who live on campus, and models for how to increase student involvement are often not applicable to the commuter student population (Braxton et al., 2014; Jacoby & Garland, 2004; Museus et al., 2017).

In addition to students not living on campus, higher feelings of marginalization may be a factor that impacts students' sense of belonging in community colleges. Community college students often have characteristics and backgrounds, such as being a student of color or a first-generation student, that can result in them feeling minoritized and marginalized on campus. Because feeling marginalized is the reverse experience to that of mattering and mattering is a key component of sense of belonging, community college students may be susceptible to having a lower sense of belonging (Schlossberg, 1989; Strayhorn, 2018). Moreover, because gaining a sense of belonging becomes even more crucial when one experiences being marginalized, community colleges may need to be particularly attuned to belonging for historically excluded and marginalized groups (Booker, 2016; García et al., 2019; García & Garza, 2016; Garza et al., 2021; Maestas et al., 2007).

Research on sense of belonging has mainly focused on students attending four-year institutions (Carales & Hooker, 2019). Some practitioners have recently advanced recommendations for practices to increase students' sense of belonging in community colleges based on findings made at the university level. However, four-year institution findings may not be applicable as the student bodies and experience are not equivalent (Braxton et al., 1997, 2004; Jacoby & Garland, 2004). Many of the interventions recommended to increase sense of belonging require a significant amount of student time

and engagement and may not be effective for students who have substantial nonacademic responsibilities (Soria & Stebleton, 2013). More research is needed to explore what influences sense of belonging for community college students so that institutions can identify which interventions and approaches they should implement with limited resources.

Institutional Actions to Impact Sense of Belonging

Limited research has also addressed actions that institutions can take in order to increase students' sense of belonging. Implementing high-impact practices such as creating intentional learning communities, comprehensive student support programs, and service-learning programs all have positive associations with institutional belonging (Means & Pyne, 2017; Ribera et al., 2017). Schools can also work to create structures that encourage faculty-student relationships and faculty engaging students in research (Miller et al., 2019; Tovar & Simon, 2010). Practices that increase faculty interactions are "particularly meaningful for student populations vulnerable to feelings of isolation, exclusion, and attrition…. [and] impact these populations' perceptions of institutional acceptance" (Miller et al., 2019, pp. 601–602). Peer mentoring relationships have also been identified as increasing feelings of belonging and may be effective in the community college setting (Brooms, 2020; Cooner, 2019; Sullins, 2020). Even small interventions such as letters emphasizing students' value to the school community and small gifts of college logo-branded items have been shown to protect against decreases in sense of belonging and sometimes increase sense of belonging (Hausmann et al., 2007, 2009). Baleria (2021) also found that a relational micro-intervention in which students

engaged with another student in a video chat in a semi-structured conversation may be effective in increasing belonging for community college students. Normalizing doubts about belonging for students of color has also been shown to protect against drops in sense of belonging as well as increase other positive academic outcomes (Walton & Cohen, 2007). Studies also suggest the need for professional development and DEI training for faculty and staff to better support and foster the belonging of students who may experience marginalization because of their identities, such as students of color and first-generation students (Means & Pyne, 2017; Turner & Zepeda, 2021).

Chapter Summary

Sense of belonging encompasses students' feelings of connection and being valued at an institution. This fundamental need is a prerequisite for many students' persistence and success on campus. Constructs including mattering, marginalization, involvement, integration, and engagement are related to sense of belonging but conceptually distinct. Factors including student identity and high school experiences, institutional characteristics, external factors, involvement on campus, interactions with peers and faculty, and self-perceptions may also influence feelings of belonging. Additionally, research suggests that increases in sense of belonging are connected to increases in motivation, persistence, and academic success.

Community colleges have increased in number and diversified in focus over time, serving around 44% of undergraduate students. The student bodies of these institutions differ from four-year schools in terms of racial and ethnic composition, average age, socioeconomic status, and attendance patterns. Additionally, the experience of attending

a community college is not equivalent. Retention and completion in community colleges are lower than at four-year institutions and have not improved over time. Sense of belonging appears to be an important factor in increasing completion outcomes; however, little research exists on what influences sense of belonging in the community college. Some studies suggest that colleges may be able to implement changes and interventions that can influence students' sense of belonging. Systematic research is needed to develop recommendations to support student success and completion and to determine how a student's characteristics may impact those recommendations. Therefore, this study will investigate both the individual and institutional factors that may influence institutional sense of belonging for community college students.

CHAPTER 3: METHODOLOGY

Students are more likely to remain at a college if they feel like they belong at the institution (Strayhorn, 2018). Research suggests that sense of belonging at an institution may be instrumental in increasing retention in the community college setting (Carales & Hooker, 2019). However, most research on sense of belonging has been conducted in four-year colleges and universities, whose settings are not equivalent to that of community colleges. Additionally, the majority of research on sense of belonging in both two- and four-year schools has been conducted on a smaller scale within a single institution and on subgroups of students instead of on student populations as a whole. The purpose of this study is to explore and elucidate the factors that contribute to sense of belonging for community college students as well as to explore longitudinally how sense of belonging may impact students' outcomes and self-perceptions. This chapter will address the research questions that guided the study's research and describe the design and rationale for the research. Additionally, this chapter describes the data source and sample used for the study as well as the study design, variables utilized, and data analysis methods.

Research Questions

The primary research questions that guided this study were:

1. What factors are associated with institutional sense of belonging for community college students?

    a. To what extent do students' pre-entry characteristics impact their sense of belonging?

b. To what extent does students' high school performance impact their sense of belonging?

c. To what extent do the characteristics of an institution impact students' sense of belonging?

d. To what extent do students' external environmental factors impact their sense of belonging?

e. To what extent does students' institutional involvement impact their sense of belonging?

f. To what extent do students' social and psychological perceptions of faculty and peers impact their sense of belonging?

g. To what extent do students' self-perceptions impact their sense of belonging?

2. To what extent does students' institutional sense of belonging influence their retention and completion outcomes including students' enrollment intensity, grade point average, year-to-year retention, vertical transfer to four-year institutions, and credential completion?

Within these primary questions, the research also investigated the following secondary research questions:

1. To what extent do students' demographic characteristics impact the factors that contribute to student sense of belonging? These demographic factors included race and ethnicity, gender, first-generation student status, and whether students were born in the United States.

2. To what extent do students' demographic characteristics impact the

    relationship between sense of belonging and student outcomes? These

    demographic factors included race and ethnicity, gender, first-generation

    student status, and whether students were born in the United States.

Data Source and Sample

The Beginning Postsecondary Students Longitudinal Study (BPS) administered

by the National Center for Education Statistics (NCES) was chosen for this research. The

BPS dataset was developed to provide nationally representative data on issues related to

postsecondary education and provides information on students' precollege characteristics,

enrollment, financial aid, employment, perceptions of their academic experiences, and

academic outcomes (Bryan et al., 2019). The data file documentation states, "The

primary purpose of the BPS study is to contribute to a better understanding of how these

factors relate to three key postsecondary outcomes: persistence, degree attainment, and

employment (Bryan et al., 2019, p. 27)." BPS is administered in eight-year intervals to

selected cohorts of students from the annual National Postsecondary Aid Study (NPSAS).

BPS follows students longitudinally from the first year of their undergraduate education

through the following six years. Interviews are administered via web or telephone at the

end of the first, third, and sixth years following the commencement of the study.

Interview data is combined with data from other sources including financial aid

information and academic transcript data. Participants are selected with intentional

sampling to represent the population of all students who are beginning their

postsecondary education and the sample includes students who did not enter college directly after high school.

This study utilized the most recently available cohort of BPS that followed students from 2011 to 2018 (BPS 12/17). The BPS 12/17 cohort was drawn from students who initially participated in the 2012 NPSAS administration (NPSAS:12). Institutions were eligible to be included in NPSAS:12 if they are located in the United States, eligible to administer federal aid under Title IV of the Higher Education Act (20 U.S.C. §§ 1070-1099), and provide at least one postsecondary program of study with a minimum length of three months or 300 calendar hours (Wine et al., 2013). Institutions are excluded if they provide only in-house training for their own employees, are a U.S. service academy institution, or offer only remedial, recreational, or avocational programming. The target population was comprised of all students in eligible institutions who were enrolled either in an academic program, remedial coursework eligible for Title IV aid, a vocational program with a minimum of 3 months or 300 instructional hours, or who were taking at least one credit course that was applicable towards an academic degree. A sample of 95,000 students from 1,690 institutions across the United States was identified from the population of eligible students for NPSAS:12. This sample is considered to be representative of the approximately 23 million students enrolled as undergraduates during the 2011-12 academic year. To identify the BPS 12/17 sample, the NPSAS:12 cohort was filtered to include only those students identified as first-time in college beginning postsecondary education (Chen et al., 2019). The 37,000 respondents meeting this condition comprised the BPS 12/17 sample.

The BPS Longitudinal Study was chosen for this research because of the strengths of the sample and study design. First, the study design is longitudinal and allows for an examination of the influence of factors over time on student perceptions and outcomes. The dataset is remarkable in being a matched dataset that follows the same group of students over time. Second, the study includes a large percentage of community college students and does not exclude students who are beginning their postsecondary education after a lapse in time since completing their high school diploma or equivalent credential. Because community colleges serve a significant proportion of older students, a sample that only examines traditionally aged students would not be appropriate. Third, the large sample size and nationally representative data allow for large-scale analysis that is generalizable to students and institutions across the United States. Finally, study data includes a diverse range of items. Survey questions include items regarding student perceptions of their experience in college including social and academic integration, pre-college factors, and information relating to students' lives outside of their postsecondary education. BPS 12/17 links survey data with student financial aid and transcript records to allow for analyses that include multiple types of data.

BPS Data Collection and Methodology

Participants in the BPS 12/17 study had two options to respond to surveys (Hill et al., 2016; Wine et al., 2013). Participants could either complete an online form using a computer or mobile device or they could complete the survey on the phone with a trained interviewer. The questions and format of the survey were identical in either modality. The survey took an average of 26.9 minutes to complete online and 33.6 minutes to

complete on the telephone. Responses were limited to fixed options and did not allow for

an open-ended response format. Students who did not immediately complete a survey on

the Internet received outreach from an interviewer with the option to either complete the

interview questions online or with the interviewer. Approximately 69% of eligible

respondents completed the survey in 2012 and 67% responded in 2014. In 2012, 44.1%

of students submitted the survey online without being contacted, 38.1% responded online

after being contacted by an interviewer, and the remaining 17.8% completed the survey

over the phone. In 2014, 47.5% of respondents completed the study online without being

contacted, 31.7% completed it online after being contacted, and the remaining 21.2% of

surveys were completed with an interviewer by telephone. Survey data was combined

with other institutional data and matched to data from the National Postsecondary Student

Aid Study (NPSAS) and BPS 12/17 as well as from databases including the National

Student Clearinghouse, the National Student Loan Data System, FAFSA applications, the

Central Processing System, and SAT and ACT data.

The BPS Longitudinal Student 12/17 data collection and methodology were

rigorously evaluated both in 2016 before the administration of the final set of interviews

and in 2019 after the study was completed (Bryan et al., 2019; Hill et al., 2016). The

evaluations included sample and interview design, data collection procedures, coding of

interviews, how data was processed and prepared, and procedures for weighting and

estimating variance. Reports also included information on quality control procedures

utilized during interview data collection including monitoring of recorded interviews and

collaboration between staff to ensure consistency in interview procedures. Additionally,

procedures utilized were in line with those employed for previous cohorts of the Beginning Postsecondary Study and other NCES research.

BPS Dataset Access

While limited access to data analysis is available online for public use, the statistical analyses required for this research were not available in that online format. In order to access the full dataset, the researcher's dissertation chair and this researcher submitted an initial application to the Institute for Education Sciences (IES) that included an expected timeline, research question, and methodology. Subsequently, prior to receiving access to the data, a license application and data security plan as well as affidavits and training certificates for all individuals accessing the data were submitted to IES.

Population and Sample

The final sample for the BPS 12/17 cohort included 35,540 participants with 22,530 of those participants completing study surveys and being classified as respondents (Bryan et al., 2019). The target population for this research was students who participated in the BPS 12/17 cohort whose first institution attended in 2011- 2012 was a public two-year college. Students meeting these criteria in the BPS dataset included 10,930 students classified as first attending a 2-year public institution, with 6,700 of those students completing study surveys and being classified as respondents. Those 6,700 respondents comprised the data set for the study.

Study Design

For this study, two separate sets of analyses were performed to address the two primary research questions. For the first research question which explores what factors are associated with institutional sense of belonging for community college students, multistage logistic regressions were performed. Categories of variables were created using factor analysis and then added to analyses in an order that aligns with their temporal occurrence. Conceptually, this design aligns with Astin's input-environment-outcome (I-E-O) model in which inputs (I) are the qualities that a student brings with them to the college environment, the environment (E) is the milieu and experiences of the student during college, and output (O) is the output of interest that is influenced by the student's college experience (Astin, 1993). The order of the analysis and theorized organization of the variables into factors is shown in Figure 1.

Figure 1

Model of the Research Design for the Theorized Organization of the Variables in the

Analysis for Research Question One

```
        ┌─────────────────────┐
        │    Pre-College      │
        │   Characteristics   │
        └─────────────────────┘
                  ▼
        ┌─────────────────────┐
        │    Institutional    │
        │   Characteristics   │
        └─────────────────────┘
                  ▼
        ┌─────────────────────┐
        │ External Environment│
        └─────────────────────┘
                  ▼
        ┌─────────────────────┐
        │    Institutional    │
        │     Involvement     │
        └─────────────────────┘
                  ▼
        ┌─────────────────────┐
        │ Social Interactions and │
        │  School Satisfaction │
        └─────────────────────┘
                  ▼
        ┌─────────────────────┐
        │  Perceptions of Self │
        └─────────────────────┘
                  ▼
        ┌─────────────────────┐
        │  Sense of Belonging  │
        └─────────────────────┘
```
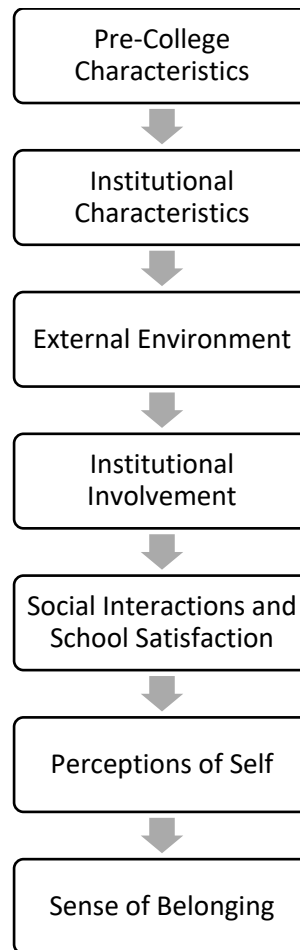
This design allowed for a determination of how the characteristics of the

individual and the institution that exist when the student enters the institution interact

with the involvement and actions that the student takes while enrolled, as well as their

perceptions of others and themselves on the outcome variable of sense of belonging.

Research question two examined the impact of sense of belonging on academic

outcomes and, specifically, asked to what extent does students' institutional sense of

belonging influence their retention and completion outcomes including students'

enrollment intensity, grade point average (GPA), year-to-year retention, vertical transfer,

and credential completion. Multiple linear regression analyses and binary logistic

regression analyses were employed to explore the relationship between the dependent

variable of sense of belonging and each of the independent variables. Figure 2 depicts the

conceptual model of these analyses.

Figure 2

Hypothesized Conceptual Model of Predictive Relationship of Sense of Belonging

Variable to Longitudinal Outcome Variables for Analysis 2
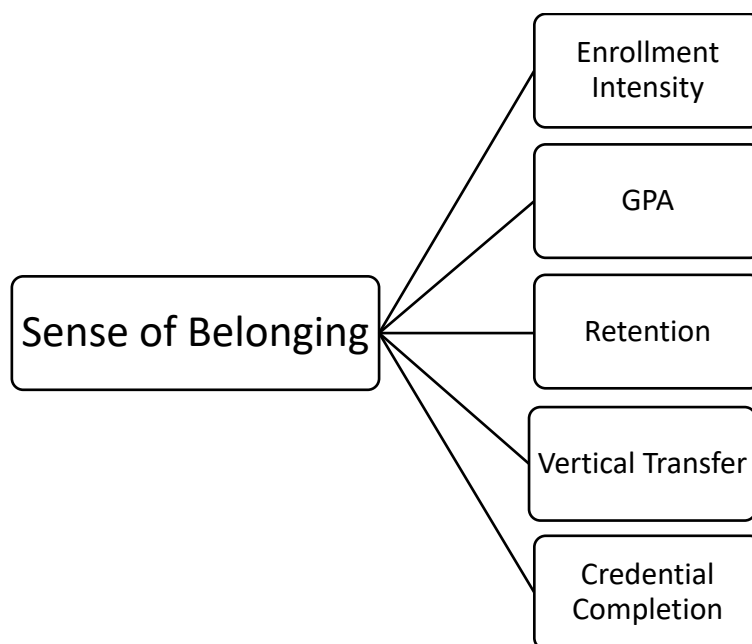
Based on Tierney's work (2000; 1999) that argued that the culture of the institution and student experience with that institution are key to whether students succeed, this study focused on institutional belonging as a measure that embodies this viewpoint. The model conceptualized for this research considered peer and faculty interactions as two factors that, along with others, contribute to overall institutional belonging. Belonging is measured in the BPS dataset by student agreement to the statement "I feel that I am a part of [SCHOOL]" on an ordinal scale from 1 = strongly disagree to 5 = strongly agree (National Center for Education Statistics, n.d.). Other research conducted with BPS data has also utilized this measure to represent the construct of belonging (e.g. Gopalan & Brady, 2020; Matesic, 2020).

Variables

For this study, variables were clustered into categories for analysis. All variables for the research come from the BPS 12/17 dataset or were derived from dataset variables. The codebook for the dataset lists variables utilized for analysis (National Center for Education Statistics, n.d.).

Demographic Characteristics

In the BPS 12/17 dataset, student demographics are reflected by a number of variables including AGE, which indicates a student's age on 12/31/2011, RACE, which indicates the student's race and ethnicity, and GENDER, which indicates student gender as a binary choice. The variable FRSTCOL indicates whether the participant was the first immediate family member to go to college. Additionally, USBORN indicates whether the student was born in the United States. For analyses, race was recoded with binary coding,

with each variable representing one demographic category with White racial identity used as the baseline group because contained the highest number of participants.

Pre-Entry Characteristics

Students' experiences in high school and pre-college preparation are encapsulated in variables including high-school GPA (HSGPA) and level of high school coursework (HCMATHHI and HSTKANY). Additionally, delayed college entry is captured by the variable ELAPSE, which represents the number of months between high school completion and entry into post-secondary education.

Factors related to students' socioeconomic status are encapsulated by the INCGRP variable, which represents the quartile of a student's income group. Students' family situations are captured in variables including SMARITAL, which indicates the student's legal marital status, DEPEND, which identifies the student's financial aid dependency status, DEPANY, which indicates whether the student had any dependents (children and other dependents), and HSIZE, that represents the size of the student's family.

Institutional Characteristics

The dataset contains variables that signify the size, locale, as well as racial and ethnic diversity of an institution in the 2011-12 academic year that were utilized in this research. LOCALE indicates the degree of urbanization of the institution and was recoded into binary variables to indicate whether a school was located in a rural area, town, suburb, or city as defined by the U.S. Census Bureau's Population Division (National Center for Education Statistics, n.d.). The variable was recoded into binary

categories for analyses. City was used as the reference category because it was the largest group. CC2010S was used to indicate the size of the institution and was recoded into binary variables to represent the categories of small, medium, large, and very large. Large was used as the reference category because that group was the largest category. PCTENRWH indicates the percentage of the student body that is White at an institution. Additionally, HBCU represents whether were designated a Historically Black College or University.

External Environment

The BPS 12/17 contains multiple variables that represent the external factors that an individual student experiences while attending an institution. Additionally, HRSWK12 indicates the average number of hours worked by a student and JOBROLE represents whether a student identified their primary role as a student or employee. Length of commute to campus is captured by DISTANCE, which represents the distance in miles from a student's home to their institution.

Institutional Involvement

Students' utilization of student services is encapsulated in dataset variables that reflect students' use of academic advising (USEACAD), academic services (USEACSP), career services (USECPP), and financial aid (USEFINAID). Each variable represents whether or not a student indicated they used the respective service in the 2011-12 academic year.

Social Interactions and School Satisfaction

Student perceptions of the quality of their engagement are reflected in dataset variables in the BPS 12/17 related to faculty and peer interactions as well as student satisfaction. The variable FACULTY reflects students' responses on an ordinal scale to the statement, "My interactions with my teachers at my first institution are more positive than negative." Students' responses on an ordinal scale to the statement, "My interactions with other students are more positive than negative" are represented by the PEERINT variable. Additionally, SOCSATIS reflects student satisfaction with their social experience and ACDSATIS represents student satisfaction with their studies.

Student Self-Perceptions

The BPS 12/17 dataset contains variables that represent student confidence and educational expectations. In the 2011-12 survey, CURCONF represents the student's confidence in their academic success, HIGHLVEX indicates the highest level of education that a student expects to complete, and CURCONF indicates the student's confidence in their academic success.

Sense of Belonging

The independent variable of student institutional sense of belonging is encapsulated in BELONG, which represents students' responses on a five-point ordinal scale whether the respondent felt like a part of the institution in 2012; and BELONG14, which represents responses to the same scale in 2014. For binary analyses, BELONG and BELONG14 were each recoded to binary variables in which students who selected the responses of strongly disagree, somewhat disagree, or neither agree nor disagree were

coded as not having feelings of belonging and students who chose the responses of somewhat agree and strongly agree were coded as having feelings of belonging.

Analysis 2 Outcome Variables

This study utilized variables related to student retention, academic performance, and outcomes from the BPS 12/17 dataset. The following variables were used to assess both retention and degree attainment over time at the first institution. STNUM3Y represents the number of stopouts a student took at their first institution through 2014. In data collection, stopouts were defined as whether a student had taken a break in enrollment for five or more consecutive months through June 2014. This variable was recoded into a binary variable representing whether a student had stopped out at least once. QTGPA1STSC indicates the respondents' GPA at the first institution they attended. PROUT1 indicates cumulative retention and attainment in 2011-12 and was recoded into a binary variable that indicated whether a student had either attained a credential or was enrolled at an institution at the end of the 2011-2012 academic year. PROUT2 indicates cumulative retention and attainment in 2012-13 and was recoded into a binary variable that indicated whether a student had either attained a credential or was enrolled at any institution at the end of the 2012-2013 academic year. Additionally, variables were utilized related to vertical transfer and persistence. TFINLV6Y indicates whether the respondent had ever transferred and to which type of institution. This variable was recoded into a binary variable to assess whether a student ever vertically transferred to a four-year school. PRLVL3Y indicates a student's post-secondary enrollment and

attainment as of June 2014 and was recoded into a binary variable to represent whether a student had completed a credential at their first institution by June 2014.

Data Analysis

This study examining the factors that influence sense of belonging and outcomes associated with sense of belonging was non-experimental and ex-post facto, examining a preexisting data set. All research was completed utilizing IBM SPSS Statistics version 28. For analyses to address all research questions, the dataset was first filtered by the FSECTOR variable, which represents the control and level of the first institution the student attended in 2011-12, to select only students whose first institution was a public two-year college. The researcher used multiple statistical methods to answer the research questions. Descriptive statistics were utilized to observe general tendencies in the data. For Analysis 1, factor analysis was performed to reveal the relationship between each of the individual items and how they relate to factors. The theorized model of the clustering of factors for research question 1 was refined based on the results of factor analysis.

After clustering individual variables into factors as appropriate, preliminary bivariate correlations were conducted to determine if there was a relationship between individual variables and factors and the dependent variable. Additionally, potential interactions were explored with bivariate correlations to determine whether interactions should be included in analyses. Significant bivariate correlations were then used as the basis for multiple logistic regression analyses. Regression analyses were performed to show the percentage of variability accounted for by the predictor factors. While the variables listed in this chapter were proposed for the analysis, preliminary analyses

ultimately determined which variables, factors, and interactions were included in the regression analyses. For the first research question, after these preliminary analyses were performed, factors were entered temporally into regression analyses, in order of occurrence, as outlined in Figure 1. Regression analyses were run twice, first employing the dependent variable of BELONG, to assess the impact of independent variables on student's initial sense of belonging in 2012, and second, utilizing the dependent variable of BELONG14, to measure the impact of the independent variables on student's sense of belonging over time.

For the second research question in Analysis 2, separate analyses were performed to assess the relationship between sense of belonging using BELONG and each of the outcome variables. After examining the relationship between belonging variables and outcome variables, interaction variables including student age, gender, race and ethnicity, first-generation status, and whether students were born in the United States were added to determine if relationships between independent variables and the dependent variable in each analysis changes based those factors.

Data Analysis Methods

The statistical analysis methods of factor analysis, multiple linear regression, binary logistic regression, and ordinal logistic regression were employed by the researcher in the proposed data analysis.

Factor Analysis

Factor analysis is used to reduce a cluster of variables into a single explanatory construct (Field, 2018). This technique also allows a determination of the similarity

between variables and to decrease the number of variables used in an analysis.
Additionally, factor analysis can reveal latent constructs that are not able to be measured
directly. For this study, factor analysis was used to determine whether multiple data
points related to constructs hypothesized to be related to sense of belonging can be
consolidated into single factors.

Multiple Linear Regression

Linear regression is appropriate to employ in order to determine the predictive
model of multiple independent variables on a dependent variable (Field, 2018). These
predictor variables are used in conjunction to increase their predictive power. Multiple
linear regression is the appropriate technique to use when assessing the impact of
multiple independent variables on a criterion measure that is continuous in nature.

Logistic Regression

Logistic regression is a form of multiple regression that can be utilized as a
predictive analytical approach when a dependent variable is categorical (Field, 2018).
Multiple independent variables are utilized simultaneously to predict which category the
outcome is likely to be. Because multiple predictor variables can be used, the likelihood
of an accurate prediction can potentially be increased. Logistic regression is utilized
when outcome variables are categorical instead of continuous such as whether a student
transferred or whether a credential was completed. Binary logistic regression is a form of
logistic regression used with the dependent variable has exactly two categories.

Ordinal Logistic Regression

Ordinal logistic regression is a form of logistic regression that can be employed when the dependent variable is a scaled ordinal outcome (Hosmer et al., 2013). Like other forms of regression, multiple independent variables can be utilized simultaneously to create a more accurate prediction model. This technique accounts for the ordinal nature of the data and produces estimated odds ratios that are applicable to the data type.

Study Approval Process

The Portland State University (PSU) Institutional Review Board determined that this research was exempt from Human Research Protection Program (HRPP) review because the research was an analysis of preexisting data and therefore did not meet the federal criterion for human subjects research.

Researcher Positionality

When beginning any research, it is important to consider the experience, background, and potential biases of the researcher. The bulk of my career has been in education. As a staff member, adjunct instructor, and administrator in community colleges, I have worked primarily with students and programs that serve low-income and first-generation students as well as students of color and first- and second-generation immigrant students. Particularly, my experience working in a wraparound support program serving students from these populations influenced my belief in the importance of belonging and community in student retention and success.

Personally, I attended a small liberal arts school for my undergraduate degree. I did not attend a community college and my position as an outsider in that regard may also

influence my perspective. Additionally, my grandfather's experience as a high school dropout who found academic success at a community college has contributed to my beliefs regarding the value of community colleges and the importance of higher education.

Research Limitations

The research had a number of limitations that merit consideration. First, the data for this research was from a preexisting data set and the analyses were constrained by the variables available. There may be other factors that influence sense of belonging that are not reflected in the dataset. For example, while the BPS 12/17 has information on students' utilization of student services, it does not contain information on students' utilization of instructor office hours. Similarly, the dataset does not have specific information on students' extracurricular involvement. Additionally, the construct of institutional sense of belonging is represented by a single survey response question in the dataset. A multi-item scale might be preferable in terms of predictive validity if it were available.

In addition to variable limitations, the research was also limited by the age of the data. While the research was conducted utilizing the most recent BPS dataset, students participating in the BPS 12/17 study began their postsecondary education in the 2011-12 academic year, over a decade before the current academic year. Since that time, the COVID-19 pandemic had a profound influence on students and on the modalities of courses and services offered by community colleges. This study cannot assess whether findings would be different in the post-pandemic period. The research was also

constrained by the population sampled in the BPS 12/17 dataset. Students were only eligible to participate if they were beginning post-secondary coursework for the first time. Therefore, the research scope was limited to that population and does not reflect the experience of students who have previously attended college.

In addition to the limitations of the specific BPS 12/17 dataset, this study was limited analytically. The research conducted was non-experimental and observational in nature and therefore can only make descriptive and correlational conclusions (Creswell & Creswell, 2018). Causality cannot be inferred from the results. Additionally, because a quantitative design was employed, the research was limited in exploring the meaning and experience of the study participants. Future qualitative studies could further illuminate community college students' perspectives on what factors influence their sense of belonging and how belonging might influence their academic outcomes.

Chapter Summary

Community college student retention and completion outcomes have remained resistant to improvement, despite significant research and attempts at institutional interventions. A body of research primarily conducted in four-year colleges and universities indicates that sense of belonging appears to be a key influence on students' retention and completion. However, questions remain as to what influences sense of belonging in the community college setting and how that sense of belonging can impact student success. The research sought to identify what factors are fundamental and provide guidance to institutions on how to better create the conditions for students to feel like they belong and are part of a community.

Chapter 3 has provided an overview of the research questions for this study. An overview of the Beginning Postsecondary Students Longitudinal Study (BPS) dataset utilized for the research was provided. Additionally, the BPS methodology, quality control procedures, population, and sample were reviewed. The study's design, variables used for the analyses, and the data analysis process and methods were also summarized. Finally, the researcher's positionality and limitations of the research were reported.

CHAPTER 4: RESULTS

The purpose of this study was to explore the factors that may contribute to students' sense of belonging in the community college setting and whether institutional belonging predicts student outcomes. The present study utilized an exploratory approach with national data to examine the elements that contribute to sense of belonging. Subsequently, this study also assessed what longitudinal outcomes are associated with students' sense of belonging to an institution.

This chapter will review the descriptive analyses and findings of the study. First, descriptive statistics review the characteristics of the sample's population and the variables used in analyses. Next, results are organized and reported by research question. In order to comply with NCES standards for utilizing BPS data, all n-values are rounded to the nearest 10.

Descriptive Statistical Analyses

This section reviews the descriptive statistical analyses that were conducted for this study. The BPS 12/17 dataset contains a pool of 6530 students identified as first attending a public 2-year institution in 2012. Table 1 contains a table of demographic variables of the participants in the study. While the majority (69.0%) of students were 20 or younger, within the age considered to be a traditional college-aged student, the remaining 31% represents a substantial percentage of students above the traditional age to begin college coursework. Nearly one quarter of students (22.9%) reported being first-generation college students and almost 20% of students reported that their primary spoken language was either not English or a mix of English and another language.

Additionally, the majority of students in the sample (55.1%) were female, over ten

percentage points higher than the representation of male students (44.9%).

Table 1

Demographic Variables

		N	Percent
Gender	Male	2930	44.9
	Female	3600	55.1
Age in years (as of 12/31/2011)	<20	4510	69.0
	20-21	620	9.5
	22-24	380	5.8
	25-29	400	6.1
	30+	630	9.6
Race/ethnicity group	American Indian or Alaska Native	50	.8
	Asian	270	4.1
	Black or African American	1040	15.9
	Hispanic or Latino	1400	21.4
	Native Hawaiian/other Pacific Islander	30	0.5
	White	3510	53.8
	More than one race	230	3.5
First-generation status	First-generation	1500	22.9
	Not first-generation	4870	74.5
	Did not know	170	2.6
Primary language spoken	English	5290	81.0
	Other	850	13.0
	Equal mix of English and another language	360	6.0
Born in U.S.	Yes	5900	90.4
	No	630	9.6
Total Unique Participants		6530	

Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

A typical participant in the study was female, White, under 20 years old, and worked on average 12.8 hours per week. Most students were English speakers, born in the U.S., and were not first-generation students. Students most frequently had a 3.0-3.4 GPA in high school and had competed Algebra 2 as their highest level of mathematics. The majority of students took at least one dual-credit course in high school. Participants were most likely to considered financial aid dependents and were classified in the low or low middle income groups based on their FAFSA application.

Descriptive analyses also examined the cross categorical disaggregation of some demographic categories. Table 2 shows gender percentages within age groups of the sample. Females had the highest percentage of representation in the youngest (<20) and oldest (30+) age categories, with males having slightly higher levels of representation in the 20-21, 22-24, and 25-29 age group categories.

Table 2

Gender by Age Categories (%)

|	Gender	
Age group	Male	Female
<20	44.6	55.4
20-21	46.8	53.2
22-24	47.4	52.6
25-29	47.5	52.5
30+	42.9	57.1
Total	44.9	55.1

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analyses also examined the disaggregation of gender by race (Table 3). Males comprised a higher percentage of the populations for students of White, Latino, and Asian identity. In contrast, females were particularly overrepresented in the Black, Native Hawaiian and other Pacific Islander, and American Indian or Alaska Native categories. Females also comprised a proportionally higher percentage of first-generation than of non first-generation students (Table 4).

Table 3

Gender by Race (%)

	Gender	
Race	Male	Female
American Indian or Alaska Native	42.0	58.0
Asian	48.5	51.5
Black or African American	41.2	58.8
Hispanic or Latino	44.6	55.4
Native Hawaiian/other Pacific Islander	32.1	67.9
White	45.9	54.1
More than one race	44.9	55.1
Total	44.9	55.1

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Table 4

Gender by First-Generation Status (%)

	Gender	
First-Generation Status	Male	Female
First-generation	41.2	58.8
Not first-generation	45.8	54.2
Did not know	51.8	48.2
Total	44.9	55.1

Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

The under 20, 20-21, and 22-24 age groups had a higher proportion of students of

students who reported being born in the United States than the 25-29 and 30+ age groups

(Table 5).

Table 5

Born in United States by Age Categories (%)

	Born in U.S.	
Age group	Yes	No
<20	90.4	9.6
20-21	91.6	8.4
22-24	92.2	7.8
25-29	88.2	11.8
30+	86.3	13.7
Total	90.4	9.6

Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

Factor Analysis Variables

The research question for Analysis 1 asked what factors are associated with institutional sense of belonging for community college students? In order to test this hypothesis, 22 variables were considered as inputs for a factor analysis. Tables 24, 25, and 26 in the Appendix show descriptive statistics of these variables.

Institutional Characteristics Variables

Variables representing institutional characteristics utilized in this research included variables representing institution locale, size, the percentage of the student body that was White, and whether the institution was identified as an HBCU. Table 6 shows the frequency distribution of categorial institutional variables. Table 7 shows descriptive statistics for the continuous variable of the percentage of the student body that was identified as White and Figure 3 shows a histogram of the distribution of percentages for the variable.

Table 6

Frequency Distribution of Categorical Institutional Characteristics Variables

	N	%
Institution Locale		
Rural	1250	19.1
Town	700	10.7
Suburb	1780	27.3
City	2800	42.9
Institution Size		
Small	710	11.0
Medium	1750	27.0
Large	2130	32.9
Extra large	1880	29.1
HBCU		
Yes	50	.8
No	6480	99.2

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Table 7

Descriptive Statistics for Percent of White Students in Student Body in 2011-12

Variable	Minimum	Maximum	Mean	SD
Percent of White Students in Student Body	2	98	55.74	22.49

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Figure 3

Histogram of Percent of White Students in Student Body in 2011-12
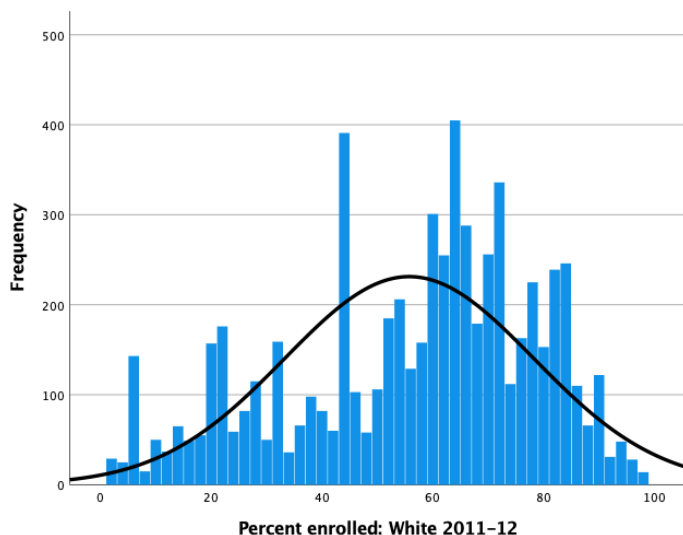
Percent enrolled: White 2011–12

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analysis 1 Dependent (Outcome) Variables

      The BPS 12/17 dataset contains two ordinal variables BELONG and BELONG14 that represent responses the degree to which the respondent indicated that they felt like a part of the institution respectively in 2012 and 2014. Table 8 shows the distribution frequency of responses to the 2012 sense of belonging variable and Table 9 shows the distribution frequency for the 2014 variable. Before conducting binary logistic regressions to determine the influences on participants' sense of belonging and the impact of belonging on outcomes, these ordinal variables were converted into new binary variables, BELONGBIN and BELONGBIN14. Responses of a 1 (strongly disagree), 2 (somewhat disagree), and 3 (Neither disagree nor agree) were coded as a 0 (does not have

a sense of belonging). Responses of a 4 (somewhat agree) and 5 (strongly agree) were

coded as a 1 (has a sense of belonging).

Table 8

2012 Sense of Belonging Outcome Variable Response Frequencies (n = 5690)

"I felt like a part of the institution."	Frequency	%
1 (strongly disagree)	260	4.6
2 (somewhat disagree)	360	6.3
3 (Neither disagree nor agree)	1170	20.5
4 (somewhat agree)	1630	28.6
5 (strongly agree)	2280	40.0

Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

Table 9

2014 Sense of Belonging Outcome Variable Response Frequencies (n = 1980)

"I felt like a part of the institution."	Frequency	%
1 (strongly disagree)	110	5.6
2 (somewhat disagree)	150	7.5
3 (Neither disagree nor agree)	440	22.2
4 (somewhat agree)	490	24.6
5 (strongly agree)	790	40.1

Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

Analysis 2 Dependent (Outcome) Variables

Table 10 shows the frequency distributions for the categorical outcome variables

used in Analysis 2 including student stopouts, defined as whether a student took a break

of at least 5 consecutive months from attending their first institution, whether a student

was retained at the end of their first and second year, whether a student vertically

transferred to a four-year institution, and whether a student completed a credential by

2014.

Table 10

Frequency Distribution of Analysis 2 Categorical Outcome Variables

	N	%
Stopped out at least once by 2014		
No	5290	81.0
Yes	1240	19.0
Retention (end of year 1)		
Retained	5790	88.7
Not retained	740	11.3
Retention (end of year 2)		
Retained	4640	71.1
Not retained	1890	28.9
Vertical transfer		
Transferred	1700	26.0
Did not transfer	4830	74.0
Credential completion by 2014		
Completed at least one credential	1360	20.8
Did not complete a credential	5170	79.2

Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

Table 11 shows descriptive statistics for respondents' GPA at the institution they

first attended in 2012. Figure 4 shows a histogram of the distribution of GPA scores on a

4.0 scale.

Table 11

Descriptive Statistics for Student GPA at First Institution Attended

	N	Maximum	Mean	SD
GPA	5340	4.0	2.40	1.08

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Figure 4

Histogram of Student GPA at First Institution Attended
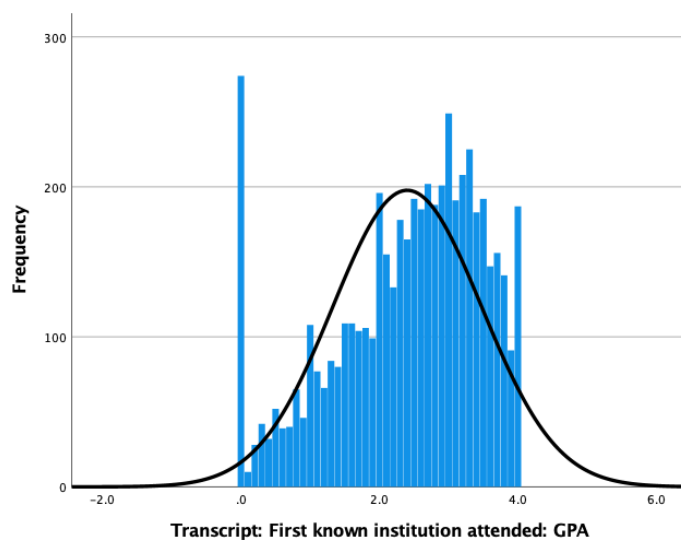
Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analysis 1

The research question for Analysis 1 asked what factors are associated with institutional sense of belonging for community college students? After descriptive analyses were conducted, a factor analysis was performed. Subsequently, binary and

ordinal logistic regression analyses were used to examine how student and institutional

characteristics were associated with students' sense of belonging in 2012 and in 2014.

Factor Analysis of Independent Variables

In order to answer this research question, because of the large number of potential

independent variables, factor analysis was first performed to cluster independent

variables into factors. 22 variables were put into a principal component analysis (PCA)

with Varimax rotation to review their suitability for factor analysis as shown in Table 12.

This analysis showed that all 22 variables were correlated at .4 or higher with another

item, suggesting that the items were all suitable for factorability. The Kaiser-Meyer-Olin

(KMO) measure of sampling adequacy. K=.702, was in the acceptable range for analysis

(Field, 2018). Additionally, Bartlett's test of sphericity $\chi2$ (231) = 18668.14, p < .0001,

was significant and therefore suggested that the correlations between variables were non-

zero and the null hypothesis be rejected. Seven components met the Kaiser criterion of

having eigenvalues greater than 1. Collectively, these components accounted for 53.96%

of the variance. A review of the scree plot (Figure 5) also demonstrated an inflection

point around this point.

Table 12

Total Variance Explained

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cum %	Total	% of variance	Cum %	Total	% of variance	Cum %
1	2.934	13.338	13.338	2.934	13.338	13.338	2.818	12.811	12.811
2	2.639	11.993	25.332	2.639	11.993	25.332	2.569	11.676	24.487
3	1.605	7.295	32.627	1.605	7.295	32.627	1.487	6.761	31.248
4	1.459	6.632	39.259	1.459	6.632	39.259	1.416	6.436	37.684
5	1.185	5.388	44.648	1.185	5.388	44.648	1.359	6.177	43.681
6	1.033	4.695	49.342	1.033	4.695	49.342	1.15	5.227	49.088
7	1.016	4.619	53.961	1.016	4.619	53.961	1.072	4.874	53.961
8	0.99	4.499	58.46						
9	0.91	4.136	62.597						
10	.882	4.009	66.606						
11	.872	3.965	70.571						
12	.847	3.852	74.423						
13	.785	3.566	77.989						
14	.773	3.516	81.505						
15	.738	3.356	84.861						
16	.708	3.219	88.08						
17	.618	2.809	90.889						
18	.558	2.538	93.427						
19	.478	2.173	95.6						
20	.42	1.909	97.509						
21	.349	1.587	99.096						
22	.199	.904	100.000						

Extraction method: Principal component analysis. Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Figure 5

Principal Components Analysis Scree Plot
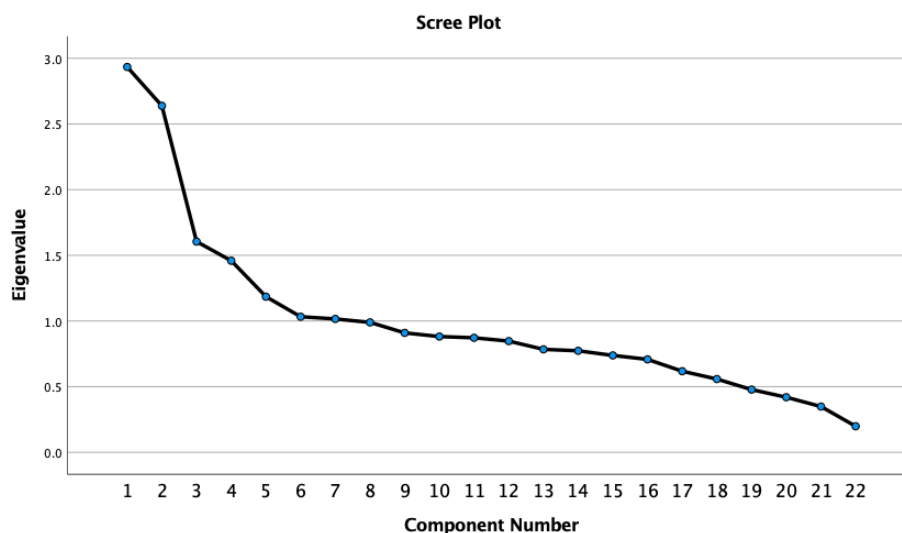
Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

The seven components identified in the initial principal component analysis were retained in the final factor analysis. Table 13 contains the factor loadings after rotation and Figure 6 shows the factor coefficients between individual variables and each component. Based on the clustering of items around components, component 1 represents academic confidence and satisfaction, component 2 represents student age and independence, component 3 represents high school preparation, component 4 represents use of student services, component 5 represents financial resources, component 6 represents expectations of self, and component 7 represents students' external environment.

Table 13

Factor Loadings Based on Principal Components Analysis with Varimax Rotation for 22

Items from the BPS 12/17 Dataset (N = 4800)

Items	Rotated factor loadings						
	1	2	3	4	5	6	7
Grade point average in high school (HSGPA)	0.087	0.115	**0.665**	-0.026	0.018	0.048	-0.041
Highest level of high school mathematics (HCMATHHI)	-0.01	-0.132	**0.674**	-0.001	0.044	0.042	-0.025
Took any college credits in high school (HSTKANY)	-0.028	-0.106	**0.663**	0.075	0.011	0.017	0.138
Income group 2012 (INCGRP)	-0.031	0.143	0.074	0.043	**0.772**	.000	0.178
Marital status 2012 (SMARITAL)	0.027	**0.643**	0.016	0.049	0.283	-0.11	-0.088
Dependency status 2011-12 (DEPEND)	-0.004	**0.882**	-0.029	-0.046	-0.205	0.005	0.091
Dependents: has any dependents 2011-12 (DEPANY)	0.016	**0.774**	0.024	0.014	-0.049	-0.061	-0.136
Family size (dependent & independent) 2012 (HSIZE)	0.026	-0.431	0.053	0.132	**0.525**	-0.134	-0.332
Number of months between HS completion and entry (ELAPSE)	0.041	**0.707**	-0.188	-0.011	0.053	0.034	0.112
Jobs while enrolled: hours worked 2011-12 (HRSWK12)	-0.021	0.042	0.02	0.003	0.167	0.045	**0.465**
Distance from student's home (in miles) 2011-12 (DISTANCE)	0.039	-0.068	0.038	0.014	-0.022	-0.1	**0.785**
Used academic advising in 2011-12 (USEACAD)	-0.019	0.036	0.109	**0.67**	0.022	0.186	0.085
Used academic support services in 2011-12 (USEACSP)	0.05	0.018	0.025	**0.705**	-0.052	0.036	0.001
Used career services in 2011-12 (USECPP)	0.056	-0.056	-0.053	**0.578**	-0.047	-0.08	-0.051
Used financial aid services in 2011-12 (USEFINAID)	0.056	0.052	0.026	0.279	**-0.545**	-0.051	-0.125
Interactions with faculty 2012 (FACULTY)	**0.741**	0.025	-0.008	0.003	0.023	0.199	0.019
Interactions with other students 2012 (PEERINT)	**0.736**	-0.024	0.009	0.063	-0.065	-0.263	0.027

Satisfaction with social experience 2012 (SOCSATIS)	**0.744**	0.024	-0.013	0.05	-0.119	-0.262	-0.042
Satisfaction with studies 2012 (ACDSATIS)	**0.787**	0.052	0.003	0.024	0.027	0.238	-0.016
Academic confidence: 2011-12 (CURCONF)	**0.705**	0.007	0.077	0.018	0.035	0.352	0.012
Highest level of education expected 2012 (HIGHLVEX)	-0.046	-0.109	0.285	0.137	-0.072	**0.439**	0.004
Likelihood of completing degree by expected date 2012 (DEGEXP)	0.181	-0.008	-0.028	0.008	0.038	**0.709**	-0.033

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Figure 6

Factor Analysis Model of Components (Right) and Individual Variables (Left) with

Loading Coefficients
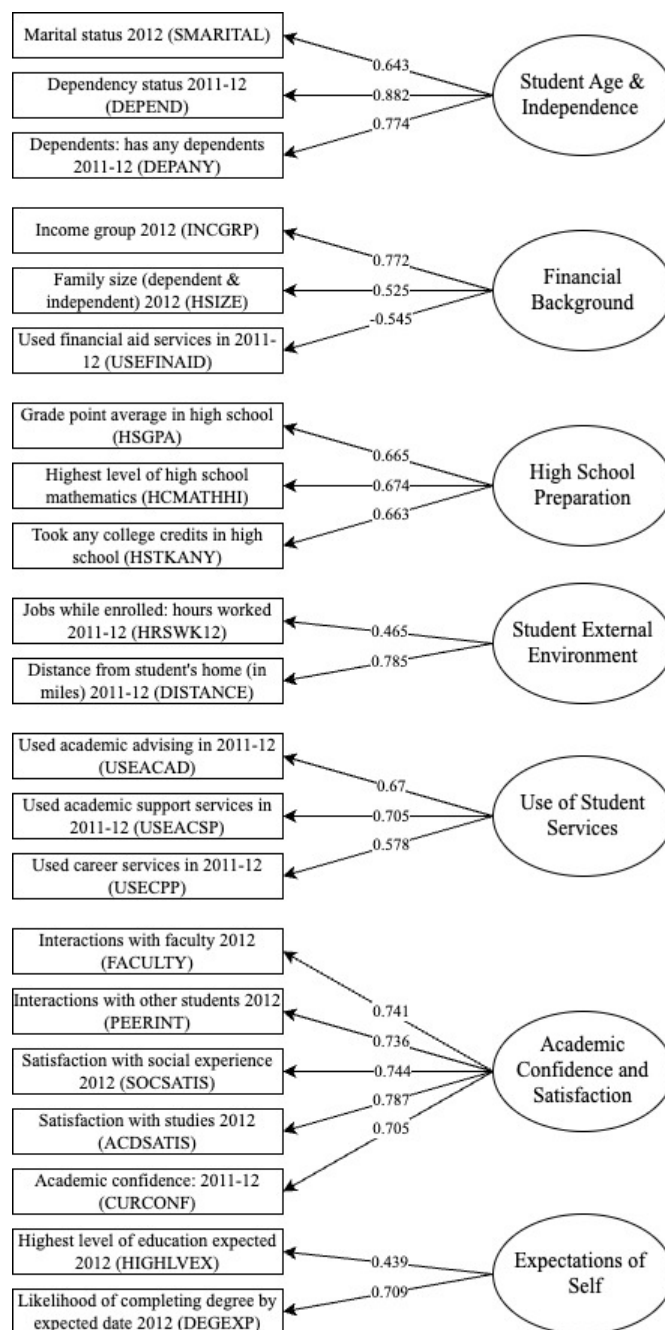
Source: U.S. Department of Education, National Center for Education Statistics,
Beginning Postsecondary Students Survey, 2012-2017.

Factors were saved in SPSS for each of the components utilizing the regression method and were given the following labels: 1 academic confidence and satisfaction factor, (ENGSAT), 2 student age and independence (AGEIND), 3 high school preparation (HSPREP), 4 use of student services (STUSERV), 5 financial resources (FINANCE), 6 expectations of self (STUEXPECT), and 7 students' external environment (OUTPULL). These factor scores are used in subsequent analyses as predictor variables for Analysis 1.

Binary Logistic Regression Analysis for 2012 Belonging Variable

A binary logistic regression analysis was conducted to develop a model for predicting whether a student would report a sense of belonging at their institution. In logistic regression, the relationship between the independent explanatory variables and the dependent variable is conveyed by beta weights (β) for each explanatory variable (Field, 2018). Exponents of beta weights, $Exp(\beta)$, convey the odds ratio of the likelihood of a unit change in the dependent variable given a single unit change in the independent variable when all other variables are held constant. Independent variables and factors for the analysis were entered in a stepwise fashion, in accordance with the model developed for the research. After each set of variables was entered, bivariate correlations explored potential interactions between demographic variables and each variable in that step. Significant correlations were added one by one to the regression to explore whether interaction effects would significantly predict the dependent variable. Interaction effects that were significant were retained for subsequent steps. Table 14 shows each model step as variables were entered in a temporal fashion.

After testing for assumptions that logistic regression could be used within SPSS, a regression was first performed with student demographic variables to determine the influence of those characteristics on the dependent variable (Model 1). The overall model was statistically significant with a Nagelkerke R^2 of .02, indicating that 2% of the variance was explained by the model. Gender and having a Black or Pacific Islander racial identity were all found to be significant. Female students were found to be 1.267 more likely to have a sense of belonging and Black students were 1.285 more likely. Pacific Islander students were 0.321 percent as likely. Age, Hispanic, Asian, American Indian, and Multiple Racial Identity, whether a student was born in the United States, and a student's first-generation status did not predict belonging. The interaction effect of whether a student was born in the United States and a student's first-generation status was found to be significant with an $Exp(\beta)$ of 1.946, meaning a student who was both first-generation and born in the United States was almost twice as likely to have a sense of belonging. The interaction was also added to the regression analysis.

After the initial analysis examining demographic variables, factors generated in the initial factor analysis were added one by one to the regression. The order of factors being added was determined by their temporal occurrence and to align with the model proposed in Chapter 3. First, the age and independence factor was added to the analysis. The overall Model 2 was statistically significant with a Nagelkerke R^2 of .02. The factor was not found to significantly predict belonging, no significant interactions were found between the factor and demographic variables, and no other substantial changes in the model were noted. Second, the financial background factor was put into the regression.

The overall Model 3 was statistically significant with a Nagelkerke R^2 of .028. The factor was also found to be significant with an $Exp(\beta)$ of 0.848, meaning that for every one unit of increase in the factor, a student was 0.848 times as likely to have a sense of belonging. No significant interactions between the factor and demographic variables were identified. Next, the high school preparation factor was inputted. The overall Model 4 was statistically significant with a Nagelkerke R^2 of .036. The factor was not found to be significant and no significant interactions between the factor and demographic variables were identified.

Subsequently, variables that represent characteristics of the institution attended by the student were put in simultaneously including institution locale, the percent of the student body who identified as White, and whether an institution met the federal definition of an HBCU. The overall Model 5 was statistically significant with a Nagelkerke R^2 of .036. The variable of small institution size was significant in the regression as was the variable of extra-large institution size. Students who attended a small institution were 1.33 times as likely to have a sense of belonging and students who attended an extra-large institution were 0.233 times as likely. Additionally, the interaction effect of extra-large institution size and student age was found to be significant with an $Exp(\beta)$ of 1.075. The interaction effect of the percent of the student body identified as White and Pacific Islander racial identity was also found to be significant with an $Exp(\beta)$ of 1.045. Both interactions were added to the regression analysis.

Next, the external environment factor was added to the analysis. The overall Model 6 was statistically significant with a Nagelkerke R^2 of .038. The external

environment factor was also found to be significant with an Exp(β) of 0.92, meaning that for every one unit of increase in the factor, a student was 0.92 times as likely to have a sense of belonging. No significant interactions between the factor and demographic variables were identified. Next, the student services factor was added to the regression. The overall Model 7 was statistically significant with a Nagelkerke R^2 of .046. The factor was also found to be significant with an Exp(β) of 1.196, meaning that for every one unit of increase in the factor, a student was 1.196 times as likely to have a sense of belonging. No significant interactions between the factor and demographic variables were identified. The interaction effect of the percent of the student body identified as White and Pacific Islander racial identity ceased to be significant in this step.

Then, the factor representing student engagement and satisfaction was added. The overall Model 8 was statistically significant with a Nagelkerke R^2 of .441 meaning that the amount of variance explained by the model increased from 4.6% to 44.1% in this step. The factor was also found to be significant with an Exp(β) of 5.16, meaning that for every one unit of increase in the factor, a student was 5.16 times as likely to have a sense of belonging. No significant interactions between the factor and demographic variables were identified. The demographic variable of student age was found to be significant beginning in this step with an Exp(β) of 0.897, meaning that for every one unit of increase in the variable, a student was 0.897 times as likely to have a sense of belonging. The institutional variable of small institution size ceased to be significant in this step. However, the variable representing suburban institution locale was found to be significant beginning in this step with an Exp(β) of 0.817, meaning that having a suburban

institutional locale was associated with being 0.817 as likely to have a sense of belonging. The variable representing the percentage of the student body identified as White also was found to be significant starting in this step with an Exp(β) of 1.006.

Finally, the student expectations of self factor was added to the regression. The overall Model 9 was statistically significant with a Nagelkerke R^2 of .45, meaning the final model explained approximately 45% of the variance. The factor was also found to be significant with an Exp(β) of 0.768, meaning that for every one unit of increase in the factor, a student was 0.768 times as likely to have a sense of belonging. In this final model, student age, having a Black or Pacific Islander racial identity, female gender, and interaction effect of whether a student was born in the United States and a student's first-generation status were all significant. Additionally, the institutional variables of suburban locale, extra-large institutional size, the percentage of the student body identifying as white, and the interaction effect of extra-large institution size and student age were all significant. The factors of financial background, external environment, student services, student engagement and satisfaction, and expectations of self were all found to be significant.

Table 14

Binary Regression Analysis for 2012 Sense of Belonging Variable

Predictor	Model 1 β (SE)	Model 1 Exp(β)	Model 2 β (SE)	Model 2 Exp(β)	Model 3 β (SE)	Model 3 Exp(β)	Model 4 β (SE)	Model 4 Exp(β)	Model 5 β (SE)	Model 5 Exp(β)
(Constant)	0.593** (0.268)	1.809	0.251 (0.399)	1.285	0.245 (0.403)	1.278	0.231 (0.414)	1.26	0.585 (0.462)	1.796
Student age	-0.003 (0.013)	.997	0.015 (0.02)	1.015	0.018 (0.02)	1.018	0.019 (0.021)	1.019	-0.005 (0.023)	0.995
Race: Black	0.461** (0.098)	1.585	0.457** (0.098)	1.579	0.343** (0.101)	1.41	0.344** (0.101)	1.411	0.358** (0.105)	1.431
Race: Hispanic	-0.031 (0.081)	.969	-0.036 (0.081)	0.965	-0.074 (0.081)	0.929	-0.073 (0.082)	0.929	0.018 (0.092)	1.018
Race: Asian	0.007 (0.173)	1.007	0.002 (0.173)	1.002	-0.066 (0.174)	0.936	-0.067 (0.174)	0.936	0.037 (0.179)	1.037
Race: American Indian	0.674 (0.426)	1.962	0.668 (0.426)	1.951	0.608 (0.428)	1.837	0.609 (0.428)	1.839	0.61 (0.428)	1.841
Race: Pacific Islander	-1.136* (0.441)	.321	-1.154** (0.441)	0.316	-1.152** (0.442)	0.316	-1.152** (0.442)	0.316	-3.167** (1.178)	0.042
Race: Multiple	-0.275 (0.158)	.760	-0.276 (0.158)	0.759	-0.311* (0.159)	0.733	-0.31 (0.159)	0.733	-0.269 (0.161)	0.764
Gender: Female	0.237** (0.064)	1.267	0.25** (0.065)	1.283	0.227* (0.065)	1.255	0.227* (0.065)	1.254	0.226* (0.065)	1.254
First-generation status	0.08 (0.083)	1.083	0.083 (0.083)	1.086	0.038 (0.084)	1.038	0.038 (0.084)	1.039	0.033 (0.084)	1.033
Born in U.S.	0.019 (0.134)	1.019	0.024 (0.134)	1.024	0.04 (0.135)	1.041	0.039 (0.135)	1.039	0.066 (0.136)	1.068
First-gen x Born in U.S.	0.666** (0.281)	1.946	0.656* (0.281)	1.928	0.69* (0.281)	1.994	0.69* (0.281)	1.994	0.693* (0.285)	2
Age and independence factor			-0.056 (0.048)	0.946	-0.059 (0.048)	0.943	-0.06 (0.049)	0.941	-0.061 (0.049)	0.941
Financial background factor					-0.165** (0.033)	0.848	-0.165** (0.033)	0.848	-0.153** (0.033)	0.858
High school preparation factor							0.005 (0.033)	1.005	0.004 (0.033)	1.004
Locale: Suburb									-0.14 (0.078)	0.87
Locale: Town									-0.119 (0.123)	0.888
Locale: Rural									-0.049 (0.098)	0.952

Table 14 – continued

Institution size: Small									0.285* (0.129)	1.33
Institution size: Medium									0.075 (0.087)	1.078
Institution size: Extra Large									-1.457* (0.604)	0.233
% White student body									0.002 (0.002)	1.002
HBCU									0.706 (0.554)	2.026
Institution size: XL x Student age									0.073* (0.031)	1.075
% White student body x Pacific Islander Race									0.044* (0.022)	1.045
External environment factor										
Student services factor										
Engaged and satisfied factor										
Expectations of self factor										
Nagelkerke R²	0.02		0.02		0.028		0.028		0.036	
Cox & Snell R²	0.014		0.014		0.020		0.020		0.026	
-2 Log likelihood	5762.055		5760.718		5735.491		5735.468		5707.751	
Chi-square	66.097**		67.433**		92.661**		92.684**		120.401**	

Table 14 - continued

Predictor	Model 6 β (SE)	Exp(β)	Model 7 β (SE)	Exp(β)	Model 8 β (SE)	Exp(β)	Model 9 β (SE)	Exp(β)
(Constant)	0.472 (0.464)	1.604	0.179** (0.033)	1.196	2.705** (0.573)	14.954	2.597** (0.576)	13.421
Student age	0 (0.023)	1	0 (0.023)	1	-0.109** (0.028)	0.897	-0.101** (0.028)	0.904
Race: Black	0.342** (0.105)	1.407	0.339** (0.105)	1.403	0.308* (0.131)	1.361	0.284* (0.132)	1.329
Race: Hispanic	0.003 (0.092)	1.003	-0.009 (0.105)	0.991	-0.081 (0.112)	0.922	-0.094 (0.113)	0.91
Race: Asian	0.01 (0.18)	1.01	0.001 (0.181)	1.001	0.048 (0.218)	1.05	0.019 (0.22)	1.019
Race: American Indian	0.603 (0.429)	1.828	0.576 (0.43)	1.78	0.312 (0.501)	1.366	0.442 (0.51)	1.556
Race: Pacific Islander	-3.152** (1.18)	0.043	-3.118** (1.183)	0.044	-2.941* (1.291)	0.053	-2.952* (1.305)	0.052
Race: Multiple	-0.28 (0.161)	0.756	-0.283 (0.161)	0.753	-0.252 (0.198)	0.777	-0.259 (0.199)	0.772
Gender: Female	0.221** (0.066)	1.247	0.202** (0.066)	1.223	0.203* (0.08)	1.225	0.24** (0.081)	1.272
First-generation status	0.028 (0.084)	1.028	0.04 (0.084)	1.04	0.066 (0.106)	1.068	0.025 (0.106)	1.025
Born in U.S.	0.064 (0.136)	1.067	0.044 (0.137)	1.045	-0.003 (0.165)	0.997	0.029 (0.166)	1.029
First-gen x Born in U.S.	0.679* (0.285)	1.973	0.668* (0.287)	1.95	0.961** (0.343)	2.616	1.023** (0.346)	2.781
Age and independence factor	-0.073 (0.05)	0.93	-0.077 (0.05)	0.926	0.094 (0.063)	1.098	0.085 (0.063)	1.089
Financial background factor	-0.156** (0.033)	0.856	-0.157** (0.033)	0.855	-0.257** (0.041)	0.774	-0.255** (0.041)	0.775
High school preparation factor	0.006 (0.033)	1.006	0.007 (0.034)	1.007	-0.042 (0.041)	0.959	-0.042 (0.041)	0.959
Locale: Suburb	-0.14 (0.078)	0.869	-0.139 (0.078)	0.87	-0.203* (0.096)	0.817	-0.191* (0.096)	0.826
Locale: Town	-0.102 (0.123)	0.903	-0.101 (0.124)	0.903	-0.258 (0.152)	0.773	-0.249 (0.153)	0.78
Locale: Rural	-0.048 (0.098)	0.953	-0.048 (0.099)	0.953	-0.159 (0.122)	0.853	-0.139 (0.123)	0.87

Table 14 - continued

Institution size: Small	0.27* (0.13)	1.31	0.313* (0.13)	1.367	0.121 (0.16)	1.128	0.086 (0.161)	1.089
Institution size: Medium	0.07 (0.087)	1.073	0.104 (0.088)	1.11	-0.054 (0.108)	0.948	-0.069 (0.109)	0.934
Institution size: Extra Large	-1.514* (0.605)	0.22	-1.594** (0.608)	0.203	-1.914** (0.73)	0.148	-1.789* (0.738)	0.167
% White student body	0.002 (0.002)	1.002	0.002 (0.002)	1.002	0.006** (0.002)	1.006	0.006* (0.002)	1.006
HBCU	0.713 (0.554)	2.041	0.714 (0.554)	2.042	0.621 (0.727)	1.861	0.552 (0.711)	1.736
Institution size: XL x Student age	0.076* (0.031)	1.079	0.08* (0.032)	1.083	0.095* (0.038)	1.1	0.089* (0.038)	1.093
% White student body x Pacific Islander Race	0.044* (0.022)	1.045	0.042 (0.022)	1.043	0.046 (0.025)	1.047	0.046 (0.025)	1.047
External environment factor	-0.083* (0.032)	0.92	-0.084** (0.032)	0.919	-0.123** (0.038)	0.885	-0.124** (0.04)	0.883
Student services factor			0.179** (0.033)	1.196	0.242** (0.042)	1.274	0.247** (0.042)	1.28
Engaged and satisfied factor					1.641** (0.053)	5.16	1.657** (0.054)	5.245
Expectations of self factor							-0.263** (0.039)	0.768
Nagelkerke R²	0.038		0.046		0.441		0.45	
Cox & Snell R²	0.027		0.033		0.315		0.322	
-2 Log likelihood	5701.044		5671.729		4070.041		4023.957	
Chi-square	127.107**		156.423**		1758.111**		1804.195**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Reference category for race variables is White. Reference category for locale is city. Reference category for institution size is large. Binary coding for remaining variables: gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1); HBCU (n = 0, y = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Ordinal Logistic Regression Analysis for 2012 Belonging Variable

In order to further explore the impact of contributory variables on sense of belonging examined in the previous binary logistic regression, an ordinal logistic regression was utilized. Ordinal regression allows for an estimation of the impact of independent variables on a multiple-category ordinal scale dependent variable (Hosmer et al., 2013). The use of this method allowed for a more fine-tuned analysis of the impact of variables in the model by retaining the original five-point scale of sense of belonging variable (BELONG) in the BPS 12/17 instead of a binary belonging variable. This analysis used a cumulative logit model or proportional odds model in which for every one unit increase in the independent variable, an estimate is given for the change in log odds of falling in a higher category of the dependent variable. A positive estimate indicates a predicted increase in the dependent variable, and a negative estimate indicates a predicted decrease. In the same manner as was done in the binary logistic regression, independent variables and factors were inputted in a stepwise approach following the model proposed for this study. After the main effect variables were added in each step, interaction effects were explored for each significant bivariate correlation between demographic variables and variables in that step. Each interaction was added individually to the regression and significant interaction effects were retained in subsequent steps. Table 15 shows the results of each step of the regression.

An ordinal regression was first performed with demographic variables inputted as independent variables in the analysis (Model 1). The results showed that the model was statistically significant and a Nagelkerke R^2 of .027 indicated that 2.7% of the variance

was explained. Black racial identity, American Indian racial identity, female gender, first-generation status, and an interaction effect of age and whether a student was born in the United States were all significant positive predictors of sense of belonging. The factor of age and independence was then added (Model 2). The model was overall significant with a Nagelkerke R^2 of .024. In this model, the factor of age and independence was not significant but two additional demographic variables, Pacific Islander racial identity and whether a student was born in the United States were found to be significant negative predictors of belonging. In Model 3, the financial background factor was added. This model was significant with a Nagelkerke R^2 of .031. Like in the binary regression, the financial background factor was found to be a significant negative predictor with a predicted decrease of 0.158 in the log odds of a student being in the higher category of sense of belonging. Model 4 was significant with a Nagelkerke R^2 of .032. Like in the binary regression of this model, the high school preparation factor was not found to be significant when added; however, in this analysis, an interaction between the factor and first-generation status was significant with a predicted increase of 0.131 in the log odds of a student being in the higher category of belonging.

In the next step (Model 5), variables representing characteristics of the institution attended by the student were added to the regression including institution locale and size, the percent of the student body who identified as White, and whether an institution met the federal definition of an HBCU. This model was statistically significant with a Nagelkerke R^2 of .32. Suburban institutional locale, small institution size, extra-large institution size, and whether an institution was an HBCU were all significant. Suburban

locale was a significant negative predictor with a predicted decrease of 0.258 in log odds of a student being in a higher category. Extra-large institution size was a significant negative predictor as well with a predicted decrease of 1.333 in the log odds of a student being in the higher category. Small institution size was a positive predictor with a predicted increase of 0.297 in the log odds of a student being in a higher category. HBCU was also a positive predictor with a predicted 0.9 increase in the log odds of a student being in a higher category. Additionally, interactions between town locale and multiple racial identity, suburban locale and female gender, and extra-large institution size and age were also all significant. Pacific islander racial identity ceased to be significant in this step.

In Model 6, the overall model was significant with a Nagelkerke R^2 of .043. In this step, the external environmental factor was added and found to be significant as a negative predictor with a predicted decrease of 0.067 in the log odds of a student being in a higher category. No other changes were noted. In the following step (Model 7), the student services factor was added. This model was significant with a Nagelkerke R^2 of .051. The student services factor was a significant positive predictor of belonging with a predicted increase of 0.158 in the log odds of a student being in a higher category. Female gender ceased to be significant in this step and Pacific Islander racial identity was found to be a significant negative predictor with a predicted decrease of 0.775 in the log odds of a student being in a higher category.

Model 8 added the factor of student engagement and satisfaction and was significant with a notable increase in the Nagelkerke R^2 to .500, meaning approximately

50% of the variance was explained by the model. Student engagement and satisfaction was a positive predictor with a predicted increase of 1.686 in the odds ratio of a student being in a higher category. Additionally, the interaction effect of student engagement and satisfaction and female gender was significant with the log odds of being in a higher level of belonging of 0.136. In this step, the age and independence factor was found to be a significant positive predictor with a predicted increase of 0.108 in the odds ratio of a student being in a higher category. The high school preparation factor was also found to be a significant negative predictor with a decrease of 0.103 in the log odds of a student being in a higher category of belonging. Student age was found to be a significant negative predictor in this step with a predicted decrease of 0.086 in the log odds of a student being in a higher category of belonging. Pacific islander racial identity, small institution size, and whether an institution was an HBCU were no longer found to be significant. Additionally, the interaction effects of the high school preparation factor and first-generation status, town locale and multiple racial identity, and suburban locale and were no longer found to be significant. In the final step, Model 9 added the expectations of self factor. This final model was significant with a Nagelkerke R^2 of .513, meaning 51.3% of the variance in the dependent variable was estimated to be explained. The expectations of self factor was a significant negative predictor with a predicted 0.21 decrease in the log odds of a student being in a higher category. The ordinal regression also found that the interaction effect of the expectations of self factor and first-generation status was a significant negative predictor with a predicted decrease of 0.145 in the log odds of a student being in a higher category. First-generation status ceased to have a

significant main effect. Female gender was found to be a significant positive predictor with predicted increase of 0.176 in the log odds of a student being in a higher category.

Table 15

Ordinal Regression Analysis for 2012 Sense of Belonging Variable

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coeff.	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
[BELONG = 1]	-2.455**	0.111	-2.394**	0.349	-2.404**	0.35	-2.436**	0.359	-2.836**	0.401
[BELONG = 2]	-1.51**	0.1	-1.446**	0.345	-1.455**	0.346	-1.487**	0.356	-1.889**	0.398
[BELONG = 3]	-0.192**	0.096	-0.143	0.344	-0.146	0.345	-0.178	0.355	-0.571	0.396
[BELONG = 4]	1.023**	0.097	1.079**	0.344	1.083**	0.345	1.053**	0.355	0.666	0.396
Student age	0.017**	0.004	0.018	0.017	0.021	0.017	0.019	0.018	0	0.019
Race: Black	0.531**	0.073	0.531**	0.08	0.421**	0.082	0.416**	0.082	0.404**	0.085
Race: Hispanic	0.045	0.064	0.035	0.069	0	0.069	-0.001	0.069	0.06	0.078
Race: Asian	-0.082	0.133	-0.036	0.146	-0.107	0.146	-0.098	0.146	0.001	0.151
Race: American Indian	0.815**	0.31	0.869**	0.334	0.816*	0.335	0.817*	0.336	0.825*	0.338
Race: Pacific Islander	-0.592	0.36	-0.797*	0.383	-0.81*	0.383	-0.786*	0.384	-0.736	0.385
Race: Multiple	-0.105	0.131	-0.093	0.138	-0.131	0.138	-0.136	0.138	-0.206	0.146
Gender: Female	0.195**	0.05	0.243**	0.055	0.219**	0.055	0.222**	0.055	0.138*	0.065
First-generation	0.18**	0.06	0.188**	0.066	0.152*	0.067	0.162*	0.067	0.161*	0.067
Born in U.S.	-0.414	0.272	-1.935*	0.752	-1.978**	0.751	-2.013**	0.751	-1.939*	0.749
Age x Born in U.S.	0.024*	0.012	0.105**	0.038	0.108**	0.038	0.11**	0.038	0.107**	0.038
Age and independence factor			-0.046	0.041	-0.051	0.041	-0.048	0.041	-0.05	0.042
Financial background factor					-0.158**	0.028	-0.158**	0.028	-0.15**	0.028
High school preparation factor							-0.038	0.031	-0.037	0.031
First gen x high school prep							0.131*	0.066	0.136*	0.067
Locale: Suburb									-0.258**	0.093
Locale: Town									-0.075	0.105
Locale: Rural									0.069	0.082
Institution size: Small									0.297**	0.107
Institution size: Medium									0.114	0.074
Institution size: XL									-1.333**	0.507

Table 15 - continued

% White Student Body									0	0.002
HBCU									0.9*	0.416
Town locale x Multi race									1.221*	0.574
Suburban locale x female gender									0.277*	0.119
XL size x Student age									0.067*	0.026
External environment factor										
Student services factor										
Engaged and satisfied factor										
Engaged and satisfied x female gender										
Expectations of self factor										
Expectations of self x female gender										
Expectations of self x first-generation										
Cox & Snell R^2	.025		.022		.029		.030		.040	
Nagelkerke R^2	.027		.024		.031		.032		.042	
McFadden R^2	.009		.008		.011		.011		.015	
-2 Log likelihood	3467.537		12780.136		12747.874		12743.935		12608.334	
Chi-square	140.778**		104.329**		136.594**		140.530**		187.187**	

Table 15 - continued

	Model 6		Model 7		Model 8		Model 9	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
[BELONG = 1]	-2.756**	0.402	-2.77**	0.403	-6.027**	0.442	-5.999**	0.445
[BELONG = 2]	-1.808**	0.399	-1.82**	0.399	-4.568**	0.435	-4.525**	0.438
[BELONG = 3]	-0.488	0.398	-0.495	0.398	-2.5**	0.431	-2.43**	0.433
[BELONG = 4]	0.749	0.398	0.75	0.398	-0.646	0.429	-0.54	0.432
Student age	0.004	0.02	0.005	0.02	-0.086**	0.021	-0.081**	0.021
Race: Black	0.391**	0.086	0.384**	0.086	0.324**	0.093	0.31**	0.094
Race: Hispanic	0.048	0.078	0.035	0.078	-0.024	0.084	-0.027	0.084
Race: Asian	-0.023	0.151	-0.038	0.151	0.014	0.161	-0.018	0.162
Race: American Indian	0.822*	0.338	0.816*	0.339	0.634	0.369	0.775*	0.374
Race: Pacific Islander	-0.727	0.385	-0.775*	0.385	-0.302	0.406	-0.298	0.409
Race: Multiple	-0.215	0.146	-0.22	0.146	-0.113	0.156	-0.116	0.157
Gender: Female	0.133*	0.066	0.124	0.066	0.118	0.071	0.176*	0.071
First-generation	0.155*	0.068	0.168*	0.068	0.162*	0.073	0.137	0.073
Born in U.S.	-1.942*	0.749	-1.913*	0.752	-2.244**	0.795	-2.266**	0.801
Age x Born in U.S.	0.107**	0.038	0.104**	0.038	0.118**	0.041	0.121**	0.041
Age and independence factor	-0.059	0.042	-0.061	0.042	0.108*	0.046	0.104*	0.046
Financial background factor	-0.152**	0.028	-0.153**	0.028	-0.24**	0.03	-0.241**	0.03
High school preparation factor	-0.035	0.031	-0.035	0.031	-0.103**	0.034	-0.107**	0.034
First gen x high school prep	0.133*	0.067	0.134*	0.067	0.102	0.072	0.114	0.072
Locale: Suburb	-0.26**	0.093	-0.25**	0.093	-0.254**	0.099	-0.225*	0.099
Locale: Town	-0.063	0.105	-0.063	0.105	-0.176	0.112	-0.167	0.113
Locale: Rural	0.07	0.082	0.068	0.083	-0.018	0.089	0.014	0.089
Institution size: Small	0.284**	0.107	0.322**	0.107	0.108	0.116	0.051	0.116
Institution size: Medium	0.107	0.074	0.137	0.074	0.009	0.079	-0.009	0.08
Institution size: XL	-1.378**	0.507	-1.43**	0.508	-1.681**	0.546	-1.536**	0.55

Table 15 - continued

% White Student Body	-8.70E-05	0.002	0	0.002	0.002	0.002	0.001	0.002
HBCU	0.908*	0.416	0.91*	0.416	0.741	0.462	0.683	0.463
Town locale x Multi race	1.231*	0.573	1.285*	0.575	1.169	0.613	1.156	0.613
Suburban locale x female gender	0.283*	0.119	0.266*	0.119	0.197	0.127	0.173	0.128
XL size x Student age	0.069**	0.026	0.072**	0.026	0.085**	0.028	0.078**	0.028
External environment factor	-0.067*	0.028	-0.066*	0.028	-0.083**	0.03	-0.078*	0.031
Student services factor			0.158**	0.028	0.206**	0.03	0.21**	0.03
Engaged and satisfied factor					1.686**	0.051	1.719**	0.052
Engaged and satisfied x female gender					0.137*	0.062	0.127*	0.062
Expectations of self factor							-0.21*	0.045
Expectations of self x female gender							-0.113	0.058
Expectations of self x first-generation							-0.145*	0.071
Cox & Snell R²	.041		.047		.468		.480	
Nagelkerke R²	.043		.051		.500		.513	
McFadden R²	.015		.018		.229		.237	
-2 Log likelihood	12602.949		12570.034		9866.997		9757.070	
Chi-square	192.573**		225.488**		2928.524**		3038.452**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Reference category for race variables is White. Reference category for locale is city. Reference category for institution size is large. Binary coding for remaining variables: gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1); HBCU (n = 0, y = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Comparison of Ordinal and Binary Models for 2012 Belonging Variable

In comparing the ordinal and binary logistic regression final models, similarities emerged. For demographic variables, both found that black racial identity and female gender were significant positive predictors whereas increasing age was a negative predictor. However, the ordinal model also identified that American Indian racial identity was a significant positive predictor whereas the binary model found that Pacific Islander racial identity was a negative predictor. For institutional variables, extra-large institution size was a significant negative predictor in both models. This means that being at an institution classified as extra-large instead of large gave a student a lower likelihood of feelings of belonging. Suburban locale was also a significant negative predictor in both models. In other words, attending an institution located in a suburb instead of a city was associated with being less likely to have a sense of belonging.

When comparing the impact of factors, both models found significant negative effect of the financial background factor. There was a positive factor loading with income group variable and a negative factor loading with the use of financial aid services variable. In other words, students who were in a higher income group and did not use financial aid were less likely to have a sense of belonging. The external environment factor was also found to have a significant negative effect in both models. This factor had positive factor loadings with both the distance from a student's home to the institution variable and the hours worked per week variable. What this means is that students who worked more hours a week and lived farther from their institutions were less likely to have a sense of belonging. The binary and ordinal models also found a significant

negative effect for expectations of self. This factor had positive factor loadings with the variable of how likely a participant reported they felt it was that they would finish their degree by the date they expected and the variable of the highest level of education expected by the participant. Put another way, students having higher expectations for their academic future were less likely to experience a sense of belonging. Both models also found a significant positive effect of the student services factor. This factor encompassed the students' reported use of academic advising, academic support services, and career services in the 2011-12 academic year. Thus, using student services was associated with having a greater sense of belonging. Finally, both models also found a positive effective from the student engagement and satisfaction factor. This factor included variables that represented whether a participant agreed with the statements that their interactions with other students and with faculty institution were more positive than negative, whether students reported that were satisfied with their studies and their social experience, and student's reported academic confidence. In other words, positive interactions with faculty and peers, liking the social and academic experience at an institution, and having confidence in one's ability to succeed were all associated with feelings of belonging.

The ordinal model also identified positive impacts of the age and independence factor. Being an independent student in terms of financial aid eligibility, being married, and having dependents were thus associated with feelings of belonging in the ordinal model, but not in the binary model. Unlike the binary model, the ordinal model also found a negative impact of the high school preparation factor. Students who took college

credits in high school, took higher levels of high school math coursework, and had higher GPAs were less likely to feel that they belonged in the ordinal model. Only the ordinal model found a positive interaction effect between whether a student was born in the United States and age meaning that when a student was born outside the United States, increasing age was associated with a higher likelihood of feelings of belonging. In contrast, only the binary model found a positive interaction effect between first-generation status and age in which, for first-generation students, increasing age was associated with an increased chance of a sense of belonging.

Binary Logistic Regression Analysis for 2014 Belonging Variable

Analyses were repeated with the same independent variables and factors utilizing the 2014 binary and ordinal sense of belonging variables as dependent variables. This process was performed to explore the impact of the independent variables on sense of belonging over time and nearer to the end of a students' time at an institution. Analyses were first performed to understand the influence of contributory variables on the 2014 sense of belonging binary variable (Table 16). Like in the previous analysis, after each factor and set of variables was added, bivariate correlations were performed to examine the potential interactions between each demographic variable and the factor. Correlations that were found to be significant were then added separately, one by one, to the regression, to determine whether the interaction would significantly predict the dependent variable.

The regression was first performed by adding student demographic variables (Model 1). The overall model was statistically significant with a Nagelkerke R^2 of .035,

indicating that 3.5% of variance was explained by the model. Female gender and Black racial identity were found to be significant and associated with students being more likely to have a sense of belonging. Next, the factor representing age and independence was added (Model 2). The model was statistically significant with a Nagelkerke R^2 of .04. The factor independently was not significant; however, the interaction effect of the factor and Black racial identity was significantly with an $Exp(\beta)$ of 1.646 meaning that for every one unit of increase in the factor for students with Black racial identity, a student was 1.646 times as likely to have a sense of belonging. In Model 3, the financial background factor was added to the regression. The overall model was found to be significant with a Nagelkerke R^2 of .043, meaning that approximately 4.3% of the variance was explained. The financial background factor was significant was an $Exp(\beta)$ of 0.894. The next step added the high school preparation factor (Model 4). The overall model was significant with a Nagelkerke R^2 of .043. The high school preparation factor itself was not significant.

In Model 5, the variables representing characteristics of the institution were added to the regression including institution locale and size, the percent of the student body who identified as White, as well as whether an institution met the federal definition of an HBCU. The model was significant with a Nagelkerke R^2 of .072. The variables of suburban locale was significant with an $Exp(\beta)$ of 0.702, meaning that an institution being located in a suburb instead of a city holding all else constant meant a student had a 0.702 likelihood of having a sense of belonging. The percentage of White students in a student body was also significant; the $Exp(\beta)$ of 1.008 suggests that for every one unit of

change in the variable increases the odds of a student having a sense of belonging by 1.008. In this model, first-generation status also become significant with an Exp(β) of 1.224, indicating that being a first-generation student was associated with a 1.224 increase in likelihood of having a sense of belonging. The percentage of White students in a student body and first-generation students was significant with Exp(β) of 0.985. In other words, in 2014, first-generation students' chance of having a sense of belonging decreased as the percentage of White students in the student body increased. The interaction of medium institution size and Hispanic racial identity was also significant with a Exp(β) of 0.52, indicating that being in a medium instead of a large institution was associated with a lower chance of a student having a sense of belonging.

Model 6 added the external environment factor and was overall significant with a Nagelkerke R^2 of .078. The external environment factor was significant with a Exp(β) of 0.815. An interaction of external environment and first-generation status was also significant with an Exp(β) of 1.398, indicating that the external environment factor that represented commuting distance and hours worked per week did not decrease the chance of a first-generation having a sense of belonging like it did for other students. In the next step (Model 7), the student services factor was added. The overall model was found significant with a Nagelkerke R^2 of .085. The student services factor was significant with a Exp(β) of 0.815 and the interaction of the student services factor and female gender was also significant with a Exp(β) of 1.398. This indicated that accessing student services increased odds of having a sense of belonging if the student identified as female and a decreased odds of having a sense of belonging if the student identified as male. The

demographic variable of whether a student was born in the United States also became

significant in this step, with a Exp(β) of 1.475. In the next step (Model 8), the factor of

student engagement and satisfaction was added. The overall model was significant with a

Nagelkerke R² of .122. Additionally, the factor was significant with a Exp(β) of 1.451,

suggesting that for every one unit increase in the factor, a student's odds of having a

sense of belonging increased by 1.451. The interaction effect of rural institutional locale

and whether a student was born in the United States became significant in this step with a

Exp(β) of 0.339. For a student born outside the US, attending a school located in a rural

location was associated with decreased odds of having a sense of belonging. In the final

step, the expectations of self factor was added (Model 9). This model was overall

significant with a Nagelkerke R² of .128. This suggests that 12.8% of the variance was

explained by the model. The factor of expectations of self was significant, with a Exp(β)

of 0.855 meaning that for every one unit of increase in the factor, a student was 0.855

times as likely to have a sense of belonging. The interaction of medium institution size

and Hispanic racial identity was no longer significant in this step of the model.

Table 16

Binary Regression Analysis for 2014 Sense of Belonging Variable

	Model 1		Model 2		Model 3		Model 4		Model 5	
Predictor	β (SE)	Exp(β)	β (SE)	Exp(β)	β (SE)	Exp(β)	β (SE)	Exp(β)	β (SE)	Exp(β)
(Constant)	-0.149 (0.477)	.861	-0.131 (0.717)	0.855	-0.102 (0.722)	0.903	-0.102 (0.744)	0.903	-4.77E-01 (0.772)	0.621
Student age	0.016 (0.024)	1.016	0.015 (0.036)	1.015	0.016 (0.037)	1.016	0.016 (0.038)	1.016	0.009 (0.038)	1.009
Race: Black	0.816** (0.171)	2.260	0.871** (0.179)	2.39	0.781** (0.184)	2.184	0.781** (0.184)	2.184	0.858** (0.192)	2.358
Race: Hispanic	0.110 (0.124)	1.117	0.102 (0.125)	1.107	0.063 (0.126)	1.065	0.063 (0.126)	1.065	0.293 (0.154)	1.34
Race: Asian	0.274 (0.249)	1.315	0.269 (0.25)	1.309	0.22 (0.251)	1.246	0.22 (0.251)	1.246	0.392 (0.261)	1.48
Race: American Indian	1.152 (0.643)	3.164	1.159 (0.643)	3.185	1.143 (0.645)	3.137	1.143 (0.645)	3.137	1.16 (0.65)	3.189
Race: Pacific Islander	0.038 (0.740)	1.038	0.017 (0.741)	1.018	0.043 (0.742)	1.044	0.043 (0.742)	1.044	0.133 (0.76)	1.143
Race: Multiple	0.114 (0.266)	1.121	0.107 (0.266)	1.113	0.087 (0.267)	1.091	0.087 (.0.267)	1.091	0.144 (0.271)	1.155
Gender: Female	0.320** (0.103)	1.377	0.319** (0.104)	1.376	0.302** (0.104)	1.353	0.302** (0.104)	1.353	0.307** (0.106)	1.36
First-generation status	0.239 (0.134)	1.270	0.232 (0.135)	1.262	0.202 (0.136)	1.224	0.202 (0.136)	1.224	0.923** (0.326)	2.517
Born in U.S.	0.187 (0.175)	1.205	0.183 (0.176)	1.201	0.193 (0.176)	1.213	0.193 (0.177)	1.213	0.364 (0.191)	1.438
Age and independence factor			-0.036 (0.085)	0.965	-0.032 (0.086)	0.968	-0.032 (0.087)	0.968	-0.018 (0.088)	0.982
Age and independence x Black race			0.498* (0.222)	1.646	0.474* (0.22)	1.607	0.474* (0.22)	1.607	0.49* (0.221)	1.632
Financial background factor					-0.112* (0.053)	0.894	-0.112* (0.053)	0.894	-0.099 (0.054)	0.905
High school preparation factor							0 (0.054)	1	-0.005 (0.056)	0.995
Locale: Suburb									-0.354** (0.123)	0.702
Locale: Town									-0.014 (0.225)	0.986
Locale: Rural									0.209 (0.173)	1.233

Table 16 - continued

Variable	M1		M2		M3		M4		M5	
Institution size: Small									0.254 (0.246)	1.29
Institution size: Medium									0.307 (0.162)	1.359
Institution size: XL									0.186 (0.13)	1.204
% White student body									0.008* (0.003)	1.008
HBCU									-0.706 (0.762)	0.494
Rural locale x born in U.S.									-0.948 (0.494)	0.388
Medium size x Hispanic race									-0.653* (0.321)	0.52
% White x first-generation									-0.015* (0.006)	0.985
External environment factor										
External environment x first-gen										
Student services factor										
Student services x female gender										
Engaged and satisfied factor										
Expectations of self factor										
Cox & Snell R²	.026		.029		.032		.032		.052	
Nagelkerke R²	.035		.040		.043		.043		.072	
-2 Log likelihood	2202.049		2195.952		2191.494		2187.883		2151.049	
Chi-square	44.415**		50.512**		54.972**		54.972**		91.806**	

Table 16 - continued

Predictor	Model 6 β (SE)	Model 6 Exp(β)	Model 7 β (SE)	Model 7 Exp(β)	Model 8 β (SE)	Model 8 Exp(β)	Model 9 β (SE)	Model 9 Exp(β)
(Constant)	-.649 (.783)	0.523	-0.585 (0.786)	0.557	0.084 (0.802)	1.087	0.051 (0.805)	1.052
Student age	0.016 (0.039)	1.016	0.013 (0.039)	1.013	-0.022 (0.04)	0.979	-0.02 (0.04)	0.98
Race: Black	0.847** (0.193)	2.332	0.854** (0.194)	2.35	0.846** (0.197)	2.331	0.834** (0.198)	2.302
Race: Hispanic	0.277 (0.155)	1.319	0.269 (0.156)	1.308	0.243 (0.157)	1.275	0.238 (0.158)	1.268
Race: Asian	0.359 (0.262)	1.432	0.348 (0.262)	1.416	0.36 (0.266)	1.433	0.347 (0.267)	1.415
Race: American Indian	1.091 (0.651)	2.978	1.046 (0.651)	2.847	0.91 (0.656)	2.484	0.935 (0.656)	2.548
Race: Pacific Islander	0.198 (0.766)	1.219	0.177 (0.768)	1.193	0.223 (0.777)	1.25	0.268 (0.777)	1.307
Race: Multiple	0.119 (0.272)	1.127	0.131 (0.273)	1.14	0.196 (0.279)	1.216	0.182 (0.279)	1.199
Gender: Female	0.310** (0.106)	1.363	0.294** (0.107)	1.342	0.297** (0.108)	1.346	0.319** (0.109)	1.376
First-generation status	1.088** (0.339)	2.968	1.065** (0.34)	2.902	1.012** (0.342)	2.75	1.02** (0.342)	2.772
Born in U.S.	0.368 (0.192)	1.444	0.389* (0.193)	1.475	0.388* (0.196)	1.474	0.407* (0.197)	1.502
Age and independence factor	-0.040 (0.89)	0.961	-0.041 (0.09)	0.96	0.005 (0.091)	1.005	0.003 (0.092)	1.003
Age and independence x Black race	0.511* (0.223)	1.667	0.532* (0.221)	1.703	0.561* (0.226)	1.752	0.602** (0.231)	1.825
Financial background factor	-0.106 (0.054)	0.899	-0.117* (0.054)	0.89	-0.123* (0.055)	0.885	-0.13* (0.056)	0.878
High school preparation factor	0.003 (0.056)	1.003	-0.008 (0.056)	0.992	-0.029 (0.057)	0.972	-0.033 (0.057)	0.967
Locale: Suburb	-0.364** (0.124)	0.695	-0.373** (0.124)	0.689	-0.393** (0.126)	0.675	-0.386** (0.126)	0.68
Locale: Town	-0.009 (0.226)	0.991	0.027 (0.227)	1.028	0.002 (0.23)	1.002	0.005 (0.231)	1.006
Locale: Rural	0.204 (0.173)	1.226	0.22 (0.174)	1.246	0.226 (0.177)	1.253	0.257 (0.178)	1.293

Table 16 - continued

Institution size: Small	0.237 (0.246)	1.268	0.192 (0.247)	1.212	0.139 (0.25)	1.149	0.115 (0.251)	1.122
Institution size: Medium	0.299 (0.162)	1.348	0.278 (0.163)	1.321	0.292 (0.166)	1.339	0.263 (0.167)	1.301
Institution size: XL	0.195 (0.130)	1.215	0.177 (0.131)	1.194	0.179 (0.133)	1.197	0.196 (0.133)	1.217
% White student body	0.008** (0.003)	1.008	0.009** (0.003)	1.009	0.009** (0.003)	1.009	0.009** (0.003)	1.01
HBCU	-0.658 (0.763)	0.518	-0.655 (0.763)	0.519	-0.863 (0.761)	0.422	-0.758 (0.765)	0.469
Rural locale x born in U.S.	-0.903 (0.501)	0.405	-0.968 (0.504)	0.38	-1.083* (0.507)	0.339	-1.097* (0.508)	0.334
Medium size x Hispanic race	-0.601 (0.323)	0.549	-0.639* (0.324)	0.528	-0.665* (0.329)	0.514	-0.642 (0.33)	0.526
% White x first-generation	-0.018** (0.006)	0.982	-0.017** (0.006)	0.983	-0.016** (0.006)	0.984	-0.017** (0.006)	0.983
External environment factor	-0.118* (0.054)	0.889	-1.25E-01* (.054)	0.882	-1.31E-01*) (0.053	0.877	-1.39E-01** (0.052)	0.871
External environment x first-gen	0.415* (0.193)	1.514	0.426* (0.193)	1.531	0.38 (0.196)	1.463	0.412* (0.197)	1.509
Student services factor			-0.204** (0.078)	0.815	-0.223** (0.079)	0.8	-0.234** (0.08)	0.791
Student services x female gender			0.335** (0.106)	1.398	0.352** (0.108)	1.422	0.364** (0.108)	1.439
Engaged and satisfied factor					0.372** (0.054)	1.451	0.358** (0.054)	1.431
Expectations of self factor							-0.156** (0.055)	0.855
Cox & Snell R²	.057		.062		.089		.093	
Nagelkerke R²	.078		.085		.122		.128	
-2 Log likelihood	2142.940		2132.644		2083.161		2075.015	
Chi-square	99.915**		110.211**		159.694**		167.840**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Reference category for race variables is White. Reference category for locale is city. Reference category for institution size is large. Binary coding for remaining variables: gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1); HBCU (n = 0, y = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Ordinal Logistic Regression Analysis for 2014 Belonging Variable

After completing an analysis of the influence of contributory variables on the 2014 sense of belonging binary variable, a second analysis utilized the ordinal 2014 belonging variable as the dependent variable in order to further explore and refine how the variables impacted belonging in 2014. The same process that was used in the 2012 ordinal analysis was repeated, in which variables and factors were added in a stepwise fashion and interaction effects were tested in each step. Interaction effects that were significant were retained in subsequent analysis models. Table 17 shows the outcome of each step of the regression analysis.

In Model 1, demographic variables were added. The model was statistically significant with a Nagelkerke R^2 of .049 which indicated that 4.9% of the variance was explained. Like in the binary regression, both Black racial identity and female gender were significant positive predictors. In the ordinal analysis, first-generation status and the interaction effect of age and Hispanic racial identity were also significant. Subsequently, in Model 2, the age and independence factor was added. This model was significant with a Nagelkerke R^2 of .045. Like in the binary analysis, the factor itself was not significant; however, the interaction of the age and independence factor and Black racial identity was a significant positive predictor with a predicted increase of 0.498 in the log odds of a student being in a higher category of sense of belonging. Additionally, the variable of Hispanic racial identity was now found to be a significant negative predictor with a predicted decrease of 2.822 in the log odds of being in a higher category.

In the next step (Model 3), the financial background factor was added and the overall model was significant with a Nagelkerke R^2 of .048. Like in the binary model, the factor was found to be a significant negative predictor with a predicted decrease of 0.104 in the log odds of being in a higher category. No significant interactions were found in the step. In Model 4, the high school preparation factor was added and the model was found to be significant with a Nagelkerke R^2 of .054. While no additional significant factor or interactions were found in this step in the binary analysis, in the ordinal analysis, the high school preparation factor was a significant negative predictor with a predicted decrease of 0.111 in the log odds of being in a higher category for sense of belonging. Additionally, the interaction of the high school factor and first-generation status was a significant positive predictor with a predicted increase of 0.252 in the log odds. The interaction of high school preparation and the born in the US factor was a significant positive predictor with a predicted increase of 0.315 in log odds. These interactions suggest that high school preparation plays a positive role in sense of belonging for both first-generation students and students born outside of the United States unlike for other groups of students.

In the following step (Model 5), variables representing the characteristics of the institution were added and the model was found to be significant overall with a Nagelkerke R^2 of .079. Like in the binary analysis, the suburban locale variable was a significant negative predictor with a predicted decrease in the log odds of 0.255. The percentage of the student body that was White was a significant positive predictor with a predicted increase of 0.01 in the log odds. Additionally, like in the binary model, first-

generation status was found to be a significant positive predictor starting in this step with a predicted increase of 0.818 in the log odds. The interaction of first-generation status and the percentage of White students in the student body was a significant negative predictor with a predicted decrease of 0.011 in the log odds of being in a higher category. The analysis did not show that the interaction of medium institution size and Hispanic racial identity was significant like in the binary model. However, the ordinal analysis did find that the interaction of Hispanic racial identity and the percentage of White students in the student body was a significant negative predictor with a predicted decrease of 0.014 in the log odds of being in a higher category for sense of belonging and that the interaction of rural locale and Asian racial identity was a significant negative predictor with a predicted decrease of 2.643 in the log odds.

The following step (Model 6) added the external environmental factor and was found overall to be significant with a Nagelkerke R^2 of .087. While in the binary model, the factor itself and the interaction of the factor and first-generation status were both significant, in this ordinal model the factor itself was not a significant predictor while the interaction of the factor and first-generation status was still a significant positive predictor with a predicted increase of 0.362 in log odds of being in a higher category. Additionally, in the ordinal analysis, the interaction of the factor and female gender was a significant negative predictor with a predicted decrease of 0.174 in the log odds of being in a higher category. This finding indicates that the external environment factor that represented commuting distance and hours worked per week decreased belonging only for female-identifying students and increased belonging only for first-generation students.

In Model 7, the student services factor was added and the analysis was found to be overall significant with a Nagelkerke R^2 of .096. Like the binary regression, the student services factor was a significant negative predictor with a predicted decrease of 0.241 in the log odds of being in a higher category and the interaction of the student services factor and female gender was a significant positive predictor with a predicted increase of 0.355 in log odds of being in a higher category. The combination of these two predictors suggests that accessing student services has a positive impact on female-identifying students and a negative impact on male-identifying students. The variable representing whether a student was born in the United States did not become significant in this step like the variable did in the binary analysis.

In the next step (Model 8), the student engagement and satisfaction factor was added and the regression was found to be overall significant with a Nagelkerke R^2 of .129. Like in the binary analysis, the factor itself was a significant positive predictor with a predicted increase in log odds of being in a higher category of 0.361. In the ordinal regression, the interaction of external environment and first-generation status remained a significant predictor whereas it ceased to be a significant predictor in this step of the binary analysis. The final step of the regression (Model 9) added the expectations of self factor and was overall significant with a Nagelkerke R^2 of .129. The factor in the ordinal regression was not a significant predictor ($p = .078$) like it was in the binary regression. No other changes were noted.

Table 17

Ordinal Regression Analysis for 2014 Sense of Belonging Variable

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
[BELONG = 1]	-2.011**	0.199	-1.96**	0.638	-1.983**	0.64	-2.11**	0.661	-1.59**	0.686
[BELONG = 2]	-1.073**	0.186	-1.003	0.634	-1.024	0.635	-1.151	0.656	-0.62	0.682
[BELONG = 3]	0.248	0.182	0.333	0.632	0.315	0.634	0.192	0.655	0.748	0.681
[BELONG = 4]	1.3**	0.184	1.369*	0.633	1.353*	0.635	1.234	0.656	1.805**	0.682
Student age	0.021**	0.008	0.027	0.032	0.029	0.032	0.022	0.033	0.017	0.034
Race: Black	0.822**	0.131	0.825**	0.143	0.743**	0.148	0.73**	0.148	0.846**	0.157
Race: Hispanic	-1.166	0.645	-2.822*	1.289	-3.001*	1.294	-3.03*	1.297	-2.319	1.316
Race: Asian	0.067	0.199	0.077	0.213	0.028	0.214	0.068	0.215	0.39	0.229
Race: American Indian	0.419	0.441	0.583	0.461	0.565	0.461	0.553	0.463	0.543	0.466
Race: Pacific Islander	0.165	0.65	0.144	0.651	0.161	0.652	0.249	0.652	0.412	0.657
Race: Multiple	0.218	0.222	0.155	0.234	0.135	0.234	0.134	0.235	0.242	0.238
Gender: Female	0.369**	0.085	0.303**	0.091	0.289**	0.091	0.304**	0.091	0.315**	0.092
First-generation status	0.26*	0.108	0.281*	0.116	0.253*	0.116	0.269*	0.117	0.818**	0.275
Born in U.S.	0.184	0.137	0.162	0.151	0.171	0.151	0.079	0.158	0.157	0.16
Age x Hispanic race	0.067*	0.034	0.156*	0.069	0.163*	0.069	0.164*	0.069	0.165*	0.07
Age and independence factor			-0.06	0.074	-0.059	0.074	-0.055	0.076	-0.044	0.076
Age and independence x Black race			0.498**	0.163	0.484**	0.161	0.504**	0.162	0.503**	0.165
Financial background factor					-0.104*	0.046	-0.106*	0.046	-0.091	0.047
High school preparation factor							-0.111*	0.054	-0.107	0.055
High school preparation x first-gen							0.252*	0.121	0.231	0.122
High school preparation x born in US							0.315*	0.14	0.345*	0.141
Locale: Suburb									-0.255*	0.108
Locale: Town									-0.093	0.192
Locale: Rural									0.254	0.145

Table 17 - continued

Institution size: Small									0.272	0.208
Institution size: Medium									1.60E-01	0.127
Institution size: Extra large									0.134	0.113
% White student body									0.01**	0.003
HBCU									-0.44	0.655
Rural locale x Asian race									-2.643**	0.938
% White student body x Hispanic race									-0.014**	0.005
% White student body x first-gen									-0.011*	0.005
External environment factor										
External environment x female gender										
External environment x first-generation										
Student services factor										
Student services x female gender										
Engaged and satisfied factor										
Expectations of self factor										
Cox & Snell R²	.046		.042		.045		.051		.074	
Nagelkerke R²	.049		.045		.048		.054		.079	
McFadden R²	.017		.015		.016		.018		.027	
-2 Log likelihood	1626.786		4756.861		4751.628		4741.513		4688.451	
Chi-square	91.258**		73.524**		78.757**		88.872**		131.608**	

Table 17 - continued

	Model 6		Model 7		Model 8		Model 9	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
[BELONG = 1]	-1.503*	0.693	-1.528*	0.694	-2.176**	0.7	-2.169**	0.7
[BELONG = 2]	-0.525	0.688	-0.546	0.69	-1.179	0.696	-1.172	0.696
[BELONG = 3]	0.852	0.688	0.84	0.689	0.243	0.695	0.252	0.695
[BELONG = 4]	1.915**	0.689	1.909**	0.691	1.338	0.695	1.349	0.696
Student age	0.021	0.034	0.02	0.034	-0.011	0.034	-0.01	0.034
Race: Black	0.832**	0.157	0.842**	0.157	0.825**	0.158	0.813**	0.158
Race: Hispanic	-2.327	1.317	-2.326	1.319	-2.033	1.327	-1.916	1.325
Race: Asian	0.363	0.23	0.359	0.23	0.36	0.231	0.349	0.231
Race: American Indian	0.508	0.467	0.468	0.468	0.337	0.469	0.353	0.47
Race: Pacific Islander	0.542	0.664	0.54	0.667	0.611	0.67	0.63	0.67
Race: Multiple	0.235	0.238	0.241	0.238	0.297	0.24	0.287	0.24
Gender: Female	0.316**	0.092	0.308**	0.092	0.315**	0.092	0.327**	0.093
First-generation status	0.955**	0.284	0.937**	0.284	0.862**	0.285	0.858**	0.285
Born in U.S.	0.163	0.161	0.163	0.161	0.165	0.162	0.171	0.162
Age x Hispanic race	0.164*	0.07	0.164*	0.07	0.148*	0.071	0.14*	0.071
Age and independence factor	-0.067	0.077	-0.071	0.077	-0.022	0.078	-0.023	0.078
Age and independence x Black race	0.511**	0.166	0.535**	0.164	0.544**	0.166	0.562**	0.168
Financial background factor	-0.096*	0.047	-0.107*	0.047	-0.113*	0.047	-0.116*	0.047
High school preparation factor	-0.101	0.055	-0.114*	0.055	-0.136*	0.056	-0.139*	0.056
High school preparation x first-gen	0.229	0.122	0.23	0.122	0.202	0.123	0.21	0.123
High school preparation x born in US	0.334*	0.141	0.357*	0.142	0.359*	0.142	0.358*	0.142
Locale: Suburb	-0.257*	0.108	-2.65E-01*	0.108	-0.28*	0.109	-0.273*	0.109
Locale: Town	-0.095	0.192	-0.053	0.193	-0.094	0.193	-0.09	0.193
Locale: Rural	0.253	0.145	0.271	0.145	0.242	0.146	0.258	0.146
Institution size: Small	0.248	0.209	0.202	0.209	1.75E-01	0.21	0.16	0.21

Table 17 - continued

Institution size: Medium	1.68E-01	0.128	0.14	0.128	0.146	0.129	1.33E-01	0.129
Institution size: Extra large	0.136	0.113	0.124	0.113	0.135	0.114	0.145	0.114
% White student body	0.01**	0.003	0.011**	0.003	0.011**	0.003	0.011**	0.003
HBCU	-0.423	0.656	-0.411	0.655	-0.561	0.656	-0.51	0.657
Rural locale x Asian race	-2.588**	0.938	-2.634**	0.941	-2.703**	0.947	-2.647**	0.949
% White student body x Hispanic race	-0.013**	0.005	-0.014**	0.005	-0.014**	0.005	-0.014**	0.005
% White student body x first-gen	-0.014*	0.005	-0.013**	0.005	-0.012*	0.005	-0.012*	0.005
External environment factor	-0.016	0.067	-0.031	0.067	-0.042	0.068	-0.039	0.068
External environment x female gender	-0.184*	0.086	-0.174*	0.086	-0.16	0.086	-0.171*	0.086
External environment x first-generation	0.362*	0.16	0.383*	0.16	0.326*	0.16	0.338*	0.161
Student services factor			-0.241**	0.068	-0.252**	0.068	-0.258**	0.068
Student services x female gender			0.355**	0.09	0.356**	0.091	0.362**	0.091
Engaged and satisfied factor					0.361**	0.046	0.354**	0.046
Expectations of self factor							-0.082	0.047
Cox & Snell R²	.082		.090		.121		.123	
Nagelkerke R²	.087		.096		.129		.131	
McFadden R²	.030		.034		.046		.046	
-2 Log likelihood	4673.561		4657.784		4599.124		4596.067	
Chi-square	146.498**		162.275**		220.935**		223.992**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Reference category for race variables is White. Reference category for locale is city. Reference category for institution size is large. Binary coding for remaining variables: gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1); HBCU (n = 0, y = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Comparison of Ordinal and Binary Models for 2014 Belonging Variable

Overall, a comparison of the binary and ordinal logistic regression final models reveals similarities. For demographic variables, Black racial identity, female gender, and first-generation status were all significant and positively predicted a sense of belonging. Being at an institution located in a suburb instead of a city was negatively associated with belonging. Additionally, the percentage of a student body that was white was a positive predictor of belonging overall. In both models, the interaction of white students in the student body percentage and first-generation status was negatively associated with belonging. In other words, for first-generation students, an increase in the percentage of white students at an institution negatively predicted belonging.

Like in the 2012 models, the factor of financial background was a significant negative predictor in both models, meaning that students in a higher income group and those who did not use financial aid services were less likely to have a sense of belonging. Similarly, the factor of engagement and satisfaction was a positive predictor in both the binary and ordinal models in both 2012 and 2014. Viewing peer and faculty interactions as more positive than negative, being satisfied with one's studies and social experience at an institution, and feeling confident in one's ability to succeed as a student are all part of this factor that is associated with belonging. Like in 2012, the factor of expectations of self was a negative predictor of belonging in both models. In short, expecting that one would achieve a higher level of education and complete their degree by the associated date was associated with a lower chance of having feelings of belonging.

Unlike in 2012, the student service factor was a significant negative predictor of belonging in both models. Using student services such as academic advising, academic support services, and career services was negatively associated with belonging overall. However, the interaction of student services and female gender was a positive predictor of belonging. Accessing student services negatively predicted belonging for male students and positively predicted belonging for female students. The external environment factor was not associated with belonging in the ordinal model while it had a negative correlation with belonging in the binary model. The 2012 model found a negative association in both models. In other words, in 2014, living farther from campus and working more hours no longer had as clear of an overall detrimental impact on belonging. Additionally, both models in 2014 found an interaction between external environment and first-generation status such that being a first-generation student was associated with a positive impact of external environment. Additionally, in the ordinal model, the interaction of external environment and female gender was significant. For female students, working more hours and living farther from campus was negatively associated with belonging.

The binary regression was the only model that found that the born in the United States variable significantly positively predicted belonging. Additionally, only that model found a negative association between the expectations of self factor and belonging. In contrast, the ordinal regression was the only model that found that the high school preparation factor was a negative predictor of belonging. Like in 2012, having a higher level of coursework or a higher GPA was associated with a lower likelihood of sense of

belonging. In the binary 2014 regression, this finding was reversed for first-generation students. In this case, having a higher GPA or taking a higher level of coursework was associated with a higher likelihood of belonging for first-generation participants. The ordinal 2014 model also found a significant interaction between age and Hispanic racial identity, such that for Hispanic students, increasing age was associated with a greater likelihood of being in a higher category of institutional belonging. This model also found a positive association between the interaction of high school preparation and the born in the United States variable, such that for students born outside of the United States, high school preparation was correlated with an increased likelihood of being in a higher category of institutional belonging. In the ordinal model, there was also a negative association between rural locale and Asian racial identity. In other words, for Asian students being in a rural institution instead of a city was associated with a lower likelihood of being in a higher category of institutional belonging. Moreover, in the ordinal analysis, for Hispanic students, there was a lower likelihood of being in a higher category of belonging as the percentage of White students at an institution increased.

Summary of Analysis 1

Examining the influences on students' sense of belonging in 2012 and in 2014 reveals a deeper understanding of what can influence first-year belonging and how that influence can change longitudinally. Overall, positive perceptions of peers and faculty, belief in one's ability to succeed academically, and satisfaction with one's social experience and academics are the strongest predictors of belonging and that effect persists over time. Being in a higher income group and not using financial aid services, in

effect likely also a signifier of wealth, predicted a lower sense of belonging at both time points. Black racial identity and female gender identity also remain positive predictors in both 2012 and 2014. An institution being in a suburb instead of a city was always associated with a lower likelihood of feelings of belonging. Likewise, high school preparation such as GPA and college-level coursework was a negative predictor of belonging in both the 2012 and 2014 ordinal regressions.

Looking at belonging in 2014 allowed for an examination of the longer-term impact of different variables and factors and how that might change over time. First-generation status was not associated with belonging in 2012. However, in 2014, being first-generation was associated with a higher likelihood of having a sense of belonging. In contrast, age negatively predicted belonging in 2012, but this association was no longer significant in 2014. Accessing student services was positively associated with belonging in 2012. In 2014, the impact was mixed. For female students, accessing student services still predicted having a sense of belonging. In contrast, for male students, there was a negative association between the utilization of student services and belonging. Interactions of variables in 2014 also revealed impacts over time. Being a first-generation student interacted with living further from campus and working more hours to positively influence belonging in a way not seen with other student groups. There was also an interaction with gender in which external environment impacted the belonging of only female students over time.

Analysis 2

Research Question 2 asked to what extent does students' institutional sense of belonging influence their retention and completion outcomes including students' enrollment intensity, grade point average, year-to-year retention, vertical transfer to four-year institutions, and credential completion? To answer this question, separate regression analyses were performed to test the association between students' sense of belonging and each outcome variable.

Analysis of Sense of Belonging and Stopouts

A binary logistic regression was used to evaluate the relationship between binary sense of belonging and the dependent variable of stopouts, defined as whether a student stopped out of college for at least five months by 2014 (Model 1, Table 18). This analysis was utilized because the dependent variable was a binary yes/no outcome. The regression was statistically significant, $\chi 2(1) = 10.995$, $p < .001$. Students who reported having a sense of belonging were 0.786 as likely to stop out as those who did not.

Second, in order to account for the influence of student characteristics, demographic characteristics were added to the logistic regression to determine whether gender, race, first-generation status, whether a student was born in the United States and age influenced the relationship that sense of belonging on the dependent variable of whether a student had stopped out by 2014 (Model 2). The regression was statistically significant, $\chi 2(11) = 59.547$, $p < .001$. Having a sense of belonging continued to be associated with a similarly lower probability of stopping out $(Exp(\beta) = 0.777, p<.001)$. Age also was associated with a slightly lower probability of stopping out $(Exp(\beta) =$

0.972) and black racial identity was associated with a higher probability of stopping out

(Exp(β) = 1.526).

Table 18

Binary Logistic Regression Analysis for Sense of Belonging and Demographics

Predicting Stopouts

Predictor	Model 1		Model 2	
	β (SE)	Exp(β)	β (SE)	Exp(β)
(Constant)	-1.328**	0.265	-0.792	0.453
	(.058)		(0.15)	
2012 binary sense of belonging	-.240**	0.786	-0.252**	0.777
	(.072)		(0.074)	
Student age			-0.028**	0.972
			(0.006)	
Race (ref: White)				
Black			0.423**	1.526
			(0.095)	
Hispanic			0.097	1.102
			(0.097)	
Asian			-0.311	0.733
			(0.211)	
American Indian			0.213	1.237
			(0.399)	
Pacific Islander			-0.13	0.878
			(0.550)	
Multiple			0.21	1.233
			(0.179)	
Gender			-0.055	0.947
			(0.070)	
First-generation status			0.023	1.024
			(0.084)	
Born in the United States			-0.063	0.939
			(0.130)	
Nagelkerke R²	.003		.017	
Cox & Snell R²	.002		.011	
-2 Log likelihood	5420.772		5226.858	
Chi-square	10.995**		59.547**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Variable coding: 2012 binary sense of belonging (n = 0, y = 1), gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analysis of Sense of Belonging and Retention

Binary logistic regression was used to evaluate the relationship between binary sense of belonging and the dependent variable of year one retention, defined as whether a student was retained in school at the end of year one. Table 19 shows the results of the analysis with year one retention as the dependent variable. The overall regression in Model 1 was statistically significant, $\chi2(1) = 14.902$, $p < .001$. Students who reported having a sense of belonging were 1.422 times as likely to be retained at the end of year one as those who did not. The analysis was then repeated with adding demographic variables to understand how their impact influenced the regression (Model 2). The overall model was significant, $\chi2(11) = 108.941$, $p < .001$. Sense of belonging continued to have a significant positive impact on the likelihood of student retention ($p < .001$), with students who had a sense of belonging being 1.5 times as likely to be retained as those who did not. Age and first-generation status also were found to be associated with a lower likelihood of student retention while Hispanic racial identity, Asian racial identity, and female gender were associated with a higher likelihood of a student being retained.

Table 19

Binary Logistic Regression Analysis for Sense of Belonging and Demographics

Predicting Retention at End of Year One

	Model 1		Model 2	
Predictor	β (SE)	Exp(β)	β (SE)	Exp(β)
(Constant)	1.931**	6.898	2.365**	0.146
	(0.071)		(0.146)	
2012 binary sense of belonging	.352**	1.422	0.405**	1.5
	(0.090)		(0.093)	
Student age			-0.032**	0.968
			(0.005)	
Race (ref: White)				
Black			0	1.0
			(0.124)	
Hispanic			0.362**	1.436
			(0.126)	
Asian			1.102**	3.012
			(0.374)	
American Indian			0.085	1.089
			(0.533)	
Pacific Islander			-0.06	0.941
			(0.623)	
Multiple			0.402	1.495
			(0.268)	
Gender			0.366**	1.442
			(0.09)	
First-generation status			-0.31**	0.733
			(0.102)	
Born in the United States			0.207	1.23
			(0.178)	
Nagelkerke R²	.005		.040	
Cox & Snell R²	.003		.019	
-2 Log likelihood	3762.362		3563.215	
Chi-square	14.902**		108.941**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Variable coding: 2012 binary sense of belonging (n = 0, y = 1), gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

A binary logistic regression was also performed to examine the relationship between the 2012 binary sense of belonging and student retention at the end of year two (Model 1, Table 20). The model overall was statistically significant, $\chi 2(1) = 15.297$, $p < .001$. Students who reported having a sense of belonging were 1.283 as likely to be retained at the end of year two than those who did not ($p < .001$). Demographic variables were then added to the analysis (Model 2), which was statistically significant, $\chi 2(11) = 108.941$, $p < .001$. Having a sense of belonging continued to be associated with retention with students who had a sense of belonging reporting a 1.340 likelihood of being retained at the end of year 2 when compared to students without a sense of belonging ($p < 001$). Hispanic and Asian racial identity, female gender identity, and being born outside the US were all associated with a higher probability of being retained at the end of year 2 whereas Black racial identity and being a first-generation student were associated with lower probabilities of being retained.

Table 20

Binary Logistic Regression Analysis for Sense of Belonging and Demographics

Predicting Retention at End of Year Two

Predictor	Model 1		Model 2	
	β (SE)	Exp(β)	β (SE)	Exp(β)
(Constant)	0.833**	2.299	1.088**	2.97
	(0.052)		(0.112)	
2012 binary sense of belonging	.249**	1.283	0.293**	1.34
	(0.063)		(0.065)	
Student age			-0.018**	0.983
			(0.004)	
Race (ref: White)				
Black			-0.243**	0.784
			(0.083)	
Hispanic			0.225**	1.253
			(0.083)	
Asian			0.524**	1.69
			(0.197)	
American Indian			-0.168	0.845
			(0.35)	
Pacific Islander			-0.598	0.55
			(0.415)	
Multiple			-0.124	0.883
			(0.16)	
Gender			0.256**	1.291
			(0.062)	
First-generation status			-0.378**	0.685
			(0.071)	
Born in the United States			0.374**	1.453
			(0.121)	
Nagelkerke R²	.004		.034	
Cox & Snell R²	.003		.024	
-2 Log likelihood	6605.741		6318.319	
Chi-square	15.297**		131.872**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Variable coding: 2012 binary sense of belonging (n = 0, y = 1), gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analysis of Sense of Belonging and GPA

A linear regression of binary sense of belonging and student GPA at their first

institution was conducted (Table 21). Linear regression was used because the dependent

variable was continuous in nature. The researcher first tested for assumptions to ensure

that the data could be analyzed through the process before proceeding. Next, in Model 1,

only sense of belonging was inputted as an independent variable. Sense of belonging was

not a significant predictor of GPA in the model. In Model 2, demographic variables were

added to control for the impact of these variables. While several of the demographic

variables were found to be significant, sense of belonging was not found to be a

significant predictor of GPA.

Table 21

Linear Regression Analysis for Sense of Belonging and Demographics Predicting GPA

Predictor	Model 1			Model 2		
	B (SE)	β	p.	B (SE)	β	p.
(Constant)	2.43 (0.028)		0	2.115 (0.058)	0.025	<.001*
2012 binary sense of belonging	0.041 (0.034)	0.018	0.219	0.057	0.131	0.074
Student age				0.021 (0.002)	-0.274	<.001*
Race (ref: White)						
Black				-0.803 (0.043)	-0.096	<.001*
Hispanic				-0.248 (0.039)	-0.002	<.001*
Asian				-0.008 (0.082)	-0.045	0.92
American Indian				-0.602 (0.186)	-0.026	0.001*
Pacific Islander				-0.38 (0.205)	-0.049	0.063
Multiple				-0.275 (0.08)	0.058	<.001*
Gender				0.123 (0.03)	-0.093	<.001*
First-generation status				-0.236 (0.036)	0.093	<.001*
Born in the United States				0.333 (0.054)	0.025	<.001*

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Variable coding: 2012 binary sense of belonging (n = 0, y = 1), gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analysis of Sense of Belonging and Vertical Transfer

A binary logistic regression analyzed the relationship between binary 2012 sense of belonging and whether a student vertically transferred to a four-year college or university (Table 23). The analysis was not statistically significant, $\chi2(1) = 3.656$, $p = .056$ (Model 1). Demographic variables were then added to the analysis (Model 2). This model was statistically significant, $\chi2(11) = 253.980$, $p < .001$. Sense of belonging did not significantly predict whether a student vertically transferred ($p = .254$). Asian racial identity, female gender, and being born outside the United States increased the odds of vertical transfer. Black and Hispanic racial identity as well as first-generation status decreased the odds of vertical transfer.

Table 22

Binary Logistic Regression Analysis for Sense of Belonging and Vertical Transfer

	Model 1		Model 2	
Predictor	β (SE)	Exp(β)	β (SE)	Exp(β)
(Constant)	-0.916**	0.400	0.555**	1.741
	(.052)		(0.159)	
2012 binary sense of belonging	-.122	0.885	-0.075	0.927
	(.064)		(0.066)	
Student age			-0.072**	0.931
			(0.007)	
Race (ref: White)				
Black			-0.185*	0.831
			(0.092)	
Hispanic			-0.187*	0.83
			(0.082)	
Asian			0.556**	1.744
			(0.151)	
American Indian			-0.012	0.989
			(0.362)	
Pacific Islander			-0.078	0.925
			(0.455)	
Multiple			0.068	1.071
			(0.16)	
Gender			0.14*	1.151
			(0.062)	
First-generation status			-0.459**	0.632
			(0.08)	
Born in the United States			0.432**	1.541
			(0.107)	
Nagelkerke R²	.001		.065	
Cox & Snell R²	.001		.045	
-2 Log likelihood	6619.382		6239.827	
Chi-square	3.656		253.980**	

*p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Variable coding: 2012 binary sense of belonging (n = 0, y = 1), gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Analysis of Sense of Belonging and Credential Completion

The relationship between students' 2012 sense of belonging and credential completion at a student's first institution by 2014 was analyzed using a binary logistic regression (Table 24). The model was overall statistically significant, $\chi2(1) = 14.467$, $p < .001$ (Model 1). Sense of belonging was associated with a significant 1.320 increase in the odds of a student completing a credential ($p < .001$). Demographic variables were then added to the analysis (Model 2). Belonging continued to significantly positively increase the odds of credential completion ($Exp(\beta) = 1.304$, $p < .001$). Student age was positively associated with increasing the odds of credential completion while Black, Hispanic, American Indian, and multiple racial identity were associated with decreased odds.

Table 23

Binary Logistic Regression Analysis for Sense of Belonging and Credential Completion

	Model 1		Model 2	
Predictor	β (SE)	Exp(β)	β (SE)	Exp(β)
(Constant)	-1.576**	0.207	-1.603**	0.201
	(0.063)		(0.119)	
2012 binary sense of belonging	.278**	1.320	0.266**	1.304
	(0.074)		(0.073)	
Student age			0.019**	1.019
			(0.004)	
Race (ref: White)				
Black			-0.671**	0.511
			(0.103)	
Hispanic			-0.462**	0.63
			(0.09)	
Asian			-0.188	0.828
			(0.18)	
American Indian			-1.464*	0.231
			(0.602)	
Pacific Islander			-0.841	0.431
			(0.619)	
Multiple			-0.55**	0.577
			(0.195)	
Gender			-0.021	0.979
			(0.066)	
First-generation status			-0.126	0.881
			(0.081)	
Born in the United States			-0.108	0.898
			(0.124)	
Nagelkerke R²	.004		.031	
Cox & Snell R²	.003		.020	
-2 Log likelihood	5692.602		5707.286	
Chi-square	14.467**		114.580**	

Note: *p < .05, **p <.01. Black includes African American, Hispanic includes Latino, Pacific Islander includes Native Hawaiian, and American Indian includes Alaska Native. Variable coding: 2012 binary sense of belonging (n = 0, y = 1), gender (male = 0, female = 1), first-generation status (n = 0, y = 1), born in the United States (y = 0, n = 1). Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Summary of Analysis 2

Analysis 2 examined how institutional sense of belonging in 2012 was associated with student academic indicators and outcomes. Sense of belonging predicted retention at the end of students' first and second years in college. Additionally, belonging was negatively associated with students taking stopouts, extended breaks from attending their institution. Overall belonging was associated with students staying enrolled at an institution. Additionally, students who had feelings of belonging at their institution were more likely to finish a degree or certificate at that institution. For all of these findings, belonging continued to predict positive outcomes, even when controlling for demographic factors. A significant association was not found between whether students had a sense of belonging and if they transferred to a four-year college or university. Likewise, there was not a predictive relationship between belonging and students' overall grades at their institution.

Chapter Summary

This chapter first reviewed descriptive statistics of the variables utilized in this analysis. Next, in Analysis 1, a factor analysis was conducted to condense 22 independent variables into seven factors. Subsequently, binary and ordinal regression analyses were conducted to examine the impact of demographic variables, institutional variables, and the seven factors on student sense of belonging both in 2012 and 2014 and to establish predictive models. The models for sense of belonging in 2012 explained a much larger percentage of the variance (45.0% for the binary model and 51.3% for the ordinal model) than did the models for sense of belonging in 2014 (12.8% for the binary model and

13.1% for the ordinal model). In Analysis 2, the researcher examined whether sense of belonging predicted student outcomes. While sense of belonging did not predict student GPA and vertical transfers, belonging did predict whether a student stopped out of school, student retention at the end of year one and year two, and whether a student completed a credential.

CHAPTER 5: RECOMMENDATIONS AND IMPLICATIONS FOR PRACTICE

The central purpose of this research was to investigate the variables and factors that correlate with sense of belonging for community college students and how that sense of belonging predicts student outcomes. The results of the study suggest that sense of belonging is influenced by a number of factors and that belonging is associated with a number of positive student outcomes and negatively correlated with student stopouts. This chapter will review the central research problem, the research undertaken with this study, and the associated findings. Additionally, this chapter will address implications for practice given the findings and examine possibilities for future research.

Summary of the Study Problem and Purpose

Community colleges are open-access, primarily commuter institutions that serve a diverse range of students (Cohen et al., 2014). While these institutions have the advantage of offering a wide range of curricula with few barriers to access, retention and rates continue to remain far lower than those of four-year institutions (Astin, 1972; National Student Clearinghouse Research Center, 2022a). Sense of belonging may be a key concept that influences student persistence, particularly for students from non-majority groups (Hausmann et al., 2007; Strayhorn, 2018). Unfortunately, much of the research on belonging has centered on the experience of students in four-year institutions. Because of differences in the student body characteristics and in the college experience, knowledge may not directly translate into the two-year setting.

The purpose of this study was to explore the factors that may contribute to students' sense of belonging in the community college setting and whether institutional

belonging predicts student outcomes. Because community college students and campuses differ considerably, it is important to conduct research in this setting rather than utilizing the results of research in the four-year setting for guidance. By utilizing national data to examine the elements that contribute to sense of belonging, the present study utilized an exploratory approach to explore contributory factors. This study also assessed what longitudinal outcomes are associated with students' sense of belonging to an institution.

Summary and Discussion of the Results

The primary research questions that guided this study were:

1. What factors are associated with institutional sense of belonging for community college students?

    a. To what extent do students' pre-entry characteristics impact their sense of belonging?

    b. To what extent does students' high school performance impact their sense of belonging?

    c. To what extent do the characteristics of an institution impact students' sense of belonging?

    d. To what extent do students' external environmental factors impact their sense of belonging?

    e. To what extent does students' institutional involvement impact their sense of belonging?

    f. To what extent do students' social and psychological perceptions of faculty and peers impact their sense of belonging?

g. To what extent do students' self-perceptions impact their sense of belonging?

2. To what extent does students' institutional sense of belonging influence their retention and completion outcomes including students' enrollment intensity, grade point average, year-to-year retention, vertical transfer to four-year institutions, and credential completion?

Within these primary questions, the research also investigated the following secondary research questions:

1. To what extent do students' demographic characteristics impact the factors that contribute to student sense of belonging? These demographic factors included race and ethnicity, gender, first-generation student status, and whether students were born in the United States.

2. To what extent do students' demographic characteristics impact the relationship between sense of belonging and student outcomes? These demographic factors included race and ethnicity, gender, first-generation student status, and whether students were born in the United States.

Influences on 2012 Sense of Belonging

Five factors, students' financial background, their external environment, use of student services, their engagement and satisfaction, and their expectations of self, emerged in the analysis with significant associations in predicting sense of belonging. The factor of engagement and satisfaction had the far largest influence on belonging, every unit of increase in this factor was associated with a 425% increase in the likelihood

of a student experiencing a sense of belonging. In short, students having positive perceptions of their interactions with peers and faculty, satisfaction with their social and academic experience, as well as confidence in their ability to succeed was the best predictor of their sense of belonging. Use of student services was associated with a 28% increase in the likelihood of a student experiencing a sense of belonging. Reporting accessing academic advising, academic support services, or career services correlated with belonging.

Three factors were associated with decreases in the likelihood of students having a sense of belonging. First was the factor of external environment, which encompassed working more hours and living farther from campus. These metrics were both signifiers of students who had more obligations off-campus. Additionally, the financial factor that represented factors associated with higher income students and families and less use of financial aid, was also associated with less feelings of belonging. In other words, students who were wealthier were less likely to feel like they belonged. Students' expectations for their academic future—having higher expectations for the level of education they would ultimately complete and their assessment of whether they could complete their declared program within a specific timeframe—were also associated with a lower chance of having a sense of belonging. Students who had higher academic goals and confidence in their ability to finish their degree on time were less likely to feel like they belonged. This effect seemed to be magnified for first-generation students. Findings on the factor that encompassed students' high school academics and age and family status were mixed and are not as clear in the current study.

Characteristics of the institutions themselves and of students also made a difference. The degree of urbanization of an institution influenced sense of belonging. Specifically, institutions located in suburbs tended to lower sense of belonging compared to institutions located in cities. Institutional size also impacted student belonging. Extra-large institutions specifically seemed to have challenges with students experiencing a sense of belonging. Demographic characteristics also had a significant influence on sense of belonging. Students who identified as female were more likely to have sense of belonging. Additionally, Black students were associated with having an increased likelihood of sense of belonging when compared to White students. An increase in student age was also associated with decreasing the likelihood of sense of belonging. Student age and institution size also significantly interacted to influence belonging. In extra-large institutions, increasing age worked to counteract the decreases in belonging seen in those schools.

Influences on 2014 Sense of Belonging

Examining belonging in 2014 revealed that the factor encompassing student engagement and satisfaction including their ratings of interactions with peers and faculty and of their own academic confidence was most influential. A one-unit increase in the student engagement and satisfaction variable was associated with a 43% increase in the likelihood have a sense of belonging two years later. The financial factor that represented socioeconomic status and lack of use of financial aid services also continued to be negatively associated with belonging. A one-point increase in that factor was associated with being 0.878 times as likely to have a sense of belonging. Student expectations of self

continued to be negatively associated with belonging, with a one-unit increase in the factor associated with being .855 as likely to have a sense of belonging. While in 2012, the factor of student services, reflecting accessing advising, academic support services, and career services had a positive influence, the results in 2014 were mixed. Male students who accessed student services were likely to have a sense of belonging whereas female students were more likely to have a sense of belonging. Findings on the external environment were mixed and conclusions on the impact of the factor overall are tentative. However, the results indicated that being a first-generation student seemed to potentially reverse any negative effects of working off-campus or living farther away from home.

Institutional differences and demographics also had significant influences. Female students continued to be more likely to experience feelings of belonging than male students. Black students also continued to be more likely to have a sense of belonging than White students. Unlike in 2012, first-generation students were more likely to have a sense of belonging than non-first-generation students. However, first-generation and Hispanic students were predicted to have decreased belonging as the percentage of White students at a school increased. A school being in a suburb instead of a city was associated with students being less likely to have a sense of belonging. Being an extra-large institution no longer seemed to challenge students' belonging as it did in 2012.

Influences of Belonging on Student Outcomes

Research Question 2 asked to what extent does students' institutional sense of belonging influence their retention and completion outcomes including students' enrollment intensity, grade point average, year-to-year retention, vertical transfer to four-

year institutions, and credential completion? The study found that sense of belonging was associated with students being .777 times as likely to stop out, defined as taking a break of five months of from school. Additionally, students who had a sense of belonging were 1.5 times as likely to be retained at the end of year 1 and 1.34 times as likely to be retained at the end of year 2 than students who did not have a sense of belonging. Belonging appeared to be a protective factor against stopping out or dropping out of school. However, sense of belonging did not have a significant association with student GPA nor with the likelihood of students vertically transferring to a four-year college or university. Finally, students who had a sense of belonging were 1.304 times as likely to complete a credential than those who did not. In other words, belonging increased the chances that students would ultimately receive a degree or certificate.

Discussion of Results

The results of Analysis 1 suggest that the variables and factors identified in this research explain around half of the variance in students' sense of belonging at the end of their first year of college. Engagement and satisfaction emerged as the factors most related to sense of belonging. This factor encompassed whether a student viewed their interactions with faculty and other students positively as well as felt satisfied with their academic and social experience and confident in their academic success. These findings fit with previous research on the importance of peer and faculty interaction and school satisfaction to sense of belonging (Cooner, 2019; Freeman et al., 2007; Hoffman et al., 2002; Tovar & Simon, 2010; Vaccaro & Newman, 2016). The result that academic and social aspects were identified as being in the same factor together fits with previous

research suggesting that academic and social integration may not be separate for community college students (Deil-Amen, 2011; García & Garza, 2016; Garza et al., 2021). Accessing student services was secondary in the importance of the factors and was also identified as important in previous research (Lau et al., 2019; Wood & Harris, 2015). However, this factor was not nearly as strong a predictor as engagement and satisfaction.

In contrast, students having high expectations of their educational outcomes had a negative association with sense of belonging, a somewhat surprising finding. The financial background factor, which encompassed variables that included income group and an association with students not accessing financial aid services, was also negatively predictive of belonging. Previous research has found that wealth tends to be a positive predictor of belonging (Maestas et al., 2007; Ostrove & Long, 2007; Soria & Stebleton, 2013). It is possible that students who had high expectations of educational outcomes and came from wealthier backgrounds felt out of place in the community college setting, highlighting the importance of investing sense of belonging specifically for community college students. Likewise, this study found a positive association between belonging and some racial identity factors including being from a Black or American Indian background whereas other research in four-year settings has found negative associations between belonging and being a student of color (e.g. Berger, 1997; Johnson et al., 2007). In 2014, being a first-generation student also had a positive association with belonging and also served as a protective factor in an interaction effect with the external environment factor which encompassed living farther from campus and working. This finding suggests that,

in some instances, community colleges may provide a place of belonging for students who sometimes feel like outsiders in the traditional academic setting.

Interaction effects found in the research also suggest that, in some circumstances, the impact of identified factors and institutional characteristics may vary based on demographic characteristics. For example, while extra-large institutions tended to be negatively associated with belonging in 2012, increasing student age was associated with reversing this effect. It is possible that students struggle to find their place at a very large college but older students are better able to navigate this challenge. While having high expectations of self was negatively associated with sense of belonging for all students, first-generation students were even more negatively impacted.

While the model for sense of belonging in 2014 explained a smaller percentage of the variance than in 2012, looking at what influenced sense of belonging over time proved valuable. While first-generation status was not a significant predictor of belonging in 2012, it was the top positive predictor of belonging in 2014. While this research does not elucidate why first-generation students were more likely to have a sense of belonging later in their academic trajectory, this finding may be reflective of the first-generation students finding "their place" on campus. First-generation students who were able to persist and succeed may have worked to develop the skills to build community on campus more so than other students. Unfortunately, first-generation and Hispanic students' sense of belonging in the later measurement in 2014 was impacted negatively by being on a less racially diverse campus. It is notable that this effect was not visible in 2012 but emerged over time. The effect of accessing student services also seemed to

change over time. While in 2012, the impact on belonging was overall positive, the findings in 2014 were not as universal. Male students who accessed student services tended to have a lower sense of belonging than those who did not while female students had a positive association with accessing student services.

The findings in Analysis 2 of this student reinforce the importance of sense of belonging and also offer some stipulations in the understanding of when sense of belonging has influence. In the community college setting, belonging appears to impact a student staying enrolled in school, both in terms of not stopping out and being retained over time. These findings fit with previous research indicating that belonging is associated with student retention in the four-year setting (e.g. Hausmann et al., 2007, 2009; Miller et al., 2019). This study also found that belonging was associated with students completing a credential such as a degree or certificate at a community college. The results of the research revealed that belonging to a historically marginalized group often tended to negatively predict outcomes. However, the finding that sense of belonging was positively associated with outcomes suggests that, for some students, having a sense of belonging may serve as a protective factor towards retention and completion. The analyses did not find that belonging was associated with student grade point average counter to some research in the high school and four-year setting (e.g. Hamann, 2022; Khalandi, 2021). It is possible that belonging behaves more as a mechanism that promotes student retention rather than improved grades. Interestingly, belonging also did not predict vertical transfer. This outcome suggests that students

feeling like they belong at an institution may not feel motivated to transfer to a different institution.

Recommendations

The results of this study reinforce the importance of sense of belonging for student outcomes in the community college setting. Students are more likely to stay enrolled at an institution and finish a credential if they report having a sense of belonging at the institution. Therefore, college leaders who are looking at how to increase key performance indicators at their institutions would be well-served to consider how best to bolster feelings of belonging.

This study clearly identified students' academic and social satisfaction and peer and faculty interactions as comprising the most influential element for sense of belonging. The factor analysis did not differentiate the social and academic spheres as separate factors but instead found high factor loadings between these areas. This finding reinforces the findings of Deil-Amen (2011) and García and Garza (2016) that, for community college students, social and academic spheres may not be separated and the differentiation may not be meaningful. Moreover, because community college students' time on campus is concentrated in the classroom, interventions that enhance connection and belonging in the classroom may be most effective.

One recommendation for increasing belonging in the classroom is to assist faculty in developing those skills and creating classroom spaces that are culturally relevant and supportive. Perceiving a classroom as caring and supportive and receiving validation from faculty are both directly associated with increasing sense of belonging (Cooner,

2019; Hoffman et al., 2002; S. Hurtado et al., 2015). College instructors typically have a background in the subject area in which they provide instruction and may not have received training in how to foster a caring classroom environment. Developing opportunities for faculty to build these skills, particularly opportunities that target a significant proportion of instructors at an institution, might be effective in supporting faculty in creating classroom spaces that foster a sense of belonging.

A second recommendation is to prioritize student-faculty connection and interactions when in labor and fiscal decision-making. Frequent interactions with faculty, strong faculty relationships, and faculty-student engagement are all associated with having a sense of belonging (Brooms, 2020; Cooner, 2019; Hoffman et al., 2002; Newman et al., 2015; Wood & Harris, 2015). Faculty often have a number of competing demands outside of teaching such as scholarly productivity and research, committee work, and meeting metrics for tenure and promotion processes (Eagan & Garvey, 2015). For student belonging to be a primary concern, work expectations and standards that support and reward faculty for prioritizing student connection and relationships should be established.

Additionally, college leaders and government legislatures should consider prioritizing increasing the percentage of full-time faculty. Many colleges have become increasingly reliant on part-time or adjunct faculty and this problem is particularly pervasive in community colleges (Center for Community College Student Engagement, 2014; Ran & Xu, 2017). Adjunct faculty often work at multiple institutions and may not be employed consistently at an institution from term to term. Additionally, they may not

have office space on campus to meet with students nor be compensated for time spent on campus outside of teaching. While the shift to employing adjunct faculty is often a cost-cutting measure, this move may come at the cost of fostering the conditions for faculty-student connection.

The engagement and satisfaction factor that emerged in this research also encompassed the quality of peer relationships and social experience. Previous research supports the importance of college climate in sense of belonging (Locks et al., 2008; Maestas et al., 2007; Museus et al., 2017; O'Keeffe, 2013). College leaders should regularly assess students' perceptions of climate and disaggregate results to better understand the experience of historically marginalized groups. In addition to working to create classroom spaces that foster belonging, research suggests that there are also approaches for campus-wide interventions to improve climate and increase belonging (Baleria, 2021; O'Keeffe, 2013; Strayhorn, 2018). Interventions of this type could be employed when either student bodies as a whole or subgroups report a chilly campus climate.

Leaders also need to be attuned to the fact that sense of belonging is not static. Conditions that did not seem to impact belonging initially appeared to have a longer-term impact over time. Hispanic and first-generation students attending institutions with a higher percentage of White students seemed to be negatively impacted over time. It is important that schools continue to monitor students over time to monitor for negative outcomes on their campuses. Additionally, institutions should also consider investing in high-impact practices to promote the belonging of historically underrepresented groups.

For example, Ribera et al. (2017) found that high-impact practices such as service learning, learning communities, research with faculty, and campus leadership were all associated with increased belonging for historically marginalized groups of students.

Examining sense of belonging over time highlighted conditions that may slow the development of sense of belonging. For example, extra-large colleges were associated with students having a lower sense of belonging in 2012 but not in 2014. It is possible that students need more time to find communities and connect with peers at institutions of this size. Practices that create smaller communities within a larger school, such as learning communities or affinity spaces might need to be prioritized in these types of institutions to help students develop a sense of belonging more quickly. In a similar vein, increasing age was only negatively associated with belonging in students' first year, but not in their third. Older students may not feel like they fit in at first but may find opportunities like student government, working on campus, or connections with staff and faculty that help them develop belonging. Institutions could also proactively work to connect older students with opportunities and places to develop community earlier in their academic careers.

The fact that belonging was not associated with vertical transfer suggests that college leaders at two- and four-year schools may need to engage in collaborative work to promote successful transfers and to help students carry their feelings of belonging at their transfer institution. Despite the ability of community college students to succeed in the four-year setting, transfer rates remain low, particularly for students of color (Wassmer et al., 2004). Careful outreach to students still enrolled in community colleges that

addresses students' primary needs and concerns may be effective (Handel, 2007).

Additionally, promoting a transfer-receptive culture and attending to both the financial,

socioemotional, cultural, and community backgrounds of students may be key to

promoting not only enrollment but also completion (Jain et al., 2011).

Finally, this research highlighted that student experiences and perceptions are not

a monolith. Students were not all impacted by factors or institutional characteristics in the

same way. For example, first-generation students' sense of belonging was not as

impacted by living farther from campus and working more hours as was the belonging of

other students. However, racial diversity on campus appeared to be important for first-

generation students. Additionally, male students accessing student services in 2014

showed decreased belonging while female students did not. Staff and faculty should

consider how programs and interventions might impact different groups. It may be

particularly important to proactively seek out feedback from students whose voices might

not frequently be heard or captured in survey data.

Suggestions for Further Research

This study reinforced the importance of sense of belonging and identified a

number of factors that may impact belonging. Continued research is needed to continue

to further refine the field's understanding and to assess whether findings have changed

over time.

1. Explore the meaning of the study's findings. The current research did not allow the

    researcher to assess what may be causing study results. For example, the finding that

    male students who accessed student services in 2014 had a lower sense of belonging

does not explain what contributed to this difference. Data that allowed for a determination of the reasons for the disparity or if student gender was associated with different reasons for accessing services. It is possible that male students were more likely to access student services for remedial purposes while female students might be more likely to access these services in a proactive manner. However, it is also possible that male students may have a different experience when receiving services. A qualitative study that examined students' perspectives on their experience could yield a richer and more nuanced understanding of the meaning of this study's findings. Similarly, the finding that first-generation students had an increased likelihood of belonging over time also warrants consideration. Research that explores how this population appears to be successful in developing community and belonging over time could help to find ways to foster these conditions for more students.

2. Assess the causal effect of interventions and changes. The current research did not allow for a causal analysis of the findings. While the study assessed whether variables or factors were associated with an increase in the likelihood of a student having a sense of belonging, the data does not allow the researcher to conclude whether changes in those areas would impact belonging.

3. Replication of the research with more recent data. The dataset utilized in this study followed students who first enrolled in college in the 2011 school year through 2018. Since that time, the community college experience has changed dramatically in many institutions. These transformations include the widescale adoption of Guided Pathways reforms and the wholesale shift to providing more services and classes in a

virtual and hybrid environment in response to the COVID-19 pandemic. Repeating

this research with a future Beginning Postsecondary Students (BPS) Longitudinal

Study dataset would allow an assessment of whether findings have changed over

time.

4. Expand the research to include more types of institutions. This study intentionally

focused on community colleges as the student experience in this type of institution

may not be equivalent to a four-year college or university. Future research could

utilize BPS data and explore whether findings are equivalent in other settings.

Conclusion

Sense of belonging is a key component of student success in the community

college population. This study investigated what is associated with students developing a

sense of belonging and what outcomes are connected to students having a sense of

belonging. The findings identified what components are most connected to belonging and

what differences exist between demographic groups of students. This result suggests that

the model of what contributes to sense of belonging in community colleges may be

unique to this setting and can vary based on both individual and institutional

characteristics. Additionally, the findings identified a connection between having a sense

of belonging, student retention, and credential completion, key outcomes for community

college students that have been historically difficult to improve. College and political

leaders should consider the importance of facilitating sense of belonging in future efforts

to improve results and work to ensure that all students feel that they are an important part

of their college community.

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APPENDIX

Table 24

Descriptive Statistics for Pre-College Factor Variables

Items	Frequency	Percent	Cum. Percent
Grade point average in high school (HSGPA)	10	.2	
0.5-0.9 (D- to D)	130	2.2	2.4
1.0-1.4 (D to C-)	350	5.9	8.3
1.5-1.9 (C- to C)	1410	23.9	32.2
2.0-2.4 (C to B-)	950	16.1	48.3
2.5-2.9 (B- to B)	2020	34.2	82.5
3.0-3.4 (B to A-)	1030	17.5	100.0
3.5-4.0 (A- to A)			
Highest level of high school mathematics (HCMATHHI)			
Less than Algebra 2	1280	21.6	
Algebra 2	2250	38.0	59.6
Trigonometry	400	6.8	66.4
Pre-calculus	1280	21.6	88.0
Calculus or beyond	710	12.0	100.0
Took any college credits in high school (HSTKANY)			
Yes	3370	57.1	
No	2540	43.0	100.0
Income group 2012 (INCGRP)			
Low	2050	31.3	
Low middle	1920	29.4	60.7
High middle	1570	24.0	84.7
High	1000	15.3	100.0
Marital status 2012 (SMARITAL)			
Single, divorced, or widowed	5980	91.6	
Married	480	7.4	98.9
Separated	70	1.1	100.0
Dependency status 2011-12 (DEPEND)			
Dependent student	4680	71.7	
Independent student	1850	28.3	
Dependents: has any dependents 2011-12 (DEPANY)			
No dependents	5470	83.8	
Has Dependents	1060	16.2	

Family size (dependent & independent) 2012 (HSIZE)			
1	660	10.1	
2	970	14.8	24.9
3	1530	23.4	48.3
4	1610	24.6	72.9
5 or more	1770	27.1	100.0

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Table 25

Descriptive Statistics for Continuous Pre-College and College Factor Variables

Items	Mean	St. Dev	Min	Max
Number of months between HS completion and entry (ELAPSE)	28.7	67.3	0	446
Jobs while enrolled: hours worked 2011-12 (HRSWK12)	12.8	16.9	0	120
Distance from student's home (in miles) 2011-12 (DISTANCE)	31.45	148.1	1	3762
Likelihood of completing degree by expected date 2012 (DEGEXP), scale of 1-10	8.3	2.2	0	10

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.

Table 26

Descriptive Statistics for College Factor Variables

Items	Frequency	Percent	Cum. Percent
Used academic advising in 2011-12			
(USEACAD)	2890	50.8	
Yes	2800	49.2	
No			
Used academic support services in 2011-12			
(USEACSP)			
Yes	1330	23.4	
No	4360	76.6	
Used career services in 2011-12 (USECPP)			
Yes	640	11.2	
No	5050	88.8	
Used financial aid services in 2011-12			
(USEFINAID)			
Yes	3520	62.0	
No	2160	38.0	
Interactions with faculty 2012 (FACULTY)			
Strongly disagree	120	2.1	
Somewhat disagree	160	2.8	4.9
Neither disagree nor agree	620	10.9	15.8
Somewhat agree	1590	28.0	43.8
Strongly agree	3190	56.2	100.0
Interactions with other students 2012			
(PEERINT)	90	1.6	
Strongly disagree	130	2.3	3.9
Somewhat disagree	770	13.5	17.4
Neither disagree nor agree	1650	29.0	46.4
Somewhat agree	3050	53.6	100.0
Strongly agree			
Satisfaction with social experience 2012			
(SOCSATIS)			
Strongly disagree	270	4.7	
Somewhat disagree	370	6.5	11.2
Neither disagree nor agree	1100	19.3	30.6
Somewhat agree	1690	29.7	60.3
Strongly agree	2260	39.7	100.0
Satisfaction with studies 2012 (ACDSATIS)			
Strongly disagree	170	3.0	
Somewhat disagree	330	5.8	8.8

Neither disagree nor agree	650	11.4	20.2
Somewhat agree	1900	33.4	53.6
Strongly agree	2640	46.4	100.0
Academic confidence: 2011-12			
(CURCONF)	110	1.9	
Strongly disagree	220	3.9	5.8
Somewhat disagree	420	7.4	13.2
Neither disagree nor agree	1410	24.8	38.0
Somewhat agree	3520	62.0	100.0
Strongly agree			
Highest level of education expected 2012			
(HIGHLVEX)			
No degree or certificate expected	10	0.2	
Undergraduate certificate or diploma	300	4.6	4.7
Associate's degree	1390	21.3	26.0
Bachelor's degree	2740	42.0	68.0
Master's degree	1380	21.1	89.1
Doctor's degree	710	10.9	100.0

Source: U.S. Department of Education, National Center for Education Statistics, Beginning Postsecondary Students Survey, 2012-2017.