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Adverse Childhood Experience and Undergraduate Student Success: A longitudinal investigation into the relationship between childhood stress and success in higher education

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ADVERSE CHILDHOOD EXPERIENCE AND UNDERGRADUATE STUDENT SUCCESS: A LONGITUDINAL INVESTIGATION INTO THE RELATIONSHIP BETWEEN CHILDHOOD STRESS AND SUCCESS IN HIGHER EDUCATION

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Education
at the University of Kentucky

By
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ABSTRACT OF DISSERTATION

ADVERSE CHILDHOOD EXPERIENCE AND UNDERGRADUATE STUDENT SUCCESS: A LONGITUDINAL INVESTIGATION INTO THE RELATIONSHIP BETWEEN CHILDHOOD STRESS AND SUCCESS IN HIGHER EDUCATION

Institutions of higher education have long worked to understand factors that influence or predict student success and degree completion. Childhood experiences including potential exposure to toxic stress have been found to impact student success in K-12 schools yet have rarely been evaluated among undergraduates. Therefore, the purpose of this study is to investigate the relationship between Adverse Childhood Experiences (ACEs) and undergraduate degree completion among a random sample of 1,894 students at a state-funded university in the US. Participants completed a web-based survey assessing ACEs in spring 2015. Results from the survey were linked to student academic records for each semester enrolled, spanning from 2008-2020. Chi-square tests and logistic regression models were used. A significant dose-response relationship between ACE score and degree completion was identified. Final analysis included the controls: gender, state residency, first-generation status, race, a composite variable of high school GPA and ACT, academic classification, first-year cumulative GPA, history of part-time enrollment, transfer status, and Greek affiliation. When evaluating the outcome of ever completing a bachelor's degree, students with an ACE score of 2-3 were 74% more likely not to graduate when compared to students with an ACE score of zero. Further, students with an ACE score of four or higher were 91% more likely not to complete their degree. Four- and six-year graduation rates found similar trends. This study has implications for a variety of student support services. Future projects could partner with these groups to assess the effectiveness of resiliency programming in supporting student success.

KEYWORDS: Adverse Childhood Experiences, ACEs, Higher Education, Student Success, Undergraduate Degree Completion

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DEDICATION

This project is dedicated to my family, who have provided unwavering support throughout my pursuit of this dream. Thank you for the love and laughter you all bring to my life. When there were difficult days, you were my light

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Chapter One: Introduction

Introduction

Throughout recent history, undergraduate education has moved from an elite opportunity to a standard expectation for the majority of American youth. In the mid-twentieth century approximately one in twenty American's earned a bachelor's degree (Bok, 2009). As of the mid 1960's, 95% of the student body in higher education was White and 60% were male (Crowley, 1998). In contrast, in 2016, 69.7% of high school graduates between the age 18-26 were enrolled in college (2017). This included 72% of female and 67% of male high school graduates. When assessing racial and ethnic enrollment rates, it was found that 92% of Asian graduates enrolled in a university following high school, compared to 72% of Hispanic, 70% of White, and 58% of Black American students. White students now represent 52% of all undergraduate student enrollment (Espinosa, Turk, Taylor, & Chessman, 2019). This significant increase in higher education enrollment, along with a substantial shift in income and diversity among the growing undergraduate population, has required the field of education to critically assess what variables predict and support a student's likelihood of remaining at the institution through the completion of their degree.

Currently the national six-year graduation rate from bachelor programs at non-profit public institutions is 60% (U.S Department of Education, 2019). Comparatively, it is 66% for non-profit private institutions and 21% at for-profit universities. Further, not all student populations are meeting this rate, with males lagging behind females in degree completion with a graduation rate of 57% vs 63% respectively. Underrepresented minority populations are also falling short of these numbers, with only 39.8% of Black

students completing a bachelor degree within six years. That rate is 55% for Hispanic students, 64% for White students, and 74% for Asian students. When taking into account both race and gender, Black male students have the lowest reported graduation rate at 34%, while Asian females report the highest rate at 77%.

Understanding the conditions that support student success within higher education is critical, both for the institutions of higher learning and for the industries in need of an educated workforce. Over the last fifty years, a significant shift has occurred in the educational requirements for many of the primary industries within the United States (U.S.). For example, in the 1970s, less than half of those working in the healthcare field had obtained a degree beyond high school. Today the rate is over 75%, with 52% holding a bachelor's degree or higher (Carnevale, Strohl, & Smith, 2013). Similarly, in the field of technology the degree completion rates have increased from 63% to 86% over the same time period. Office workers have an even more significant increase, going from 36% of workers having some level of higher education to 70% today. Even in fields such as factory work and farming, where the overall number of individuals in the workforce has dropped significantly, educational expectations have grown. Employment in factories used to represent 32% of the U.S. workforce, whereas today it represents 17%. Comparatively, the percent of workers within that industry with some college experience has increased from 12% to 36% during that time (Carnevale et al., 2013). This educated workforce need is only expected to grow as the baby boomer generation continues to retire, opening more positions for college trained individuals than are currently being supplied (Carnevale et al., 2013; Leider, Coronado, Beck, & Harper, 2018).

Student Success and Student Health

Over the previous half century, institutions of higher education have worked to identify factors that may influence student retention and success. Many of the factors identified have also been found to correlate with general health outcomes across the life course. Demographic characteristics such as parent's education, family income, gender, race, and geographic location are found to be significantly associated with both health and educational attainment. Similarly, social engagement and support have been found to have a significant impact on both student retention and health. Negative or adverse experiences throughout life, such as experiencing neglect or victimization, have also been found to have an impact on these outcomes. However, adverse childhood experiences have been less studied in the area of higher education. These factors will be discussed throughout the following sections.

As previously discussed, undergraduate student enrollment has grown dramatically over the previous half century. However, this growth has not affected all demographics evenly. The recent increase in student enrollment can be largely attributed to the rise in admission rates among female students, first generation students from middle and low-income communities, and racial and ethnic minority students. These demographic groups have long been a focus of public health research which finds significant life expectancy differences along socioeconomic status (SES) and racial divides (Chetty et al., 2016; Olshansky et al., 2012). A key reason identified for these differences includes differing levels of academic attainment between demographic groups, which has been found to be one of the most important predictors of health across the lifespan (Meara, Richards, & Cutler, 2008). Therefore, it is significant to note that

these populations fail to complete an undergraduate degree at the rate of their higher SES and White peers (DeBerard, Spielmans, & Julka, 2004; Jury et al., 2017).

It has been identified that underrepresented minority students, first-generation students, and students from low SES backgrounds have unique needs in relation to student success and retention. Research has found that historically underrepresented minority students are significantly less likely to graduate from a post-secondary institution when compared to their White peers (Espinosa et al., 2019; Swail, 2003). Following a similar pattern, first generation students have historically failed to achieve academic success at the rate of students who had at least one parent complete a bachelor degree or higher (Bettencourt, Manly, Kimball, & Wells, 2020; Pike & Kuh, 2005). In fact, these students have been found to be twice as likely to depart from an institution prior to the start of their second year when compared to non-first generation students (Choy, 2001). The reasons for these gaps are complex. Studies find multiple variables at play including but not limited to structural and systemic racism, the family's academic expectations for students, educational priorities, social capitol, use of non-standard dialects, student maturity, and income inequality in both the home and school systems (Brezinski, Laux, Roseman, O'Hara, & Gore, 2018; Harper, 2012; Marjoribanks, 1997; Swail, 2003; Williams, 1999).

As institutions of higher education have begun to take a more holistic approach to student retention and success, an increased focus on demographic differences among their student populations and their varying needs has developed. Resources were given to providing social support for students as they transition into the college student body. This allowed for the growth of student support administrative units within universities

(Demetriou & Schmitz-Sciborski, 2011). To meet the needs of these demographically diverse students, research stressed the importance of collaboration across campus departments (Briggs & Ammigan, 2019; Swail, 2003). Similarly, Wyckoff (1998) emphasized the importance of effective counseling for students experiencing stress, as well as the importance of quality academic advising. In further support of this idea, Tinto (2004) stated that universities who provide easily accessible academic, personal and social support services would positively impact student retention.

Student Success and Social/Emotional Factors

In addition to demographic differences among student populations, there are other key social factors that have been found to have an association with student retention and success. Specifically, a student's positive and negative social/emotional history has been found to be significantly associated with student success (Leafgran, 1989; Spady, 1971; Tinto, 1975). While the concept of social factors and their impact on student retention was not the primary focus of many universities throughout the 1970s and 80s, the concept was not new. Spady includes friendship support as one of his five key factors impacting student retention in 1971. Similarly, Tinto addressed the importance of family and peers in his 1975 Student Retention Model. In 1987 Szulecka, Springett, and de Pauw suggested that the major factor impacting student attrition in the first year was social/emotional, rather than academic in nature. Similarly, Leafgran (1989) stated that students who were more emotionally and socially healthy had higher rates of success within higher education.

In order to address the impact of social and emotional factors on student retention, universities have focused on building social support within the campus experience. Astin

(1984) suggested one of the most important elements of student retention in the first year is student involvement. In fact, these support systems on campus have been found to significantly influence GPA and retention. Students who are more involved and who report increased number of close peer connections perform better and are found to be more likely to remain at the institution (Bronkema & Bowman, 2019; Pritchard & Wilson, 2003). Further, participation in campus organizations such as Greek organizations and Living Learning Communities have been found to increase social connections and to be positively associated with increased student success and retention rates (Baker & Pomerantz, 2000; Bowman & Holmes, 2017; Turton, Nauta, Wesselmann, McIntyre, & Graziano, 2018). However, these interventions focus on social connections, rather than the more complex topic of mental and emotional wellbeing. This is an important distinction, as psychological variables such as high self-confidence, high rates of self-control, and having an achievement-oriented personality have been found to be positively correlated with increased GPA and increased rates of retention (Pritchard & Wilson, 2003). Comparatively, students who are depressed (Clayborne, Varin, Colman, & Psychiatry, 2019; Fazio & Palm, 1998), experience anxiety (Tobey, 1997), and students who report high levels of stress (Frazier, Gabriel, Merians, & Lust, 2019; Van Heyningen, 1998) have lower GPAs and higher rates of attrition compared with their peers.

Recently universities have increased their focus on mental health among students, acknowledging that it has a significant impact on both retention and overall health among the student population (Kitzrow, 2009; Mahmoud, Staten, Hall, & Lennie, 2012). This is important, as the prevalence of mental health problems has steadily increased among

college students, with current estimates finding one third of undergraduates reporting clinically significant symptoms (Eisenberg, Lipson, & Posselt, 2016). Further, this issue is not impacting all student populations evenly, with first-generation students reporting lower rates of belonging, greater levels of stress and depression, and reduced rates of using counseling resources than non-first-generation students (Stebleton, Soria, & Huesman Jr, 2014). The standard intervention for mental health needs among students are counseling centers, disability resource centers, and student health services. Unfortunately, research has found not all students know these resources are available, or are comfortable using them. Yorgason, Linville and Zitzman (2008) found students living off campus, male students, and students with fewer years completed in college were less likely to know mental health services were available and were less likely to report using the services.

Student Success and Stress

Family history, and the influence it has on health, has been even less studied in relation to student retention and success. Both positive and negative childhood experiences have been found to significantly impact individuals throughout life, yet higher education has yet to rigorously assess the impact these factors may have on student success and degree completion. For example, Adverse Childhood Experiences (ACEs) are recognized as significant contributors to negative outcomes throughout the lifespan (Dube, Williamson, Thompson, Felitti, & Anda, 2004; Felitti et al., 1998), yet limited research has been done to assess rates of ACEs and their impact on college student success. The ACE measure was originally developed and evaluated by the Centers for Disease Control and Prevention (CDC) and Kaiser Permanente (Petruccelli,

Davis, Berman, & neglect, 2019). It observes the prevalence and effects of ten categories of ACEs including childhood abuse (emotional, physical, or sexual), childhood neglect (emotional or physical), and household dysfunction (witnessing domestic violence, substance abuse, mental illness, incarceration, or separation and divorce) (Felitti et al., 1998). From this work, a dose response relationship has been identified between a number of categories of ACEs experienced during childhood and many diseases, disorders, and social problems later in life (Chapman et al., 2004; Williamson, Thompson, Anda, Dietz, & Felitti, 2002). This means that as the rate of adverse events increase, the likelihood of negative health events in adulthood also increases. A significant relationship has been found between number of ACEs experienced and rates of psychiatric disorders such as depression, anxiety, and suicidality among adults (Afifi et al., 2008; Schilling, Aseltine, & Gore, 2007). These factors are important, given the known rate of ACE exposure is high within the general population. The Centers for Disease Control and Prevention (2016) report 64% of the U.S. adult population have experienced at least one ACE, while 12.5% have experienced four or more ACEs.

Individual stressors in childhood that are included in the ACE survey have been found to be negatively related to student success. Children that experienced physical maltreatment were twice as likely to have low educational qualifications at the age of 18, when compared to children that did not experience maltreatment (Jaffee et al., 2018). A second study reported higher rates of childhood maltreatment correlated with poorer educational outcomes as measured by participants GPA (Welsh, Peterson, & Jameson, 2017). Children who experienced physical and sexual abuse were far less likely to attend college, and those who were admitted were found to be less likely to complete

undergraduate degrees (Boden, Horwood, & Fergusson, 2007). Additional studies of small populations consistently find childhood trauma negatively impacts educational outcomes (Charles, Dinwiddie, & Massey, 2004; Duncan, 2000; Lisak & Luster, 1994). Beyond the study of individual stressors, limited research has been conducted on the potential association between a combination of ACE exposure and student success among undergraduate students. A summary of the current research on those studies will be discussed in the following chapter. Combined, this literature suggests the need for further investigation into the relationship between ACEs and student success.

Study Purpose

Given the prevalence of enrollment in higher education in the U.S. and the importance of degree completion on the workforce needs nationally, it is important to understand factors related to undergraduate degree completion. Therefore, the purpose of this research project is to expand on knowledge in this area, and to identify potentially underexplored factors related to student success. Specific attention was paid to research evaluating the impact of student health, and more specifically stress, on student success. Finally, an investigation was conducted on the potential association between Adverse Childhood Experiences (ACEs), or high stress events occurring prior to the age of 18, and undergraduate degree completion among a group of undergraduate students at a large state-funded university in the southeastern United States.

Overview of Methodology

The current study assessed the potential relationship between Adverse Childhood Experiences and degree completion among 1,894 undergraduate students at a large state-funded university in the United States. Study participants completed a web-based survey

that included the CDC's ACE measure in Spring 2015. The current dissertation project was a secondary analysis of data collected in that original spring 2015 study, which was funded by the National Institute of Health. In the current project, results from the original survey were then linked to student academic records for each semester they were enrolled at the institution, spanning from 2008 to 2021. At the time of survey completion, students ranged in age from 18 to 24. Participants were fairly evenly distributed across academic classifications. Students were disproportionately White, female, residents of the state where the university is located, and non-first generation. Participants could be considered highly engaged, as evidenced by extremely high rates of sophomore year retention, utilization of on-campus housing, utilization of campus study resources, Greek affiliation, and overall degree completion rates. Therefore, this study provides a unique opportunity to explore factors that may be associated with student success among a highly engaged undergraduate population.

Students completing the survey self-reported exposure to ten categories of adverse events that occurred prior the age of 18. The most frequently reported ACE experienced among study participants was parental separation or divorce, with household mental illness being the second most common. Over half of the students who completed the survey reported experiencing zero ACEs in childhood, with nearly 10% of the population experiencing four or more ACEs.

Overview of Study Findings

Chi-square tests and logistic regression models were used to assess the relationship between ACEs and degree completion. A further assessment of time to degree was conducted a review of four and six-year degree completion rates. A

significant dose response relationship between ACE score and degree completion among undergraduate student participants was identified. A complete summary of results can be found in chapter four.

As discussed throughout the following chapters, this study improves understanding around the relationship between traumatic events in childhood and undergraduate degree completion. For many institutions of higher education, a primary goal is to ensure that all students who begin college will be able to be successful and graduate. Understanding factors that predict this, and identifying students who may need additional support, is crucial to improving the rate of students who meet this goal. Given the findings, this study has implications for a variety of student support services, including academic advising, student health, behavioral health, disability resource centers, and other organizations across campuses that work to support students. Future projects could work on partnering with these groups to build resiliency programing in order to support student success and in turn, positively impact health outcomes among students who have experienced trauma.

Summary

Over the previous century, universities throughout the United States have significantly increased their interest in student retention. This has led to a deeper understanding of students and the factors that impact their success within higher education. However, there continues to be need for studies that further investigate factors that may be predictive of student success and undergraduate degree completion. Currently there is a significant gap in knowledge around how family and social factors,

especially negative events, occurring prior to enrollment may be influencing students once they arrive on campus.

Student success remains an important area of study within higher education. Expanding traditional retention strategies that focus primarily on academic preparedness and social connections while on campus to incorporate the impact of mental health and family/social experiences prior to enrollment, including the impact of trauma or victimization, may be an effective strategy to improving student degree completion. The current study will investigate the relationship between toxic stress in childhood, as measured by the ACE survey, and undergraduate degree completion in a longitudinal study conducted at a large state-funded university in the southeastern United States. The study findings may help institutions of higher education improve rates of student success and degree completion in the future.

Chapter Two: Literature Review

This chapter highlights the recent history and current literature on student retention and success within higher education in the United States in order to better understand factors that positively influence degree completion. Focus was given to the identification of variables that are used to predict student success, as well as those that are under-studied, including student health, stress, and adverse childhood experiences. Literature is also discussed that identifies how these variables are measured within the field. An emphasis was given to degree completion as a key indicator of student success as it represents a significant measure to which most students list as the primary purpose of enrollment, and one that institutions of higher education use for a key measure of their success.

History of Retention in Higher Education

While institutions of higher education have existed in the United States for several hundred years, until the mid-1800s student graduation was rare and institutions paid little attention to retention or degree completion rates (Berger, Ramirez, & Lyons, 2012). This began to shift through the mid to late 1800s with federal investment in institutes of higher education through the adoption of the Morrill Land Grant Act of 1862 (Goldin & Katz, 1999). This, along with urban growth and an increased need for trained individuals within the industrial workforce, resulted in a significant change in the understood purpose of higher education within the United States (Demetriou & Schmitz-Sciborski, 2011). With this shift came a reevaluation of curriculum and an increased interest in retention and graduation (Goldin & Katz, 1999). It is important to note that data on retention and graduation was not systematically gathered across institutions of higher education until

the late 1960s when the U.S. Department of Education launched the Higher Education General Information System and the Integrated Postsecondary Education Data System (Thelin, 2010). Therefore, comparing retention numbers within higher education before that time is challenging. However, the shift in interest and interventions within the field of higher education are well documented.

Early studies on student retention appear in the literature in the 1930s. These early evaluations focused primarily on demographics associated with student success (Demetriou & Schmitz-Sciborski, 2011). Following the conclusion of World War II, student enrollment rates again increased with the passing of the GI Bill. With this, the subject of student retention and graduation grew in importance within the industry (Burke, 2019; Manyanga, Sithole, & Hanson, 2017). While institutions began regularly monitoring student enrollment at this time, research in the area continued to focus predominantly on characteristics of individual students, such as gender, SES, and race (Bender, Cutler, Hazlett, & Root, 1926; Burke, 2019; Thelin, Brint, Karabel, & Feldman, 2017).

The 1960s led to universities feeling the strain of rapid growth with a significant rise in enrollment among middle and low-income populations, as well as a rapidly diversifying student body. National events such as the Civil Rights Movement and the War on Poverty raised questions about who had access to higher education and who was succeeding once admitted (Berger et al., 2012; Demetriou & Schmitz-Sciborski, 2011). Access to higher education again grew with the passing of the 1965 Higher Education Act, which provided financial support to students seeking to attend college (McDonough & Fann, 2007). By the end of the decade, student retention had become a common

concern among institutions of higher education and recommendations were made for comprehensive and systematic examination of the issue (Berger et al., 2012).

The 1970s were a pivotal time in student retention research, with the decade producing key models on the subject that are still in use today. One of the first widely recognized models in student retention was Spady's (1970) Undergraduate Dropout Process Model. In this model, Spady suggested five key variables that impacted student social integration, which were in turn linked to a student's decision to drop out of school: (1) academic potential, (2) normative congruence, (3) grade performance, (4) intellectual development, and (5) friendship support. Spady found these factors related to both student satisfaction and commitment. The following year Spady (1971) published an empirical study which identified academic performance as the primary factor related to student retention.

Following Spady came the publication of Tinto's (1975) Institutional Departure Model, also known as the Student Integration Model. This model was a notable shift in how the nation addressed retention within higher education. Tinto's model, like Spady's, was in part based on Durkheim's (1951) Suicide Model. Tinto states that student retention is impacted by academic experiences, both formal and informal, as well as to a student's social integration (Demetriou & Schmitz-Sciborski, 2011). Tinto suggests that a student's success within higher education impacts the student's commitment level to the institution, as well as to their academic and career goals. Tinto's model has gone through multiple revisions following its original publication (Tinto, 1988, 1993). A key focus of Tinto's work was on the importance of the first year of higher education where a student transitions through separation from family, before transitioning to incorporation within

the campus community. Tinto also emphasized that universities have two systems, the academic and the social. He states students must be integrated into both systems to persist at their academic institutions (Aljohani, 2016; Tinto, 1993).Tinto's work continues to have a significant impact on graduation and retention programming today.

Following the publication of retention models from Spady and Tinto, additional retention frameworks began to emerge. Bean published his Student Attrition Model (1980) where he stressed the factors such as a student's prior academic performance, student demographics such as SES, distance from home, and student satisfaction all influenced a student's decision to remain at an institution. Bean stated that student turnover parallels employee turnover, with student Grade Point Average (GPA), development, institution quality, and value of degree as the measurable indicators of potential turnover, or attrition (Aljohani, 2016; Bean, 1983). Bean also found that men and women leave higher education for different reasons, assessed the unique retention needs of non-traditional students, and noted the importance of peers on student retention or attrition in revisions to his model and later publications (Bean, 1982; Bean & Metzner, 1985; Berger et al., 2012). Another important model developed in the 1980s was Astin's Model of Student Involvement (1984), which identified three key elements influencing student retention. These items included: student demographics and prior experiences; environment including experiences that occur while in college; and student characteristics such as knowledge, attitudes and beliefs (Demetriou & Schmitz-Sciborski, 2011; Pascarella & Terenzini, 2005).

Along the same timeline as Bean and Astin's publications, institutions of higher education began shifting their administrative frameworks to better support student

retention and success. This resulted in the rise of enrollment management groups within institutions (Demetriou & Schmitz-Sciborski, 2011). These administrative units focused on student marketing and recruitment, financial aid, retention and graduation, bringing an even stronger focus on understanding and positively impacting student success from the institutional perspective. This focus grew over the following decades, with the 1990s shifting attention to the retention of students who historically were less likely to be retained, specifically underrepresented minority students, first generation students, and students from economically disadvantaged backgrounds (Demetriou & Schmitz-Sciborski, 2011; Hornor, 2020). This focus was supported by Tierney (1999) who questioned Tinto's expectation of cultural conformity as a means to success for minority students. Tierney suggests universities embrace cultural integrity as an important component of student success. Additional focus was placed on the experiences of minority students and the need to provide quality support services to meet these student needs. This led to Swail's (2004) framework for student retention that emphasized the importance of collaboration between student recruiting, admissions, academic services, curriculum, and financial aid.

From the late 1990s through to current day, the literature focuses on a holistic approach to undergraduate student retention, stressing the importance of working across administrative units to support student success (Burke, 2019; Demetriou & Schmitz-Sciborski, 2011; Hornor, 2020). The importance of the Academic Advisor has been discussed as a critical connection point between the student and the university (Anderson & McGuire, 1997; Tinto, 1999). Further research suggests that the interactions students have on campus with faculty, staff, advisors, and peers directly impact their desire to

remain at an institution (Habley, 2004). Student sense of belonging is also a current focus in retention literature, as current studies continue to find that as student's sense of belonging increases, so does their likelihood of persisting at the institution (Burke, 2019; Logan, 2017). Therefore, a current practice among institutions of higher education is to attempt to support student retention through both formal and informal interactions throughout the student's time on campus, with a specific emphasis being placed on the first-year experience, and cohort models to allow students to move through coursework together (Burke, 2019; Levitz, Noel, & Richter, 1999).

Theoretical Perspectives for Student Success

As discussed in the previous section, in the field of higher education researchers have long worked to identify theoretical frameworks to help understand, and therefore improve, student success. These frameworks are a critical component to the majority of student success research and therefore warrant discussion. These theories fall into several major categories: Sociological perspectives, psychological perspectives, cultural perspectives, and organizational perspectives (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2011). A brief summary of these frameworks, along with their strengths and weakness, is provided below.

Tinto (1975) produced the most influential sociological framework on student retention, which has undergone multiple revisions and expansions throughout the years (Tinto, 1988, 1993). As previously summarized, Tinto states that in order for students to be successfully retained, they must first separate themselves from family and friend groups they were associated with prior to enrollment. The model focuses on the commitment to the institution and subsequent integration, with key components to this

transition centering around social and academic integration. It is worth noting that while popular, Tinto's work has limited support within the literature. For example, Braxton, Sullivan and Johnson (1997) found only 21 of 40 studies examined show an association between academic integration and student persistence. Braxton et al. also found only partial support for Tinto's theories among residential universities, such as the university in this study. Specifically, they found student entry characteristics, social integration, initial level of institutional commitment, and subsequent levels of commitment were associated with student persistence in residential universities. Tierney (1999) also provided an important critique of Tino's model for minority student retention and success. He highlights the flaw in Tino's focus on the importance of cultural assimilation, and provides support for an embracing of students' culture differences at the institutional level.

Additional research in the area of sociological perspectives on student retention exists, with an emphasis on the importance of social networks within higher education. Most agree that it is important for students to learn to effectively interact with strangers, many of whom may be from backgrounds outside of the student's historical perspective. In fact, substantial literature supports the importance of student's relationships with faculty, staff, peers, and family as being important to student success (Astin, 1977; Brezinski et al., 2018; Burke, 2019; Kuh, Kinzie, Schuh, & Whitt, 2005; Pascarella & Terenzini, 2005). Further literature explores factors associated with lack of social integration. Specifically, it has been found that students are more likely to integrate socially, and therefore have higher rates of student success, when their values, norms and behavior align with those dominant patterns on campus (Berger & Milem, 1999).

Research has also found racially and ethnically diverse students utilize family support networks, rather than on campus peer networks, more frequently than White students (Brezinski et al., 2018; Kenny & Stryker, 1996).

Psychological perspectives have also long been used to understand and predict student success. Bean and Eaton (2000) found that students demonstrating high self-efficacy, or those confident in their ability to succeed, were more likely to be successful within higher education. Further, students guided by an internal locus of control, those who felt they were in control of their own fate, were more likely to be retained and to be academically successful (Kuh et al., 2011; Micomonaco, Espinoza, & Practice, 2019). It has also been found that student expectations prior to attending college is predictive of student activities and engagement while on campus. This in turn, impacts student's academic performance and overall perceptions of an institution. Current studies continue to find evidence to support locus of control and academic self-efficacy are positively associated with academic success (Drago, Rheinheimer, Detweiler, & Practice, 2018). This relationship is supported in multiple theoretical frameworks including expectancy theory, self-efficacy theory, and motivational theory (Kuh et al., 2011).

In contrast to sociological and psychological perspectives, cultural perspectives on student success suggest differences between a student's cultural background and the culture on campus can be used to better understand student success. From this perspective, it is important to note that student perceptions of the institutional environment influence how they engage while on campus, which then influences student satisfaction (Astin, 1977; Kuh et al., 2011; Pascarella & Terenzini, 2005). This perspective highlights that some models based on the sociological perspective may

feature culturally biased assumptions, with a point of contention centering around the question of if a student should be expected to undergo cultural conformity to align with institutional norms (Brezinski et al., 2018; Tierney, 1999).

An alternate perspective through which researchers assess variables influencing student success is the organizational perspective. Through this lens, the focus shifts away from the student and more towards the institution. Specifically, an emphasis is placed on structures within the organization and processes that impact student performance. Important organizational factors associated with this perspective include institutional size, admission selectivity, faculty to student ratios and campus resources (Kuh et al., 2011).

It is important to note that no single perspective on student success should be used in exclusion of the others. Predicting retention and success should include a multi-level approach, taking into consideration sociological, psychological, cultural and organizational factors. In combination, these perspectives account for many key factors that influence a student's time within an institution. Therefore, institutions should work to assess and incorporate programs that address all four factors.

Predicting Student Success – Pre-Admission

Admission officers throughout higher education have long worked to identify key variables that predict student success. Specifically, student demographics related to overall success rates have historically been a focus. Additionally, student experience prior to enrollment has also long been studied in order to identify potential variables that predict retention, student success, and degree completion. According to Kuh et al (2011), the major categories of these factors include: student demographics such as gender, race,

and SES; student motivation; family and peer support; aptitude and college readiness; academic preparation; and enrollment choice. The literature surrounding these variables, as well as gaps in current research around pre-admission predictive factors that may be understudied, are discussed throughout the following section.

Early student success research primarily focused on student demographics. Specifically, research throughout the first half of the 20th century focused predominantly on characteristics of individual students, such as gender, SES, and race (Bender et al., 1926; Burke, 2019; Thelin et al., 2017). These factors remain closely monitored today and continue to provide context into who is excelling, or failing to excel, within the current system of higher education. When looking at student success by gender, clear differences have arisen. Currently women are more likely to enroll in college and are more likely to be successful while there (U.S. Department of Education, 2019). One reason this trend may occur is that women outperform men in factors that predict college enrollment and success. Specifically, women report higher grades in high school, higher test scores, and higher rates of college preparatory coursework (Kuh et al., 2011).

Another key demographic heavily researched is race and ethnicity, where gaps have persisted in rates of student success for decades. As mentioned with gender, these differences are unsurprising as we see variance in rates of completion of high school along the racial and ethnic divide as well. Currently 89% of White high school students graduate, whereas the rate drops to 78% for Black students, 80% for Hispanic students and 72% for American Indian/Alaska Native students. Comparatively, the graduation rates is 91% for Asian/Pacific Islander students (U.S. Department of Education, 2018). This disparity appears to transcend basic access, as the gap in high school graduation

rates by race/ethnicity are found in schools across the SES spectrum (Ferguson, 2002). This achievement gap seen in high school has not been eliminated through college admission criteria; rather it has carried over into higher education. Research has found that historically underrepresented minority students are significantly less likely to graduate from a post-secondary institution than their White peers (Espinosa et al., 2019; Swail, 2003).The reasons for these gaps are complex. Studies find multiple variables at play, including but not limited to: structural and systemic racism; income inequality in both the home and school system; the family's academic expectations on students; educational priorities; social capitol; use of non-standard dialects; and student maturity (Brezinski et al., 2018; Harper, 2012; Marjoribanks, 1997; Swail, 2003; Williams, 1999).

Another key demographic variable that is strongly correlated with student success is family SES, which is calculated using a combination of income, education, and geographical location. Student SES has been found to be the best predictor of degree completion in studies that controlled for academic ability (Kuh et al., 2011). There are several key reasons why family SES is strongly associated with student success. First, it is important to note that neighborhood wealth is tied to educational resources in the K-12 school system. A primary funding source for public schools are property taxes, which vary drastically by neighborhood and community income. This leads to a measurable disadvantage in educational quality for students attending low income schools (Berliner, 2013). Family SES impacts student success beyond influencing the effectiveness of the public school system. Family economic resources increase the likelihood of student success due to both an increased investment in educational resources at home and an increase in social capital (Coleman, 1988). It should also be stated that overlap exists

between family SES and underrepresented minority populations, with higher economic need being concentrated disproportionately in Black and Hispanic communities. This is attributable, at least in part, to structural racist policies such as red lining that prevented non-White individuals from owning property in many high income communities (Shapiro & Kenty-Drane, 2005). This, in turn, prevented many minority families from accruing wealth at the rate of White Americans and widened the gap in SES and family wealth by race across the United States.

While universities have long studied demographics as an indicator for student success, there has also been substantial research in other predicative variables. One such variable, which has some overlap with the previously discussed demographics, is family and peer support. Research has found parent expectation is strongly related to student aspirations and spans across all levels of SES and between racial/ethnic groups (Hamrick & Stage, 2004; Loughlin-Presnal & Bierman, 2017). One factor related to parent support is their own educational attainment. First-generation college students, who are more likely to be female and under-represented minority students, are significantly less likely to complete their bachelor's degree. In fact, students with parents who have completed college are found to be five times more likely to graduate than their first-generation peers, after controlling for SES and institution type (Pascarella & Terenzini, 2005). Again, the reasons for this difference is multifaceted, with first-generation students being less likely to complete advanced coursework in high school, typically having less-well developed time management skills, less social support, being less knowledgeable about how higher education works, and having less experience navigating bureaucratic institutions (Kuh et al., 2011). This results in first-generation students having a higher

dropout rate and being less likely to pursue graduate and doctoral degrees than their non-first-generation peers (Bettencourt et al., 2020; Pascarella & Terenzini, 2005).

The relationship between both parent and peer support and student success in higher education appear earlier than may be expected. Studies have found parental expectations of college attendance as early as 8th grade is a strong predictor of college degree completion (Hamrick & Stage, 2004). Further, research has found both parents and peers influence student enrollment and student persistence in higher education, with students performing better when they report being supported in their decision to attend college and encouraged to persevere while in attendance (Kuh et al., 2011). This influence is more impactful among underserved populations, which has been found to partially offset the negative impacts of poverty (Chrispeels & Rivero, 2001).

One of the most important predictors for student success in college is academic preparation, which is strongly associated with the quality of educational offerings within a student's high school. High schools that offer an advanced curriculum produce students who are more prepared for post-secondary education, and are therefore more likely to complete their degree (Millea, Wills, Elder, & Molina, 2018; Rodriguez & McGuire, 2019). In fact, high school GPA is the strongest predictor for first year college grades (Galla et al., 2019; Pike & Saupe, 2002). It is important to note that it is not only high school grades that are important, but also courses completed while in high school. Adelman (2006) found that completing a high level mathematics classes in high school, specifically algebra II, pre-calculus, trigonometry, or calculus, was the single best high school predictor of performing well academically in college. Yet schools with higher percentage low SES or minority students were less likely to offer these courses, which is

one reason some researchers believe family SES is less predictive of student success than neighborhood SES factors (Kuh et al., 2011).

Student expectation for college is another predictive variable for student success. Research indicates that when student expectations align with their actual college experience, they are more likely to persist through graduation (Braxton, Vesper, & Hossler, 1995). Unfortunately, many students report expectations that diverge substantially from those held by faculty. One area of difference in expectations between students and faculty centers around the expected out-of-class time needed in order to be successful in college. High school students commonly report being bored, disengaged, or absent from class, yet maintained a B+ average in their high school coursework (Sax et al., 2003). These students in turn reported a similar expectation for college in regards to both expected effort and grades. Therefore, it is not surprising the majority of first year college students report working just hard enough to get by in their courses (Kuh et al., 2011). This results in student's under-preparing for courses in college, assuming they will be able to be successful with minimal effort. When students are then not successful in their coursework, they become more likely to leave the institution prior to degree completion.

Beyond academic expectations, student reported expectations on campus activities and faculty interactions were also found to be predictive of student success. Students who were strong academically in high school were found to be more likely to engage with activities while at college, which improves student connectivity with the university and increases the likelihood of degree completion (Van Rooij, Jansen, & Van de Grift, 2017). Like student engagement, student-faculty interactions have been

identified as a variable that is positively associated with student success. While this will be explored further in the following section on predicting student success post-admission, it can be stated here that student expectations for faculty interactions prior to enrollment may not align with the reality of the frequency or format of these interactions. Students are far less likely to interact with faculty outside of the classroom than they expected to prior to enrollment (Kuh et al., 2011). The fact that this pre-admission expectation fails to come to fruition may be significant, as student/faculty interactions are regularly found to be associated with student success. Students reporting an interest in engaging in such activates, yet not doing so after matriculation, shows an important area of opportunity post admission.

When and where students choose to enroll are also important factors when predicting student success. Most high school graduates will eventually enroll in some type of post-secondary education. According to the National Center for Education Statistics (NCES), 67% of the 2017 high school graduates began college the following fall, with 44% enrolling in a 4-year institution and 23% enrolling in a two-year college. Unsurprisingly, given previously discussed trends, females enrolled at a higher rate than males (72% versus 61% respectively). That enrollment was split between two and four-year institutions, with 50% of females and 37% of male high school graduates attending a four-year institution. Continuing with current trends, White students enrolled at a rate of 69%, compared to 67% of Hispanic graduates, 58% for Black students, and 87% for Asian students. NCES provides 2008 data on race and institution type, which found 33% of White students, 36% of Black students, 49% of Hispanic students, and 35% of Asian students attended a two-year institution.

The research is mixed on two-year institutions, with bachelor degree completion being higher among students who enroll directly into a four-year institution, but also finding enrolling full-time in a two-year institution directly after high school being associated with an increased rate of eventual bachelor degree completion when compared to students who enroll later (Pascarella & Terenzini, 2005). This is logical, as many students admitted directly to 4-year institutions on average are stronger academically than those attending a 2-year college, with 50% of all first-time community college students being identified as academically unprepared (Kuh et al., 2011). Students attending a 2-year college are also more likely to be working 30 hours per week or more, which also inhibits student success.

Beyond institution type, an important variable associated with student success is when students enroll. While 67% of students attend some type of college directly from high school, over three-quarters of high school graduates eventually participate in some type of higher education (Kuh et al., 2011). Unfortunately, non-traditional students have lower rates of success than their graduating peers who entered directly into college from high school as full-time students. Students who begin college later in life are more likely to work more than 30 hours per week and more likely to have dependents living in their household, two factors that are negatively associated with student success.

Throughout this section many factors have been discussed that predict student success prior to enrollment in a post-secondary institution. Additional research has found many of the factors to be additive in nature, where the more factors a student experiences, the less likely they are to be successful in their pursuit of a degree. Kuh et al. (2011) provides a list of eight variables related to student enrollment that are predictive of

student success, where if a student is identified as having two or more of the listed variables, their risk of dropping out is significantly higher than those students experiencing none of the factors. The eight variables include: (1) being academically underprepared for college-level work; (2) not entering college directly after high school; (3) attending college part-time; (4) being a single parent; (5) being financially independent (students whose parents are not sources of income for supporting college costs); (6) caring for children at home; (7) working more than 30 hours per week; and (8) being a first-generation college student. These factors, as well as the others discussed throughout this section, have been found to important predictors of student success.

Predicting Student Success – Post-Admission

Substantial research exists that attempts to identify key components to success for students following their matriculation to campus. According to Chickering and Gamson (1987), the seven principles critical to undergraduate student success include: (1) contact between students and faculty; (2) development of reciprocity and cooperation among students; (3) active learning in the classroom; (4) providing prompt feedback to students; (5) emphasizing time on task; (6) communication of high expectations; and (7) and respecting the fact that students may learn in different ways. It has been found that the more students engage in these types of activities, the more likely they are to persist in higher education and complete their degree. Further, institutions offering effective educational practices such as these found students were more engaged while in college and gain more from their degree (Pascarella & Terenzini, 2005).

Throughout the previous decade the Association of American Colleges and Universities supported the Liberal Education and America's Promise (LEAP) initiative in

order to assess and improve liberal higher education throughout the nation (Kuh, 2008). A specific focus of the LEAP initiative was to provide essential student learning outcomes for higher education programs throughout the nation that support student success in meeting expected educational standards within an undergraduate degree program. The initiative sought to identify effective teaching and learning strategies, referred to as High Impact Practices (HIP), which support student learning and success across student demographics. This initiative included an assessment of students who historically have seen lower rates of success within the field of post-secondary education, specifically first-generation college students, minority students, and students living in poverty (Finley & McNair, 2013; Kuh, 2008).

The HIP commonly discussed in the literature include, but are not limited to: first-year seminars and experiences; common intellectual experiences; learning communities; collaborative assignments and projects; undergraduate research; and writing-intensive courses (Felten et al., 2016; Finley & McNair, 2013; Kuh, 2008). Educational research has found the use of these HIP to improve student learning outcomes and increase rates of retention and student engagement, with a greater positive impact being seen among students traditionally identified as underserved (Finley & McNair, 2013). Further, studies have found a significant dose-response relationship between number of HIP experienced by students and overall student success, meaning the greater number of HIP experienced by a student during their time in an undergraduate program, the more likely they are to be academically successful. Significantly, it has been found that historically disadvantaged students appear to have an greater positive academic impact from experiencing HIP, which has resulted in an apparent reduction in the achievement gap between these

students and the traditionally advantaged undergraduate population (Finley & McNair, 2013).

Another factor related to student success following matriculation at an institution of higher education is academic major change. Research suggests students are more likely to be successful in higher education when they have academic success in their initially declared major. This has been noted among student populations that historically have reduced rates of student success and degree completion. For example, it has been found that first-generation students who do not change majors have higher rates of academic success than those who do change fields (McLean, 2015). Across demographics, it has been found that students who change their major out of a STEM field become more likely to drop out prior to degree completion (Lee & Ferrare, 2019). Unfortunately, changing majors out of a STEM field is more common among underrepresented minority students, who change out of science and technology majors at a rate of 60% prior to completing a degree (Weir, 2017).

Student engagement expands beyond experiences in the classroom. Additional engagement can be measured by the amount of time a student spends on academically relevant activities outside of the traditional lecture setting. Student engagement in educational activities is strongly associated with student success and degree completion (Holliman, Martin, & Collie, 2018; Tight, 2020). Unsurprisingly, college grades are an excellent predictor of student persistence, degree completion, and enrollment in graduate education (McLean, 2015; Pascarella & Terenzini, 2005). Further, grades earned during a student's first year are a better predictor of bachelor degree completion than pre-college characteristics, including institutional selectivity, financial aid, and hours worked

(Adelman, 2006). In fact, first year students with a GPA in the top two quintiles of the grade distribution were twice as likely to complete their bachelor degree when compared to students in the bottom three quintiles (Kuh et al., 2011).This is understandable as GPA is also associated with time studying, willingness to ask questions in class, tutoring of other students, and maintaining a high quality relationship with faculty. However, it is impossible to assign causality to these relationships, as grades and student engagement are undoubtedly intertwined.

It is important to identify what students are more likely to engage in campus activities while enrolled, given the correlation between engagement and student success. According to Kuh, (2011), there are several major student groups that are more likely to be actively engaged. This list includes; women; full-time students; students living on campus; student who start at and graduate from the same school; students involved in living learning communities; international students; and students with diversity experiences. It should be noted that some universities excel at incorporating student engagement into their college experience. Specifically, women's colleges typically have far higher engagement than what is reported among women at coed institutions (Kinzie et al., 2004). Similarly, minority students who attended minority serving institutions were found to interact more with faculty, participate more frequently in collaborative learning activities, and engage in higher rates of community service when compared to minorities attending predominantly White institutions (Bridges, Kinzie, Nelson Laird, & Kuh, 2008).

As previously mentioned, faculty-student contact has long been associated with student success. Students who have an opportunity to informally interact with faculty

through activities such as working on research projects, serving on committees together, or socially interacting with faculty outside of the classroom, are positively correlated with student learning and development (Austin, 1993; Kuh et al., 2011). First year students who reported positive interactions with faculty outside of the classroom were more likely to report satisfaction with their academic experience and to record higher GPAs than those who did not (Amelink, 2005). Mentoring activities for African American students, both at historically Black institutions and predominantly White institutions, have been found to correlate with student persistence (Fernandez, Davis, & Jenkins, 2017; Himelhoch, Nichols, Ball, & Black, 1997). Rates of student success also increase among gender-variant students who report positive student-faculty interactions (BrckaLorenz, Garvey, Hurtado, & Latopolski, 2017). Student-faculty interactions focused on writing improvement, positively impacts the amount of time student spend on educational activities outside of class (Kuh et al., 2011). Further, interacting with faculty outside of class positively influences how a student perceives the university and also increases a student's educational aspirations (Hearn, 1987). It is important to note that these trends may be changing, a recent study found student reported faculty interactions not to be predictive of retention among first-year millennial students (Romsa, Bremer, Lewis, & Romsa, 2017).

Another critical component to student success while on campus involves peer connections. Astin (1993) identifies peers as the most important source of influence on students. Peers foster learning through discussing course content, working on group projects, peer tutoring, intermural sports, social fraternities or sororities, and other student clubs and organizations . Extensive research has found students are more likely to be

retained at an institution if they feel comfortable and connected to their peers (Bean, 1980; Bronkema & Bowman, 2019; Spady, 1970; Tinto, 1975). More recent studies have found a positive relationship between peer support and student retention and success among first-generation students (Yomtov, Plunkett, Efrat, & Marin, 2017) and students from low SES backgrounds (Sadowski, Stewart, & Pediaditis, 2018).

One way students connect with peers within an institution is through co-curricular activities, which also predict student success. Participation in co-curricular activities are thought to positively influence student success by providing an opportunity for students to connect with like-minded peers and by supporting student engagement (Pascarella & Terenzini, 2005). A primary co-curricular activity undergraduate students participate in to connect with peers are fraternity and sororities. The value of participation in these groups are mixed. One study found support for Greek participation, with students reporting higher rates of social well-being and lower rates of loneliness when compared to students who did not participate (Turton et al., 2018). Another study by Bowman and Holmes (2017) found women who participated in a sorority were more likely to report high satisfaction with college, higher grades, and increased rates of retention than non-members. However, the same study did not find similar associations for male students.

Throughout this section variables have been discussed that predict student success following matriculation. Many of these factors are related to general student satisfaction with an institution, which unsurprisingly relates to student success and degree completion. Student satisfaction is associated with student connection with peers, faculty and the institution (Kuh et al., 2011). These factors, in combination with the variables

identified in the previous section on pre-admission predictors of student success, have been heavily researched throughout the previous decades.

Predicting Student Success– Student Health

Understanding the relationship health plays in predicting student success is important when attempting to expand upon variables that are associated with student retention and graduation. Throughout this section, several health-related variables in need of further study will be reviewed. Then, a more in-depth discussion on factors related to stress and student success will be provided. Lastly, a review of available literature on how Adverse Childhood Experiences (ACEs) prior to admission are associated with student success will be summarized. These areas highlight specific understudied health related factors that may have a significant impact on student success and degree completion within higher education programs and emphasize the importance of further research in the area.

Student health is an under studied, yet important variable potentially influencing student retention and degree completion. Factors such as positive and negative health behaviors, acute and chronic illness, and mental illness may impact student's ability to connect and engage with academic and social offerings during their time on campus. Students reporting chronic illness are less engaged, which puts them at higher risk of leaving college before completing their degree (Herts, Wallis, & Maslow, 2014). The American College Health Association's (ACHA) Spring 2018 National College Health Assessment report found health concerns among students are common, with 24% of students reporting personal health issues that were traumatic or difficult to handle occurring within the last 12 months. The report also details health behaviors that may

effect students, including the fact that 72% report eating 2 or less fruits and vegetables per day and 51% reporting not engaging in the recommended amount of physical activity. Meanwhile, 62% of students report using alcohol within the last 30 days, while 21% report marijuana use in the same time period. These behaviors may have significant impact on overall health, which in turn may impact student engagement and academic performance. In fact, research in the area supports this correlation, with studies finding health behaviors such as positive food choices, high rates of physical activity, reduced rates of drug and alcohol consumption, and positive sleep patterns being associated with increased rates of student retention and success while on campus (Arria, Caldeira, Bugbee, Vincent, & O'Grady, 2015; Mull & Tietjen-Smith, 2014; Musgrave-Marquart, Bromley, & Dalley, 1997; Trockel, Barnes, & Egget, 2000). Consistently, the studies reviewed recommended additional research in this area and emphasized the importance of strengthening the relationship between student health behavior interventions and student retention.

Mental Health and Student Success

Mental health is another significant student health area that should be further investigated as a corelate to student retention and success rates. Mental health concerns were widely reported by students in the ACHA report, with 42% of respondents feeling so depressed it was difficult to function within the past 12 months (2018). Sixty-three percent reported feeling overwhelming anxiety and 12% reported considering suicide during that same time frame. Yet commonly these concerns went untreated, as only 18% of the sample reported being diagnosed or treated for depression, and 22% reported treatment for anxiety. These issues are not new, as in 1982 a four year study found

prevalence for mental illness was 39% among the college students studied, with the majority going untreated (Rimmer, Halikas, & Schuckit, 1982). This is important, as depression and anxiety has been found to strongly correlate with college GPA and dropout rates (Eisenberg, Golberstein, & Hunt, 2009).

Stress is another important risk factor that should be further investigated in relation to student health and success. Studies have found college students who report increased stress also have increased rate of illness, which may directly impact student success (Roddenberry & Renk, 2010). While research on the potential relationship between stress, health, and student success is limited, literature on the association is available (Herts et al., 2014; Pritchard & Wilson, 2003; Roddenberry & Renk, 2010; Shankar & Park, 2016). A particular study of interest, conducted by Larson, Orr and Warne (2016), utilized a cross sectional survey of 526 undergraduate students to assess how health variables predict GPA. They found 21.8% of the variance in GPA based on health related stressors and concluded that health factors are significantly associated with student success. Their study included multiple categories of health concerns, including overall health, physical health, mental health, stressors, and substance abuse. Stressors, such as being diagnosed with a mental illness, parent conflict, excessive credit card debt, termination of personal relationship, and average stress level, were found to have the highest variance in GPA.

ACEs and Student Success

Another important form of stress is that which is experienced in childhood, which may have a lasting impact on students in higher education. As mentioned in the previous chapter, Adverse Childhood Experiences (ACEs) are recognized as significant

contributors to negative outcomes throughout the lifespan (S. R. Dube et al., 2004; V. J. Felitti et al., 1998). Literature on ACE exposure and student success conducted among college students will be summarized throughout this section. In the following section a more detailed discussion will be provided on how ACE exposures may be associated with the pre- and post-admission variables discussed throughout the previous sections.

There is a large body of research confirming ACEs are extremely common, with 66% of the general U.S. population experiencing at least one ACE during childhood (CDC, 2016). Interestingly, the rates of each type of ACE appear to differ among undergraduate students from what has been found nationally. The CDC reports that the most common ACE in the general population is physical abuse, which is reported to occur in 28.3% of those surveyed (Anda et al., 2009; Centers for Disease Control and Prevention, 2016). A study by Cprek et al. (2020) found physical abuse was reported in only 6.7% of the studied student population. The most frequent individual adverse experience reported by college students in the study was parental separation or divorce (27%), household mental illness (15.7%), and emotional abuse (15.1%). Further, over half of the college students included experienced zero ACEs, which is out of alignment with the 34% reported within the general population. This indicates traditional aged students who attend four-year residential undergraduate institutions may be different than those who do not. However, with nearly half of students reporting at least one ACE prior to enrollment, they remain an important understudied variable in relation to student success.

There has been limited research to date on the relationship between ACEs and student success, however some have started to explore a potential relationship. A recent

study of 525 undergraduate students found those with high ACE scores reported increased rates of family difficulties and a higher number of health problems, which in turn was found to increase academic barriers (Hinojosa, Nguyen, Sellers, & Elassar, 2019). A significant cross-sectional study was conducted among Minnesota college students attending both two- and four- year institutions that found students reporting higher ACE scores also reported lower GPAs, along with increased rates of mental health concerns, poor physical health, and greater alcohol consumption (Merians, Baker, Frazier, & Lust, 2019). Similar to the study discussed above, this project found rates of ACE exposure differed from what is found in the general population. The most frequent ACE experienced among the 8,994 survey participants was emotional abuse, at 44%. The second and third most frequent ACEs were household mental illness (32%) and parental divorce (28%). The study did not evaluate degree completion, but does indicate students with high ACE scores may be less academically successful.

Finally, an international study conducted at the University of Banja Luka in Bosnia investigated the relationship between ACE score and academics as measured by class grades and GPA. The study found as ACEs increased, rates of depressiveness increased, which in turn predicted lower GPA (Subotić, Marinković, & Zečević, 2018). The study did not evaluate the impact of ACE exposure on degree completion.

The majority of the remaining studies in the area have investigated individual ACEs or types of victimization, with many of the studies published being limited by small sample size. However, this research has found children that experienced physical maltreatment were twice as likely to have low educational qualifications at the age of 18, when compared to children that did not (Jaffee et al., 2018). Another study, which

included 64 undergraduate students, found that higher rates of childhood maltreatment was correlated with poorer educational outcomes as measured by participants' GPA (Welsh et al., 2017). Similarly, research has found children who experienced physical and sexual abuse were far less likely to attend college, and those that were admitted were found to be less likely to complete degrees (Boden et al., 2007). Additional studies of small populations consistently find childhood trauma negatively impacts educational outcomes (Charles et al., 2004; Duncan, 2000; Lisak & Luster, 1994).

ACEs and Variables that Predict Student Success

Throughout the previous sections factors that may predict student success have been discussed. Factors such as student demographics, pre-admission factors, post-admission factors, and student health have been explored. Next, it is important to explore the potential relationship between toxic stress in childhood and these factors known to be associated with or predictive of student success. If an association has historically been identified between ACEs and these variables, it would provide further strength to the hypothesis that increased ACE exposure is associated with decreased rates of student success. Therefore, literature on the relationship between ACEs and demographic, pre-admission, and post-admission variables will be explored in this section.

As previously discussed, many variables that are predictive of student success in higher education have also been found to be influenced by stress in childhood. Literature discussed throughout this section will include key research findings on the impact of stress causing events with an emphasis on studies utilizing the ACE survey when possible. Additional research will be discussed that assessed the impact of stress,

including individual stressful events in childhood such as childhood abuse and neglect, when studies utilizing the ACE survey are limited.

ACEs and Pre-Admission Variables

Research on the impact of stress among minority and low income populations is extensive (Dohrenwend & Dohrenwend, 1970; Franklin, Boyd-Franklin, & Kelly, 2006). This is important, as underrepresented minority students and those from a low SES background have far lower rates of success within higher education (Kuh et al., 2011). A comprehensive study on variations in stress exposures by Turner and Avison (2003) found significantly higher rates of stress among African Americans when compared to non-Hispanic White populations. Similarly, low SES populations reported significantly higher levels of stress exposure. Between genders, females reported more stress related events, however males were found to have more major stressors. Gad and Johnson (1980) found increased rates of adolescent stressors, such as death of a family member, divorce of parents, serious illness in family, changing schools, and losing a friend, were correlated with negative life change. Areas of negative life change identified included increased rates of illness, issues coping with personal problems, and drug use. Rates of both increased stressors and negative life change were highest among low SES and African American students. When looking specifically at studies utilizing the ACE survey, significant differences arise between racial groups. Nationally, 61% of Black children, 51% of Hispanic children, 40 % of White children, and 23% of Asian children report experiencing at least one ACE (Sacks & Murphey, 2018). Rates of ACEs have also been found to be highest among low SES groups, with those in the lowest income bracket and with the lowest education levels reporting the highest average number of ACEs (Nurius, Green, Logan-Greene, Longhi, & Song, 2016).

An important measure for predicting student success within higher education is student academic preparation. Therefore, it is important to assess the impact childhood stress and ACEs may have on educational factors throughout childhood. Research has found ACEs prior to the age of five are correlated with risk of developmental, social and behavioral delays among children in the United States (Cprek et al., 2019). As children enter elementary school, those with high ACE scores are found to be at risk for poor school attendance, behavioral issues, and failure to meet grade level standards in mathematics, reading and writing (Blodgett & Lanigan, 2018). Amongst middles school children, increasing rates of ACEs are correlated with increased behavioral problems in school, which negatively impacts school performance (Hunt, Slack, & Berger, 2017). The trend continues among high schoolers, with those reporting high ACEs being more likely to have poor reading achievement and more likely to drop out than their peer with low or no ACEs (Morrow & Villodas, 2018). Across all school age groups, studies have found increased ACE scores are associated with increased absenteeism, a factor strongly associated with academic success (Balfanz & Byrnes, 2012; Stempel, Cox-Martin, Bronsert, Dickinson, & Allison, 2017). Further study found children between the ages of six and seventeen with increased rates of ACEs reported reduced school engagement, increased rates of grade repetition, and increased likelihood of having an Individualized Education Program (Porche, Costello, & Rosen-Reynoso, 2016).

Parent Support has been found to strongly correlate with student success. However, parent support and engagement appears to vary by stress level in the home. Early parental involvement in educationally supportive activities when children are pre-school age has been found to positively influence child development, yet these practices

are less common among households with high levels of stress (Cprek, Williams, Asaolu, Alexander, & Vanderpool, 2015; Grolnick, Benjet, Kurowski, & Apostoleris, 1997). Among children ages 8-12, parents reporting high rates of stress utilized more controlling strategies in the area of parent academic support (Rogers, Wiener, Marton, & Tannock, 2009). Comparatively, the study found less stressed parents used a more supportive strategy, which resulted in improved student achievement (Rogers et al., 2009). It is also important to note that many of the stressors measured through the ACE survey involve the parent/child relationship. Child abuse and neglect, parent incarceration, parent death, and mental illness in the home may impact both the level of parent support in academically relevant activities, and the student's response to that parent support, or lack thereof.

ACEs and Post-Admission Variables

Another important factor related to student success while in college is student engagement. A dose response relationship has been identified between ACE score and antisocial behavior (Schilling et al., 2007). Similarly, Briggs and Price (2009) found that an increased ACE score is associated with experience avoidance. These factors could be influential in how students connect both inside and outside of the classroom while attending institutions of higher learning. This impact on social behavior may also directly impact a student's willingness to meet with faculty members and build social connections with peers while on campus, additional variables that have been found to correlate with student success while in college.

As previously discussed, students engaging in negative health behaviors such as poor dietary practices, reduced rates of physical activity, and substance use, are

associated with poor student performance and success. Therefore, it is important to highlight that a dose response relationship has been identified between ACE score and substance use among undergraduate college students, with 75% of students reporting utilization of illicit drugs within the last month also reporting ACE exposure (Forster, Grigsby, Rogers, & Benjamin, 2018). Another study found college students with high ACE exposure reported higher rates of drinking and driving, suicide ideation, and lack of restful sleep (Grigsby et al., 2020). The same study found gender differences in the relationship between ACE exposure and outcomes, with ACE exposed female college students having higher rates of mental health conditions, while ACE exposed male college students reporting higher rates of substance abuse. Similarly, another study found current college students who report high ACE exposure in childhood experience greater stress and lower rates of social support when compared to their peers with low ACE scores (Karatekin & Ahluwalia, 2020).

Limited research has been conducted that assesses the impact of ACEs on student academic performance and success within higher education. As previously mentioned, a 2019 cross-sectional study conducted among 2 and 4-year college students in Minnesota found students reporting increased ACE exposure were more likely to report lower GPAs than peers reporting no ACEs (Merians et al., 2019). Similarly, a previously discussed international study found as ACEs increased, rates of depressiveness increased, which in turn predicted lower GPA (Subotić et al., 2018).

ACEs and Health

Research has long supported the claim that there is a negative association between stress and health, where increased amounts of stress is associated with poorer health

outcomes (Glaser & Kiecolt-Glaser, 2005; Keller et al., 2012; Wiebe & McCallum, 1986). Stress has been found to negatively impact the human immune system, resulting in increased rates and duration of illness (Glaser & Kiecolt-Glaser, 2005). Individuals experiencing high rates of stress as adults report impaired physical and mental functioning, are more likely to miss work, and report higher rates of health care service usage than their adult peers who do not report high stress rates (Kalia, 2002). Further, increased stress has been found to correlate with increased rates of both physical and mental health concerns and ultimately, premature mortality (Keller et al., 2012).

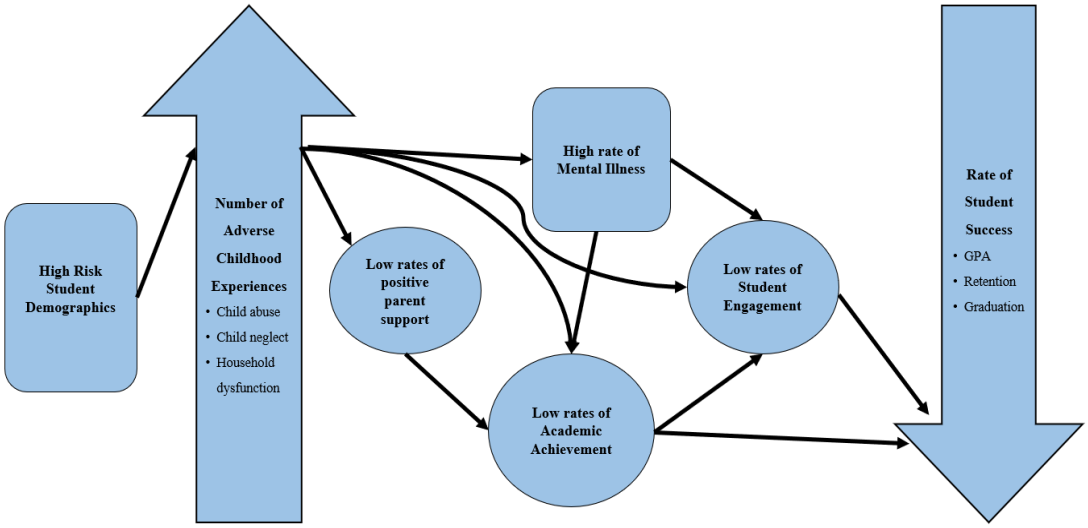
Mental Health is strongly associated with student success, and appears to be significantly impacted by toxic stress in childhood. Schilling and colleagues (Schilling et al., 2007) found those experiencing ACEs reported an increased rate of mental illness, with a dose response relationship identified between ACE score and mental health concerns, with depressive symptoms being the most commonly reported. This finding was supported in a 2017 study, which found ACE scores were predictive of worsening mental health over the course of a semester (Karatekin, 2018). Additional studies have supported the correlation between ACEs and mental health disorders including Depression, Obsessive Compulsive Disorder, Anxiety, and suicidal ideation and attempts among adults (Afifi, Boman, Fleisher, & Sareen, 2009; E. S. Briggs & Price, 2009; Chapman et al., 2004; De, Demyttenaere, & Bruffaerts, 2013). Drug use, abuse, and addiction have also been found to correlate with ACE score, with a more significant association being found among males when compared to females (Schilling et al., 2007).

Conceptual Model

The literature described throughout the previous sections outline the potential mechanisms for the relationship between ACE score and student success among colleges students enrolled in a four-year bachelor degree program. It is hypothesized that increased childhood stress, as measured by the ACE survey, will negatively impact factors such as academic preparedness, parent support, student engagement, and student mental health. These factors are associated with decreased rates of success within higher education. Therefore, students with high ACE scores would be more likely to experience low rates of positive parenting practices, increased rates of mental illness, lower rates of academic achievement prior to enrollment, and lower rates of student engagement while on a college campus. These factors would in turn result in lower rates of academic success including reduced rates of degree completion. A Conceptual model for the expected mechanism of this relationship is provided in Figure 1.

Figure 1

Conceptual Model for Relationship Between High Rates of Adverse Childhood Experiences and Student Success



Therefore, the purpose of this study was to investigate the relationship between ACE score and student success, as measured by student degree completion. It is hypothesized that as student ACE scores increase, degree completion rates will decrease.

Conclusion

Many variables have been found to correlate with student success. From pre-matriculation through graduation, institutions of higher education have been attempting to understand these variables within their institutions. This chapter provides an overview of the literature around predicting student success. Focus was given to variables that are measured prior to matriculation, as well as variables that occur while a student is on campus. Attention was also given to the relationship between student health, including toxic stress in childhood, and student success, engagement and graduation. Finally, a conceptual model was presented which predicts ACE exposure in childhood negatively impacts variables associated with low rates of student success. This, in turn, would result in ACE score being a potential predictor of student success among students in undergraduate programs.

Chapter Three: Methods

The current study utilized a longitudinal design to identify if a relationship exists between Adverse Childhood Experiences and degree completion, among a random sample of undergraduate students at a large state-funded university in the southeastern United States. The study is classified as longitudinal due to the periodic time series of the academic record review. On-time degree completion was also reviewed, with the outcome variables of (1) not ever completing degree, (2) four-year non-degree completion, and (3) six-year non-degree completion included in the final analysis.

Study Design

This project built on an analysis of data collected in spring of 2015 at a large, state funded university. The original study used a cross-sectional design and collected data by sending a web-based survey to a randomized group of 5,000 undergraduate students between the age of 18-24. (See Appendix A for a copy of the full survey.) The original data collection was conducted through a grant funded by the National Institute of Health (5R21HD069897). The original survey was conducted at two universities. For the current dissertation project, only one campus was included. The current project is a secondary analysis from data collected in the original study.

The original random student sample was evenly distributed between genders. Students in the original random sample were evenly distributed among academic classification groups, with the study population spanning first semester freshman to graduating seniors. Among the study participants, the first semester of university enrollment spanned from 2008 to 2015. Participants were selected by a random sample obtained from the university registrar. The survey took approximately 25 minutes to

complete and contained 172 items. Items included: Likert scales; select all that apply; single answer multiple choice; and free response. Links to a SurveyMonkey questionnaire were emailed to the 5,000 undergraduate students via their university email. Following the initial communication, five scheduled email reminders were sent over the four-week data collection timeframe. Students were provided a $10 Amazon gift card as an incentive to participate in the study. Of the 5,000 invitations sent, 2107 students completed the survey. This resulted in a 42.2% response rate for the 2015 study.

In order to compile the dataset for the current longitudinal project, a study participant list was created with previously provided identifying information including student email, first, middle, and last names. This information was provided to the university registrar for student ID matching. The registrar completed a multi-series matching process to identify unique student ID information for each survey participant. The initial match attempt was conducted using student email and year of enrollment (2014-15 academic year). Following email review, the student's first and last name, along with year of enrollment, were used. The process produced Student ID information for 2,060 of the 2,107 survey participants. Individual matching was then conducted on the remaining 47 participants using first, middle and last name, age based on the 18-24 year old demographic from the original survey, and year of enrollment. This process resulted in the identification of 45 additional Student ID matches. Two survey participants were unable to be matched due to there being multiple possible students matching with the identifying information. These two participants were removed from the sample, resulting in a study sample of 2,105 students. Of these 2,105 individuals, 211 failed to complete

the ACE Survey questions and were removed from the analytic sample. This resulted in a final study population of 1,894 undergraduate students.

Student IDs were used to retrieve relevant student success information. Variables collected include: gender, age, ethnicity, residency status, first-generation status, Advanced Placement (AP) credits, high school GPA, High School Readiness Index (HSRI), developmental coursework enrollment by semester, Pell Grant eligibility, term GPA by semester, cumulative GPA by semester, academic college by semester, major by semester, part-time status by semester, Freshman seminar enrollment, campus housing utilization, transfer status, and utilization of on campus tutoring services. This information was then linked to survey responses by the student ID identifier to finalize the analytic sample. Each participant record created included information on all semester enrolled from their first semester through Fall 2020. Additional information was not collected directly from the student participants outside of the original cross-sectional survey.

The original project was approved by IRB in 2010, under protocol 44378, and remains active. Further approvals from Institutional Research and the Office of Legal Counsel were obtained for the addition of the educational outcomes as part of this study.

Measures

Demographic Variables

Demographic variables for this study were provided by the university registrar. Information on student state and country of residence was provided. Students were coded as (1) domestic and (0) international based on their international designation in their student record. Students were coded as (1) in-state if they indicated being a resident of

the state where the university resides and (0) out of state if they indicated otherwise. Student gender was coded as (1) male and (2) female. Student age was provided on the original 2015 survey and was coded as a numeric variable between 18-24. Student race and ethnicity data was coded based on registrar data. The racial group designations include: White (non-Hispanic), Black (non-Hispanic), Hispanic, Asian, American Indian or Alaskan Native, multi-racial (two or more races), Native Hawaiian or other Pacific Islander, nonresident alien, and unknown. A secondary race variable was then created that included white (1) an non-white (0) identification. This was done because of the small student populations in some demographic groups. Student academic classification was calculated based on student's first semester enrolled and the date of survey completion. Students were classified as first-year (1) if they had been enrolled 1-2 semesters, (2) second-year if they had been enrolled 3-4 semesters, (3) third-year if they were enrolled 5-6 semesters, and fourth-year if they had been enrolled 7 or more semesters. The university defines first-generation students as those that do not have a parent that completed at least a four-year post-secondary degree. This information was provided by the registrar and coded as (1) first-generation and (0) not first-generation.

A slightly higher percentage of the study population were female with 57.1% reporting as such (Table 1). Nineteen percent of the students were identified as first-generation college students by the university registrar, indicating neither parent had previously completed a bachelor degree. Only 2.2% of students in the study were identified as international students with the registrar. Students ranged in age from 18-24 years at the time the survey was completed, with the most commonly reported age being twenty, which represented 24.8% of the sample. The least common ages reported were

twenty-three (5.1%) and twenty-four (1.8%). Students were fairly evenly distributed across academic classification, with a slightly higher percentage of first-year (26.0%) and second-year (26.7%) participating than third-year (23.9%) or fourth-year (23.4%). The study population overwhelmingly identified as White (80.6%), with Asian students representing 5.2% and Black students representing 4.7% of the sample. Only 1.5% of the study population identified as Hispanic. These demographic specifics vary slightly to that seen at the university of Spring 2015. According to data published by the university, the undergraduate student body at that time was 52.4% female and 15.5% first generation. Students identifying as White represented 75.8% of the student body at that time, with Black or African American students representing 7.6% and Asian students representing 2.5%. Hispanic or Latino students made up 3.8% of the student population in spring 2015 (University of XXXXXX, 2015). It is important to note this variance impacts the generalizability of the study findings. This will be further explored in chapter five.

Table 1	
Sample Demographics (n=1,894)	
Gender	n (%)
Male	812 (42.9)
Female	1082 (57.1)
Age	
18	163 (8.6)
19	388 (20.5)
20	469 (24.8)
21	437 (23.1)
22	306 (16.2)
23	97 (5.1)
24	34 (1.8)
Race	
White (non-Hispanic)	1491 (78.7)
Black (non-Hispanic)	91 (4.8)
Hispanic	90 (4.8)
Asian	76 (4.0)
American Indian or Alaskan Native	6 (0.3)
Multi-racial (two or more races)	49 (2.6)
Native Hawaiian or other Pacific Islander	2 (0.1)
Nonresident Alien	40 (2.1)
Unknown	50 (2.6)
Academic Classification	
First Year	492 (26.0)
Second Year	506 (26.7)
Third Year	452 (23.9)
Forth Year	444 (23.4)
Residency	
In-state resident	1370 (72.3)
Out of state resident	524 (27.7)
International status	
International student	41 (2.2)
Domestic student	1853 (97.8)
First Generation Status	
First Generation student	343 (19.1)
Non-First-Generation student	1551 (81.9)

Independent variable

The 2015 cross-sectional survey included the complete Adverse Childhood Experiences (ACEs) Survey, developed by Kaiser Permanente and the CDC, which is comprised of questions on negative experiences including psychological, physical, and sexual abuse; violence against mother; or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned, which occurred prior to the student turning 18 (Felitti et al., 1998). The survey includes ten binary questions assessing stress experiences in childhood. All questions have “yes” or “no” response

option. Each question aligns to one of the ten categories of stress events measured in the survey. The full survey measure is available for review in Appendix B. The ACE survey's psychometric properties have been assessed in many studies and found to have good face validity, test retest kappa statistic of .52-.72, and intraclass correlations coefficient of .65 or higher across all 10 items (Dube, Williamson, Thompson, Felitti, & Anda, 2004; Pinto, Correia, & Maia, 2014). Total ACE score was calculated by summing the number of individual ACEs reported on the survey in accordance with the measure guidelines.

Frequency distributions were generated on individual ACE items as well as overall ACE score, according to total number of 'yes' responses. Students were then collapsed into the following categories: (1) 0 ACEs experienced; (2) 1 ACEs experienced; (3) 2-3 ACEs experienced; and (4) 4 or more ACEs experienced. This aligns with the original ACE study that utilizes the ACE score of four or higher as the threshold for high ACE exposure (Felitti et al., 1998).

The majority of students (56.4%) in the study reported experiencing zero adverse childhood events as measured by the ACE questionnaire (Table 2). Approximately twenty percent of students reported experiencing one ACE, nearly 10% experienced two ACEs, and 5% reported experiencing three ACEs. Students experiencing four or more ACEs represent the remaining 8% of students. ACE exposure was not evenly distributed across adverse events. The most frequently experienced ACE was parent separation or divorce, which impacted 26.8% of students in the study. The next most common ACE were household mental illness and emotional abuse, which both impacted 13.8% of

students who completed the survey. A complete list of the ten items included in the measure and their frequency within the study can be seen in Table 2.

Table 2
Prevalence (%) of Individual Adverse Childhood Experience (ACEs) and ACE Scores in Study Population (n=1,894)

Individual ACEs	**Study n (%)**
Parental Separation or Divorce	508 (26.8)
Household Mental Illness	264 (13.8)
Emotional Abuse	261 (13.8)
Emotional Neglect	217 (11.5)
Household Substance Abuse	202 (10.7)
Physical Abuse	110 (5.8)
Mother Experienced Violence	87 (4.6)
Sexual Abuse	78 (4.1)
Incarcerated Household Member	68 (3.6)
Physical Neglect	45 (2.4)
ACE Score	
0 ACEs	1068 (56.4)
1 ACE	405 (21.4)
2 ACEs	182 (9.6)
3 ACEs	85 (4.5)
4 ACEs	57 (3.0)
5 ACEs	50 (2.6)
6 ACEs	18 (1.0)
7 ACEs	14 (0.7)
8 ACEs	8 (0.4)
9 ACEs	4 (0.2)
10 ACEs	3 (0.2)

Primary Dependent Variable

Using the provided student IDs, data was compiled on student success outcomes including continued enrollment and degree completion. Data was provided for all terms enrolled. Terms were sequenced in chronological order and numbered. The first term participants were enrolled was Fall 2008 and the final term included in the analysis was Fall 2020. This resulted in terms numbered from one (Fall 2008) to twenty-seven (Fall 2020) for the Term variable. This information was then used to calculate the total number

of semesters a student was enrolled at the university. It was also used to provide information on gaps in enrollment.

The university provided information on student degree completion including the semester degree was conferred. Calculations were conducted to assess number of terms between enrollment and degree completion. Graduation terms were numbered using the same sequencing as described above, with Fall 2008 being coded as 1 and Fall 2020 being coded as 27. Students completing their degree in summer were considered spring graduates for the purpose of four-and six-year degree completion analysis. The difference between term of first enrollment and term degree was completed was used to calculate time to degree completion. Students completing their degree within eight semesters of original enrollment were coded as (1) yes for four-year degree completion. Students who did not were coded as (0) no. A similar measure was created for six-year degree completion, with the calculation adjusted to review completion rates within twelve semesters of original enrollment. A final graduation variable was created for graduation status, regardless of time to degree completion, with those that graduated being coded as (1) and those who did not coded as (0). Nearly ninety percent of students in the study completed their bachelor degree (Table 3). Four-year degree completion rates were lower, with only 63.2% of students graduating in that time. Comparatively, 89% of students completed their degree within six years of initial enrollment.

Retention was assessed using the previously discussed term variable. Using student's first semester enrolled as a starting point, a review was conducted to assess enrollment in the following two terms. Students enrolled in both second and third consecutive terms following initial enrollment were coded as retained in student's

sophomore year (1). Those not enrolled in all three semesters were coded as not retained (0). Due to the composition of students in the study, which spanned all undergraduate academic classifications, and the timing of the survey of April, student retention for their sophomore year within the sample was extremely high at 99% (Table 3). This is likely due to the fact that three quarters of the sample were current or previously sophomores at the time of the study. Further, given the survey's time of distribution and the recruitment through the university email system, participants may have been more likely to be engaged students, who are in turn more likely to be retained. This is supported by second year retention rates among the first-year students included in the sample (n=479), of which 97% returned for their sophomore year. This highlights an important distinction of the study population, in that they were actively engaged students with higher than average retention and degree completion rates when compared to the university average. This will be explored further in chapter five. Because student second year retention was found to be so high across the entire study population, this measure was not used as a major outcome variable in additional analysis.

Table 3
Frequency (%) of Student Success (n=1,894)

Bachelor Degree Completion	**n (%)**
Yes	1700 (89.8)
No	194 (10.2)
Four-Year Degree Completion	
Yes	1197 (63.2)
No	697 (36.8)
Six-Year Degree Completion	
Yes	1682 (88.8)
No	212 (11.2)
Retention Second Year	
Yes	1878 (99.2)
No	16 (0.8)

Pre-Admission Control Variables

As previously discussed, there is substantial literature evaluating many factors that may be associated with student success and degree completion rates among undergraduates. An attempt was made to capture as many relevant variables as possible for review. Information provided by the registrar help to quantify academic preparedness prior to enrollment at the university. These variables include unadjusted high school GPA, which was analyzed as a continuous variable. A High School Readiness Index (HSRI), which combines both high school GPA and standardized test score, was provided by the university registrar. HSRI has been used as a proxy for academic preparedness prior to admission at the university. HSRI was used as a continuous variable in analysis. The mean unadjusted high school GPA among survey participants was 3.50 and the mean HSRI was 51.2 (Table 4).

The university also identifies students who may be under prepared academically for higher education, and requires these students to enroll in developmental coursework. Information on this designation was provided by the registrar, and students in need of this coursework were coded as (1) and those not in need of developmental courses were coded as (0). The university also provided information on students who completed Advanced Placement (AP) course credit in high school. Students completing at least one AP credit were coded as (1) while those with no AP credit were coded as (0). Nearly half of the participants were admitted with AP credit and only 2.6% required developmental coursework based on high school performance (Table 4).

Financial barriers prior to and during enrollment are also associated with rates of student success and degree completion, therefore information on Pell Grant eligibility

was included in the analysis. Students receiving at least one semester of Pell Grant funding were coded as (1), while those not receiving Pell Grants were coded as (0). Nearly 30% of students were identified as eligible to receive Pell Grant funding (Table 4).

Table 4
Frequency (%) and Means of Pre-Admission Academic Variables (n=1,894)

Advanced Placement Credit	**n (%)**
Yes	917 (48.4)
No	977 (51.6)
Developmental Coursework Needed	
Yes	50 (2.6)
No	1844 (97.4)
Ever Pell Grant Eligible	
Yes	561 (29.6)
No	1333 (70.4)
Continuous Variables	**Mean (SD)**
High School GPA	3.50 (0.63)
HSRI Score	51.2 (6.2)

Post-Admission Variables

As previously discussed in chapter two, there are factors associated with increased rates of student success following enrollment in a four-year institution. One of these factors is academic success following matriculation. In order to evaluate student academic success, term and cumulative GPA variables were assessed, with both coded as continuous variables, ranging from 0.00 to 4.00. Term GPA was also stratified into the categorical variables of Deans List, probation eligible, and suspension eligible. Student term GPA was coded as Dean's List eligible if it met or exceeded 3.60, which is the university standard threshold for recognition. Students earning Dean's List in any semester they were enrolled were coded as (1) and those that did not were coded as (0). Of the students in the study, 80.4% had at least one academic term where they met this

measure (Table 5). A sum of total semesters each student earned Dean's List honors was then calculated, with the total ranging from zero to fifteen. Similarly, students with a term GPA below a 2.0 during any semester they were enrolled were coded as being at risk of probation (1), while students who maintained a Term GPA above or equal to 2.0 throughout university enrollment were coded as (0) not probation eligible. A sum of total semesters a student was eligible for university probation was created by totaling the number of Term GPA's a student had below a 2.0. Totals ranged from zero to nine semesters. Finally, a variable on academic suspension eligibility was created. Students were identified as being eligible for academic suspension if they had two consecutive term GPAs that were both below 2.0. Students identified as eligible for university academic suspension were coded as (1), otherwise students were coded as (0). Approximately one third of the study population had at least one semester they were eligible for academic probation, while nearly ten percent were eligible for suspension (Table 5).

Another post-admission variable that the literature suggests may correlate with degree completion is participation in a freshman seminar course. Data was included on the completion of a freshman seminar course where students scored either (1) if it was completed and (0) if it was not. Similarly, students who live in on-campus housing have been found to be more successful in higher education. Data was provided from the university on housing status. Students who were reported to live in campus housing for at least one semester were coded as (1) lived on campus, while those that did not were coded as (0). Approximately forty percent completed a freshman seminar class and 80% lived in on campus housing at some point during their time as students (Table 5). This

on-campus housing rate is consistent with the rate among the general student population at the time (University of XXXXXX, 2020).

Student engagement on campus has also been found to correlate with student retention and success. Therefore, student participation on Greek activities and utilization of on-campus study resources were included for review. These variables were selected due to the reliable data collected on them by the university for each. Students ever participating in a Greek organization were coded as (1) while those who never participated were coded as (0). Nearly two thirds of the study sample were members of a Greek organization at some time during their enrollment. This is significantly higher than the participation rate among the general student body, which in 2017 was approximately 27% of all full time undergraduate students (University of XXXXXX, 2018). This variable again demonstrates the study population may not be comparable to the general undergraduate population. It also supports the possibility that the participants are more engaged than the general student population. Students who used on-campus study services were coded as (1) while those who did not were coded as (0). Participation in campus study services was collected when students used their student ID to register for on campus tutoring services. Forty percent of students in the study scanned their ID with campus study services (Table 5). It is important to note there may be additional study service events that were not captured.

Students who maintain full-time status are more likely to complete their bachelor degree on time. Data on full time status was provided for each semester a student was enrolled. Students who maintained a full-time schedule throughout their time as an undergraduate student were coded as (0), while those that had one or more part-time

semesters were coded as (1). Sixteen percent of students had at least one semester where they were enrolled part time (Table 5). Similarly, students who maintain constant enrollment are more likely to complete a bachelor degree. Therefore, enrollment data was provided from the registrar for each semester included in the study. Students who had gaps in enrollment were coded as such (1), while students who were continuously enrolled were coded as (0). A little over 5% of students had a gap in enrollment, meaning they were enrolled, took at least one semester away from the university, and then re-enrolled to continue their education.

Finally, a review of student majors and major changes was conducted. Students who change their major are more likely to extend the time it takes to complete a bachelor degree. Therefore, information was provided on major and college for each semester students were enrolled. Major changes were summed for each student and a variable was created where students who remained in the same major throughout their enrollment were coded as (0), those that than changed their major were coded as (1). Half of the students in the study changed their major at least one time during their academic career (Table 5). A similar review was conducted of student's primary college enrollment, where students who remained in the same academic college throughout their time at the university were coded as (0) and those that changed colleges were coded as (1). College change was included for review in addition to major change because students changing academic colleges commonly have more significant changes to degree completion requirements. A quarter of students in the study changed their primary academic college at least one time (Table 5).

Table 5
Frequency (%) of Post-Admission Academic Variables (n=1,894)

	n (%)
Ever Dean's List Eligible	
Yes	1523 (80.4)
No	371 (19.6)
Ever Probation Eligible	
Yes	649 (34.3)
No	1245 (65.7)
Ever Suspension Eligible	
Yes	154 (8.1)
No	1740 (91.9)
Ever Changed Major	
Yes	958 (50.6)
No	936 (49.4)
Ever Changed College	
Yes	408 (26.3)
No	1145 (73.7)
Ever Undeclared Major	
Yes	380 (20.1)
No	1514 (79.9)
Enrollment Gap	
Yes	106 (5.6)
No	1788 (94.4)
Ever Part Time Enrollment	
Yes	308 (16.3)
No	1586 (83.7)
Freshman Seminar Enrollment	
Yes	741 (39.1)
No	1153 (60.9)
Campus Housing	
Yes	1514 (79.9)
No	380 (20.1)
Greek Membership	
Yes	1242 (65.6)
No	652 (34.4)
Utilization of University Study Services	
Yes	774 (40.9)
No	1120 (59.1)
Transfer Student	
Yes	197 (10.4)
No	1697 (89.6)

Data Analysis

Frequencies were calculated for all categorical variables including demographic information (gender, age, race, ethnicity, residency, and first-generation status), ACE variables, degree completion, and all previously mentioned potential control variables.

Means and standard deviations were calculated for the continuous variables used including GPA and HSRI.

The chi-square statistic allows for the analysis of group differences between variables. Chi-square is found to provide considerable information about the relationship between variables in a study, and is recommended as an initial test to investigate associations between study variables (McHugh, 2013). Therefore, chi-square analysis was conducted between ACE score and all categorical variables to identify any potential association. Chi-square analysis was also conducted between control variables and degree completion, to identify potential statistically significant relationships.

Logistic regression is used to predict future outcomes and assess the potential relationships between variables (Sur, Chen, Candès, & fields, 2019). In this study, logistic regression was used to analyze the relationship between ACE score and degree completion variables. Models were run evaluating the association between ACE score and (1) degree completion, (2) those who complete their degree in four years, and (3) those who do so in six years. An initial unadjusted model was completed, and then a series of models were evaluated that investigated the three categories of control variables previously discussed: (1) demographic variables; (2) pre-admission variables; and (3) post-admission variables. These were assessed independently to investigate their distinct relationships with the outcome variables of degree completion. A final logistic model was conducted that incorporated all control variables previously found to be statistically significant. A full summary of this modeling is provided in the following chapter. All analyses were conducted using SAS Version 9.4.

Chapter Four: Results

The final analytic sample included 1,894 undergraduate students between the age 18-24. The study population was fairly evenly distributed across gender and academic classification. Students in the study were more likely to be female (57%), in-state residents (72%), and non-first-generation (82%). Chi square analysis and logistic regression models were conducted to investigate the relationship between ACE score and undergraduate degree completion. A summary of results is provided below.

Chi Square Analysis

Demographic variables

Chi square analysis was conducted between demographic variables and ACE score as well as degree completion to identify if a statistically significant relationship exists. Demographic variables including gender, age, race, academic classification, in-state residency, international status, and first-generation status. Table 6 provides a summary of the analysis between Demographics and ACE score. When evaluating ACE score compared to Gender, females were found to have higher scores than male participants. Half of the females in the study reported an ACE score of 0, compared to 64% of male participants. When looking at high ACE exposure, 10% of females in the study reported an ACE score of four or higher, while the rate was 5% among male students. The relationship between ACE score and gender was found to be statistically significant, with a p-value of <0.0001, which indicates an association between the variables (Table 6). Similarly, statistically significant associations were found between ACE score and race ($p<0.0001$), in-state residency ($p<0.05$), international status ($p<0.05$), and first-generation status ($p<0.0001$).

Table 6

Chi Square Test: ACE Score and Demographic Control Variables (n=1,894)

Demographics	ACE Score 0 n (%)	ACE Score 1 n (%)	ACE Score 2-3 n (%)	ACE Score 4+ n (%)
Gender**				
Male	513 (63.2)	167 (20.6)	88 (10.8)	44 (5.4)
Female	555 (51.3)	238 (22.0)	179 (16.5)	110 (10.2)
Age				
18	87 (53.4)	34 (20.9)	25 (15.3)	17 (10.4)
19	211 (54.4)	94 (24.2)	56 (14.4)	27 (7.0)
20	271 (57.8)	94 (20.0)	62 (13.2)	42 (8.5)
21	261 (59.7)	81 (18.5)	58 (13.3)	37 (8.5)
22	174 (56.9)	65 (21.2)	47 (15.4)	20 (6.5)
23	16 (47.1)	9 (26.5)	7 (20.6)	2 (5.9)
24				
Race**				
White (non-Hispanic)	854 (57.3)	326 (21.8)	198 (13.3)	112 (7.5)
Black (non-Hispanic)	36 (39.6)	25 (27.5)	20 (22.0)	10 (11.0)
Hispanic	41 (45.6)	24 (26.7)	19 (21.1)	6 (6.7)
Asian	59 (73.7)	9 (11.8)	9 (11.8)	2 (2.6)
American Indian or Alaskan Native	1 (16.7)	2 (33.3)	2 (33.3)	1 (16.7)
Multi-racial (two or more races)	14 (28.6)	8 (16.3)	10 (20.4)	17 (34.7)
Native Hawaiian or other Pacific Islander	2 (100.0)	-	-	-
Nonresident Alien	32 (80.0)	4 (10.0)	3 (7.5)	1 (2.5)
Unknown	32 (64.0)	7 (14.0)	6 (12.0)	5 (10.0)
Academic Classification				
First Year	264 (53.7)	119 (24.2)	70 (14.2)	39 (7.9)
Second Year	276 (54.6)	113 (22.3)	77 (15.2)	40 (7.9)
Third Year	287 (63.5)	79 (17.5)	54 (12.0)	32 (7.1)
Forth Year	241 (54.3)	94 (21.2)	66 (14.9)	43 (9.7)
Residency *				
In-state resident	765 (55.8)	280 (20.4)	200 (14.6)	125 (9.1)
Out of state resident	303 (57.8)	125 (23.9)	67 (12.8)	29 (5.5)
International status*				
International student	33 (80.5)	4 (9.8)	3 (7.3)	1 (2.4)
Domestic student	1035 (55.9)	401 (21.6)	264 (14.3)	153 (8.3)
First Generation Status**				
First Generation student	145 (42.3)	77 (22.5)	67 (19.5)	54 (15.7)
Non-First Generation student	923 (59.5)	328 (21.2)	200 (12.9)	100 (6.5)

*Statistically significant relationship with p<0.05; ** Statistically significant relationship with p<0.01
*** Statistically significant relationship with p<0.001; **** Statistically significant relationship with p<0.0001

Chi square analysis was also conducted to identify any potential association between demographic variables and degree completion. Analysis was conducted on the three outcome variables of (1) ever completed a bachelor degree (yes/no), (2) four-year degree completion (yes/no), and (3) six-year degree completion (yes/no). The demographic variables of age ($p<0.0001$), academic classification ($p<0.0001$), and first-generation status ($p<0.001$) were found to be associated with ever completing a degree.

When evaluating the results for first generation status and degree completion, the analysis found 84% of first-generation students in the study completed their degree, compared with 91% of non-first-generation students. Similarly, students who completed the survey as a first-year student had an 81% rate of completion, compared to a rate of 96% among seniors (Table 7). Results varied slightly with four and six-year degree completion. Gender ($p<0.0001$), age ($p<0.0001$), race ($p<0.05$), academic classification ($p<0.0001$), in-state residency ($p<0.05$), and first-generation status ($p<0.001$) were all found to be statistically associated with 4-year degree completion rates. For six-year degree completion, gender ($p<0.05$), age ($p<0.0001$), academic classification ($p<0.0001$), and first-generation status ($p<0.001$) maintained statistical significance (Table 7).

Table 7

Chi Square Test: Demographic Control Variables and Degree Completion (n=1,894)

Demographics	Ever Degree Completion: Yes n (%)	4-year Degree Completion: Yes n (%)	6-year Degree Completion: Yes n (%)
Gender			
Male	719 (88.6)	450 (55.4) ****	704 (86.7) *
Female	981 (90.7)	747 (69.0)	978 (90.4)
Age			
18	129 (79.1) ****	104 (63.8) ****	129 (79.1) ****
19	332 (85.6)	253 (65.2)	330 (85.1)
20	416 (88.7)	310 (66.1)	414 (88.3)
21	413 (94.5)	286 (65.5)	410 (93.8)
22	293 (95.8)	201 (65.7)	288 (94.1)
23	89 (91.8)	34 (35.0)	88 (90.7)
24		9 (26.5)	23 (67.7)
Race			
White (non-Hispanic)	1352 (90.7)	957 (64.2) *	1337 (89.7)
Black (non-Hispanic)	78 (85.7)	41 (45.1)	77 (84.6)
Hispanic	74 (82.2)	54 (60.0)	74 (82.2)
Asian	68 (89.5)	50 (65.8)	67 (88.2)
American Indian or Alaskan Native	4 (66.7)	2 (33.3)	4 (66.7)
Multi-racial (two or more races)	44 (89.8)	32 (65.3)	43 (87.8)
Native Hawaiian or other Pacific Islander	2 (100.0)	2 (100.0)	2 (100.0)
Nonresident Alien	35 (87.5)	25 (62.5)	35 (87.5)
Unknown	43 (86.0)	34 (68.0)	43 (86.0)
Academic Classification			
First Year	400 (81.3) ****	323 (65.7) ****	400 (81.3) ****
Second Year	450 (88.9)	344 (68.0)	447 (88.3)
Third Year	426 (94.3)	309 (68.4)	423 (93.6)
Forth Year	424 (95.5)	221 (49.8)	412 (92.8)
Residency			
In-state resident	1238 (90.4)	842 (61.5) *	1222 (89.2)
Out of state resident	462 (88.2)	355 (67.8)	460 (87.8)
International status			
International student	36 (87.8)	26 (63.4)	36 (87.8)
Domestic student	1664 (89.8)	1171 (63.2)	1646 (88.8)
First Generation Status			
First Generation student	289 (84.3) ***	188 (54.8) ***	285 (83.1) ***
Non-First Generation student	1411 (91.0)	1009 (65.1)	1397 (90.1)

*Statistically significant relationship with p<0.05; ** Statistically significant relationship with p<0.01
*** Statistically significant relationship with p<0.001; **** Statistically significant relationship with p<0.0001

Pre-admission variables

Chi square analysis was also conducted between the categorical pre-admission variables and ACE score. Of the three variables assessed, only Pell Grant eligibility was found to be statistically significant ($p<0.0001$). One third of students who were Pell Grant eligible reported an ACE score of zero, compared to two thirds of students who were not Pell eligible. When looking at high ACE exposure, 17% of students who were Pell

eligible reported experiencing four or more ACEs, compared with nearly 5% of those not Pell eligible reporting high rates of adversity in childhood (Table 8).

Table 8
Chi Square Test: ACE Score and Pre – Admission Control Variables (n=1,894)

	ACE Score 0 n (%)	ACE Score 1 n (%)	ACE Score 2-3 n (%)	ACE Score 4+ n (%)
Advanced Placement Credit				
Yes	532 (58.0)	191 (20.8)	123 (13.4)	71 (7.7)
No	536 (54.9)	214 (21.9)	144 (14.7)	83 (8.5)
Developmental Coursework Needed				
Yes	26 (52.0)	11 (22.0)	7 (14.0)	6 (12.0)
No	1042 (56.5)	394 (21.4)	260 (14.1)	148 (8.0)
Ever Pell Grant Eligible****				
Yes	203 (36.2)	145 (25.9)	120 (21.4)	93 (16.6)
No	865 (64.9)	260 (19.5)	147 (11.0)	61 (4.6)

*Statistically significant relationship with p<0.05; ** Statistically significant relationship with p<0.01
*** Statistically significant relationship with p<0.001; **** Statistically significant relationship with p<0.0001

While only Pell Grant eligibility was found to be associated with ACE score, all three of the pre-admission variables were statistically associated with all three degree completion variables. A summary of these results are provided in Table 9.

Table 9
Chi Square Test: Pre – Admission Control Variables and Degree Completion (n=1,894)

	Ever Degree Completion: Yes n (%)	4-year Degree Completion: Yes n (%)	6-year Degree Completion: Yes n (%)
Advanced Placement Credit			
Yes	845 (92.2) ***	629 (68.6) ****	835 (91.1) **
No	855 (87.5)	568 (58.1)	847 (86.7)
Developmental Coursework Needed			
Yes	40 (80.0) *	23 (46.0) *	39 (78.0) *
No	1660 (90.0)	1174 (63.7)	1643 (89.1)
Ever Pell Grant Eligible			
Yes	486 (86.6) **	302 (53.8) ****	475 (84.7) ***
No	1214 (91.1)	895 (67.1)	1207 (90.6)

*Statistically significant relationship with p<0.05; ** Statistically significant relationship with p<0.01
*** Statistically significant relationship with p<0.001; **** Statistically significant relationship with p<0.0001

Post-admission variables

The previously discussed post-admission variables were also evaluated for an association with ACE score. Significant differences were identified between ACE exposure and multiple variables. Among students who were eligible for probation, 50%

reported an ACE score of 0 and 11% reported an ACE score of four or more. Comparatively, among students never eligible for probation, the rates were 60% and 7% respectively. The differences in ACE exposure were even more dynamic when evaluating students who were ever eligible for suspension. Among these students, only 38% reported an ACE score of zero, while 17% reported an ACE score of four or higher. Among students not eligible for suspension the rates were 58% reporting zero and 7% reporting four or more. Both probation and suspension were found to be associated with ACE score with a $p<0.0001$ (Table 10).

An association was also identified between ACE score and students who had a gap in enrollment at the university. Among students who had a break in enrollment, 39% reported an ACE score of zero and 20% reported an ACE score of four or higher. In comparison, among students with continued enrollment, the rates were 57% reporting an score of zero and 7% reporting four or more ACEs ($p<0.0001$). Associations were also identified between ACE and part time enrollment ($p<0.05$).

The student engagement variables of Greek affiliation ($p<0.001$) and utilization of study services ($p<0.05$) on campus were also found to be associated with ACE score. Among students who were Greek participants, 62% reported an ACE score of zero while 6% reported an ACE score of four or more. Among non-Greek participants the rates were 54% and 9% respectively (Table 10).

Table 10
Chi Square Test: ACE Score and Post – Admission Control Variables (n=1,894)

	ACE Score 0 n (%)	ACE Score 1 n (%)	ACE Score 2-3 n (%)	ACE Score 4+ n (%)
Ever Dean's List Eligible				
Yes	866 (56.9)	329 (21.6)	209 (13.7)	119 (7.8)
No	202 (54.5)	76 (20.5)	58 (15.6)	35 (9.4)
Ever Probation Eligible****				
Yes	322 (49.6)	140 (21.6)	114 (17.6)	73 (11.2)
No	746 (59.9)	265 (21.3)	153 (12.3)	81 (6.5)
Ever Suspension Eligible****				
Yes	59 (38.3)	41 (26.6)	28 (18.2)	26 (16.9)
No	1009 (58.0)	364 (20.9)	239 (13.7)	128 (7.4)
Ever Changed Major				
Yes	530 (55.3)	224 (23.4)	126 (13.2)	78 (8.1)
No	538 (57.5)	181 (19.3)	141 (15.1)	76 (8.1)
Ever Changed College				
Yes	270 (55.1)	115 (23.5)	73 (14.9)	32 (6.5)
No	798 (56.8)	290 (20.7)	194 (13.8)	122 (8.7)
Ever Undeclared Major				
Yes	207 (54.5)	86 (22.6)	56 (14.7)	31 (8.2)
No	861 (56.9)	319 (21.1)	211 (13.9)	123 (8.1)
Enrollment Gap****				
Yes	41 (38.7)	16 (15.1)	28 (26.4)	21 (19.8)
No	1027 (57.4)	389 (21.8)	239 (13.4)	133 (7.4)
Ever Part Time Enrollment*				
Yes	165 (53.6)	62 (20.1)	43 (14.0)	38 (12.3)
No	903 (56.9)	343 (21.6)	224 (14.1)	116 (7.3)
Freshman Seminar Enrollment				
Yes	399 (53.9)	167 (22.5)	109 (14.7)	66 (8.9)
No	669 (58.0)	238 (20.6)	158 (13.7)	88 (7.6)
Campus Housing				
Yes	857 (56.6)	324 (21.4)	210 (13.9)	123 (8.1)
No	211 (55.5)	81 (21.3)	57 (15.0)	31 (8.2)
Greek Membership***				
Yes	404 (62.0)	137 (21.0)	74 (11.4)	37 (5.7)
No	664 (53.5)	268 (21.6)	193 (15.5)	117 (9.4)
Utilization of University Study Services*				
Yes	435 (56.2)	188 (24.3)	97 (12.5)	54 (7.0)
No	633 (56.5)	217 (19.4)	170 (15.2)	100 (8.1)
Transfer Student				
Yes	107 (54.3)	38 (19.3)	34 (17.3)	18 (9.1)
No	961 (56.6)	367 (21.6)	233 (13.7)	136 (8.0)

*Statistically significant relationship with p<0.05; ** Statistically significant relationship with p<0.01
*** Statistically significant relationship with p<0.001; **** Statistically significant relationship with p<0.0001

Chi square analysis was also conducted between post-admission variables and the degree completion variables. Unsurprisingly, academic success was strongly associated with degree completion. A significant relationship was found with students who were ever Dean's List eligible and all three graduation outcomes ($p<0.0001$). Students with at least one semester of eligibility have a 95% degree completion rate, compared to a rate of

70% for those that never met that standard. When evaluating four-year completion rates, those who were Dean's List eligible had a 70% graduation rate, compared to 38% for those never on the Dean's List (Table 11). A similar pattern was seen among students who were eligible for probation and suspension, with both variables being strongly associated ($p<0.0001$) with all three graduation measures. When evaluating four-year degree completion, the rates are notable, with 37% of students who were eligible for probation and 13% who were eligible for suspension completing their degree within four years. In comparison, the four-year graduation rates were 77% for those never meeting probation eligibility and 68% for those never eligible for suspension (Table 11).

Additional post-admission variables were found to be associated with degree completion. Students who changed their major had lower four-year graduation rates than those who did not ($p<0.0001$), however the variable was not associated with ever completing a degree or six-year graduation rates. Similarly, changing of academic college was associated with four-year ($p<0.0001$) and six-year ($p<0.05$) degree completion rates, but not with ever completing a degree. Students who ever had an undeclared major were also associated with decreased rates of four-year graduation, but not the other two outcome measures. Enrolling as a transfer student was also only associated with reduced rate of four-year degree completion ($p<0.0001$). Students with gaps in enrollment ($p<0.0001$) and those who were ever enrolled part time ($p<0.0001$) reported lower rates for all three of the degree completion variables (Table 11).

Finally, student engagement was also found to be associated with degree completion rates. Students who were members of Greek organizations reported higher four-year ($p<0.05$), six-year ($p<0.001$), and overall degree completion rates ($p<0.01$).

Students utilizing campus study services also had higher rates of degree completion (Table 11).

Table 11
Chi Square Test: Post – Admission Control Variables and Degree Completion (n=1,894)

	Ever Degree Completion: Yes n (%)	4-year Degree Completion: Yes n (%)	6-year Degree Completion: Yes n (%)
Ever Dean's List Eligible			
Yes	1441 (94.6) ****	1057 (69.4) ****	1429 (93.8) ****
No	259 (69.8)	140 (37.7)	253 (68.2)
Ever Probation Eligible			
Yes	490 (75.5) ****	240 (37.0) ****	477 (73.5) ****
No	1210 (97.2)	957 (76.9)	1205 (96.8)
Ever Suspension Eligible			
Yes	78 (50.7) ****	20 (13.0) ****	73 (47.4) ****
No	1622 (93.2)	1177 (67.6)	1609 (92.5)
Ever Changed Major			
Yes	860 (89.8)	525 (54.8) ****	844 (88.1)
No	840 (89.7)	672 (71.8)	838 (89.5)
Ever Changed College			
Yes	429 (87.6)	249 (50.8) ****	421 (85.9) *
No	1271 (90.5)	948 (67.5)	1261 (89.8)
Ever Undeclared Major			
Yes	335 (88.2)	205 (54.0) ****	329 (86.6)
No	1365 (90.2)	992 (65.5)	1353 (89.4)
Enrollment Gap			
Yes	42 (39.6) ****	19 (17.9) ****	40 (37.7) ****
No	1658 (92.7)	1178 (65.9)	1642 (91.8)
Ever Part Time Enrollment			
Yes	243 (78.9) ****	102 (33.1) ****	232 (75.3) ****
No	1457 (91.9)	1095 (69.0)	1450 (91.4)
Freshman Seminar Enrollment			
Yes	653 (88.1)	471 (63.6)	644 (86.9) *
No	1047 (90.8)	726 (63.0)	1038 (90.0)
Campus Housing			
Yes	1362 (90.0)	945 (62.4)	1348 (89.0)
No	338 (89.0)	252 (66.3)	334 (87.9)
Greek Membership			
Yes	604 (92.6) **	433 (66.4)*	602 (92.3) ***
No	1096 (88.2)	764 (61.5)	1080 (87.0)
Utilization of University Study Services			
Yes	709 (91.6) *	463 (59.8) *	705 (91.1) **
No	991 (88.5)	734 (65.5)	977 (87.2)
Transfer Student			
Yes	177 (89.9)	153 (77.7) ****	177 (89.9)
No	1523 (89.8)	1044 (61.5)	1505 (88.7)

*Statistically significant relationship with p<0.05; ** Statistically significant relationship with p<0.01
*** Statistically significant relationship with p<0.001; **** Statistically significant relationship with p<0.0001

ACE score and degree completion

Finally, a chi square analysis was conducted between adverse events in childhood and degree completion in order to assess if a statistically significant relationship exists.

The ACE variables were assessed individually, and as a total score. Several individual adverse exposures were found to be negatively associated with degree completion. Parent separation or divorce, experiencing emotional abuse, household substance abuse, experiencing physical abuse, and experiencing sexual abuse were all found to be associated with all degree completion outcome measures with a $p<0.05$. Household mental illness was found to have a statistically significant relationship when assessed with ever completing a degree, but the relationship was not statistically relevant when compared to four- or six-year graduation. Similarly, emotional neglect was only found to be statistically significant with the four-year graduation outcome. Mother experiencing violence and having an incarcerated household member were both statistically significant with when compared to ever graduating and six-year degree completion, but not when compared to graduating within four years. Experiencing physical neglect was the only ACE that was not statistically associated with any of the degree completion measures (Table 12).

A final chi square analysis was conducted to assess the relationship between ACE score and degree completion. Among students with an ACE score of zero, 91.8% completed their bachelor's degree. The rate of completion was 91.1% for students with an ACE score of one, 85.4% for students with an ACE score of two or three, and 79.9% for students with an ACE score of four or higher. Similar trends were seen with the outcome variables of four and six-year degree completion. Among students with an ACE score of zero, 58.9% graduated within four years and 90.9 completed their degree within six years. Comparatively, when looking at students with an ACE score of four or higher, the rates were 49.4% and 78.6% consecutively. The association identified between ACE

score and degree non-completion was statistically significant, with both the ever-completed degree and 6-year graduation analysis having a $p<0.0001$. The four-year graduation outcome was significant at $p=0.0002$ (Table 12).

Table 12

Chi Square Test: ACE Score and Bachelor Degree Completion (n=1,894)

Adverse Childhood Experience	Ever Degree Completion: Yes n (%)	4-year Degree Completion: Yes n (%)	6-year Degree Completion: Yes n (%)
Parental Separation or Divorce			
Yes	439 (86.4) **	295 (58.1) **	431 (84.8) ***
No	1261 (91.0)	902 (65.1)	1251 (90.3)
Household Mental Illness			
Yes	226 (86.3) *	156 (59.5)	224 (85.5)
No	1474 (90.3)	1041 (63.8)	1458 (89.3)
Emotional Abuse			
Yes	216 (82.8) ****	143 (54.8) ***	214 (82.0) ***
No	1484 (90.9)	1054 (64.5)	1468 (89.9)
Emotional Neglect			
Yes	187 (86.2)	122 (56.2) *	186 (85.7)
No	1513 (90.2)	1075 (64.1)	1496 (89.2)
Household Substance Abuse			
Yes	171 (84.7) *	105 (52.0) ***	168 (83.2) **
No	1529 (90.4)	1092 (64.5)	1514 (89.5)
Physical Abuse			
Yes	90 (81.8) **	59 (53.6) *	89 (80.9) **
No	1610 (90.3)	1138 (63.8)	1593 (89.3)
Mother Experienced Violence			
Yes	72 (82.8) *	47 (54.0)	71 (81.6) *
No	1628 (90.1)	1150 (63.6)	1611 (89.2)
Sexual Abuse*			
Yes	61 (78.2) **	38 (48.7) **	61 (78.2) **
No	1639 (90.3)	1159 (63.8)	1621 (89.2)
Incarcerated Household Member			
Yes	54 (79.4) **	36 (52.9)	53 (77.9) **
No	1646 (90.1)	1161 (63.6)	1629 (89.2)
Physical Neglect			
Yes	38 (84.4)	25 (55.6)	38 (84.4)
No	1662 (89.9)	1172 (63.4)	1644 (88.9)
ACE Score			
0	980 (91.8) ****	705 (58.9) ***	971 (90.9) ****
1	369 (91.1)	257 (63.5)	364 (89.9)
2-3	228 (85.4)	159 (59.5)	226 (84.6)
4 or more	123 (79.9)	76 (49.4)	121 (78.6)

*Statistically significant relationship with $p<0.05$; ** Statistically significant relationship with $p<0.01$
*** Statistically significant relationship with $p<0.001$; **** Statistically significant relationship with $p<0.0001$

Logistic regression analysis results

Logistic regression analysis was conducted between ACE score and degree completion. As with the chi square analysis, ACE score was categorized into four groups (1) zero ACEs; (2) one ACE; (3) two to three ACEs; and (4) four or more ACEs. An ACE score of zero was used as the reference in analysis. An initial unadjusted model was conducted with the three outcome variables of (1) ever graduated, (2) four-year graduation, and (3) six-year graduation. All analyses found no difference in odds of degree completion when comparing those with an ACE score of zero to those with an ACE score of one. Students with an ACE score of 2-3 were found to have a 91% increased risk of not graduating when compared to those with no ACEs. Those odds increased to 2.8 times more likely to not graduate in the group experiencing four or more ACEs (Table 13). A similar relationship was found between increased odds of not completing a degree in four or six years, with student having twice the rate of non-degree completion in four years and 2.7 times the rate in six years when experiencing four or more ACEs. A dose response relationship was seen in all three analyses, where risk of non-degree completion was highest among those experiencing more ACEs (Tables 13).

Multiple adjusted models were then estimated to assess the impact of incorporating control variables. Model 1 included demographic variables. Gender, in-state residency, and first-generation status were found to be statistically significant in initial modeling, so were included in the final Model 1 analysis. Race was not found to be statistically significant, but was left in the model due to the historical association been race and student success previously discussed. This model produced consistent results to the unadjusted model, with all three graduation outcomes having no increased odds of

non-degree completion between students with an ACE score of zero and an ACE score of one. Odds did increase among students with an ACE score of two or three when compared to all three graduation outcomes, with ever completing a degree having the highest relationship at a 89% increased odds of non-degree completion. Among students with four or more ACEs, the odds of non-degree completion again increased, with a 2.1-2.8 times increase being seen between the three outcome variables (Table 13).

A second adjusted model (Model 2) was estimated which included potential control variables that occur prior to enrollment at the university. This model was run without the variables included in Model 1in order to isolate pre-admission factors for review. This model originally incorporated high school GPA, developmental course work, AP credit completed, Pell Grant eligibility, and the University's HSRI. Final analysis included only HSRI as the other lost significance when combined. Again, increased odds were seen across all three graduation measures among populations with ACE scores of two or three, and those with a score of four or higher, with odds similar to what was seen in the unadjusted model and Model 1. Of note is a slight decrease in the increased odds of non-degree completion among those with a score of four or higher in all three analysis, with increased odds ranging from 1.5-2.2 times. A dose response relationship was again identified between ACE score and odds of non-degree completion (Tables 13).

Model 3 incorporated potential control variables that occur during a student's time on campus. Final analysis included first-year GPA, academic classification, academic college change, ever part time, transfer status, and Greek affiliation. The potential control variables of major change, freshman seminar enrollment, living in

campus housing, participation in on-campus study services were excluded due to their lack of statistical significance in initial modeling. This model produced a reduction in association between ACE score and degree completion. When assessing those who ever graduate, students with an ACE score of two or three were 62% more likely to not graduation, while those with a score of four or more were 2.4 times as likely to not finish their degree. When looking at four-year and six-year degree completion, there was not a statistically significant relationship found between those with two or three ACEs and degree completion. However, the relationship between those with a score of four or more remained. Students with an ACE score of four or higher were 70% more likely to not complete their degree in four years and 2.2 times as likely to not graduate within six years (Tables 13).

Finally, Model 4 was conducted to incorporate all control variables found to be significant in Models 1-3. The final control variables include: gender, in-state residency, first-generation status, race, HSRI, academic classification, cumulative first-year GPA, academic college change, ever part-time enrollment, transfer student, and Greek affiliation. The Model indicated a dose response relationship exists across all three graduation outcomes. When assessing those who ever graduated, students with an ACE score of 2-3 were found to be 74% more likely to not graduation. Among those with a score of four or more, that increased to 91%. When looking at four-year degree completion, students with an ACE score of two or three were found to have a 43% increase in odds, while those with a score of four or more were 42% more likely to not graduate within that time. Finally, when looking at six-year degree completion rates, students with an ACE score of 2-3 were 71% more likely to not graduate, while for those

with a score of four or more, the increased odds were 93% (Tables 13). A complete summary of logistic regression results including controls for all models and degree completion categories can be found in Appendix C, Tables 14-16.

Table 13

Unadjusted and Adjusted Logistic Regression Models Predicting Non-Degree Completion Measures by Adverse Childhood Experience (ACE) Score – All Graduation Outcome Measures (n=1,894)

	Unadjusted OR (95% CI)	Model 1* Adjusted OR (95% CI)	Model 2** Adjusted OR (95% CI)	Model 3*** Adjusted OR (95% CI)	Model 4**** Adjusted OR (95% CI)
Ever Degree Completion					
ACE Score 0	Reference	Reference	Reference	Reference	Reference
ACE Score 1	1.09 (0.72-1.63)	1.08 (0.72-1.62)	1.03 (0.66-1.59)	0.97 (0.63-1.51)	1.01 (0.63-1.62)
ACE Score 2-3	1.91† (1.27-2.85)	1.89† (1.25-2.85)	2.03† (1.31-3.63)	1.71† (1.09-2.68)	1.74† (1.06-2.85)
ACE Score 4 or more	2.81† (1.79-4.40)	2.74† (1.72-4.38)	2.19† (1.33-3.63)	2.41† (1.45-4.02)	1.91† (1.08-3.39)
4-Year Degree Completion					
ACE Score 0	Reference	Reference	Reference	Reference	Reference
ACE Score 1	1.12 (0.88-1.42)	1.16 (0.91-1.48)	1.05 (0.81-1.36)	1.09 (0.84-1.42)	1.11 (0.83-1.48)
ACE Score 2-3	1.32† (1.00-1.74)	1.40† (1.05-1.85)	1.37† (1.04-2.17)	1.30 (0.96-1.76)	1.43† (1.02-2.00)
ACE Score 4 or more	1.99† (1.42-2.80)	2.10† (1.48-2.99)	1.50† (1.04-2.17)	1.67† (1.14-2.44)	1.42 (0.93-2.16)
6-Year Degree Completion					
ACE Score 0	Reference	Reference	Reference	Reference	Reference
ACE Score 1	1.13 (0.77 -1.66)	1.13 (0.77-1.67)	1.10 (0.73-1.66)	1.02 (0.68-1.55)	1.10 (0.71-1.72)
ACE Score 2-3	1.82† (1.23-2.69)	1.85† (1.24-2.76)	1.94† (1.27-2.96)	1.62† (1.04-2.50)	1.71† (1.06-2.75)
ACE Score 4 or more	2.73† (1.76-4.23)	2.75† (1.74-4.34)	2.20† (1.35-3.57)	2.26† (1.38-3.69)	1.93† (1.11-3.35)

† Statistically significant result; *Adjusted for gender, in-state residency, race, and first-generation status;

**Adjusted for high school readiness index, which is a compilation measure of high school GPA and ACT score;

***Adjusted for academic classification, cumulative GPA at end of Freshman year, ever part time enrollment, transfer student, and Greek affiliation

Chapter Five: Discussion

Individuals with high exposure to stress in childhood have previously been found to have higher rates of negative health outcomes and decreased rates of academic success in K-12 educational settings. To date, limited research has been conducted to evaluate the potential relationship between exposure to adverse events in childhood and student success and bachelor degree completion. Studies conducted on the topic were cross sectional and focused on GPA or course grades as an evaluation of academic success (Merians et al., 2019; Subotić et al., 2018). A review of the literature reveals no previous study has assessed the relationship between ACE score and undergraduate degree completion rates in the United States using a longitudinal study design. Therefore, the current study's findings of a dose response relationship between ACE score and degree completion among undergraduate study participants is important. It adds to a growing body of literature on factors related to student retention and success in higher education. It also expands the current research on the negative association between increased ACE exposure and wellbeing across the life-course. Further, it builds a connection between the fields of Higher Education and Public Health, which may help to build future collaborations to positively influence both student health and student success.

This project evaluated the relationship between ACE score and degree completion among 1,894 engaged undergraduate students at a large state-funded university in the southeastern United States in the spring, 2015. The original study sample was randomly selected from students enrolled full-time at the university. Study participants ranged across academic undergraduate classifications, with first semester freshman through graduating seniors included among participants. Students were disproportionately white

and female. The majority were not first-generation college students. Key findings include a dose-response relationship between ACE score and degree completion rates, with the relationship being consistent when looking at rates of students who ever complete their degree, and those who graduated in four or six-years. Final analysis included the following control variables: gender, in-state residency, first-generation status, race, HSRI, academic classification, first-year cumulative GPA, part-time enrollment, transfer status, and Greek affiliation. When considering the outcome of ever completing a bachelor degree, students with an ACE score of 2-3 were 74% more likely not to graduate when compared to students with an ACE score of zero. Further, students with an ACE score of four or higher were 91% more likely to not complete their degree. Four and six-year graduation rates had similar findings, with an increasing ACE scores correlating with an increased rate of failing to complete an undergraduate degree. While a statistically significant relationship was found, the four-year non-degree completion rates were not as clearly aligned with ACE score as was seen in the other two models. This may be because there are additional factors that impact four-year degree completion such as changing major or academic college or transferring universities. These factors were found to be statistically associated with only four-year degree completion in this study, which supports this.

This study provides important new knowledge when investigating the long-term impact of childhood stress on student success in higher education. The dose response relationship identified mirrors the body of research on the impact of adverse events in childhood on both health and earlier educational outcomes, and highlights the potential benefit of incorporating resiliency programing into the undergraduate student experience.

Study Population Comparability

When comparing the ACE scores within the study population to those seen among a nationally representative study, it is important to note there are key differences. Two thirds of American adults report experiencing at least one ACE prior to the age of eighteen (CDC, 2016). Comparatively, less than half of the study population reported adverse events in childhood. Similarly, the rates of each type of ACE also differ between this study and what has been found nationally. The CDC reports that the most common ACE in the general population is physical abuse, which is reported to occur in 28.3% of those surveyed (Anda et al., 2009; CDC, 2016). Among the study population, only 5.8% reported experiencing physical abuse in childhood, and parent separation or divorce was the most commonly experienced ACE. These variations are seen throughout ACE exposure in this sample, with notability lower rates of sexual abuse (21% versus 4%), substance use in the home (27% versus 10%), and mother experiencing violence (13% versus 5%). However, rates of emotional abuse were higher in this study than what is seen nationally (14% versus 11%). This indicates the study population is not comparable to the general population in regards to ACE exposure. Further, this may indicate that the population of students enrolling in higher education experience different levels or types of toxic stress than students who do not enroll at four-year institutions. If this is found to be true, it may indicate ACEs or factors associated with exposure to toxic stress in childhood may negatively impact college enrollment.

It is also important to note some variance in the study population from the general undergraduate student population at the university included in the study. As previously mentioned, the study population did not reflect the overall demographics of the campus.

In spring 2015 the undergraduate student population on campus was 53% female, 70% in-state residents, 16% first-generation, 18% Pell grant eligible, and 7% international students. Seventy-two percent of the student population identified as White (non-Hispanic) and 13% identified as an underrepresented minority. The study population was 57% female, 72% in-state residents, 19% first-generation, 39% Pell Eligible, and 2% international. Nearly eighty percent identified as White (non-Hispanic). The retention and degree completion rates were also higher than what is seen among the general undergraduate population at the university. An important factor influencing this was time of sampling. Students across all undergraduate academic classifications were sampled, so 74% had already met the sophomore retention measure at the time of completing the survey. Of the 26% that were first-year students, they were completing the survey in April of their Freshman year. The survey was sent to their university email, which would require participants to be actively engaged with that platform to see the invitation and participate. Therefore, in the study design, a disproportionately high number of engaged students were recruited to participate. This is reflective of the 99% sophomore retention and 90%-degree completion rates among the study participants.

While the study population may not be representative of all undergraduate students at four-year universities, the increased participation among engaged students is important, and may provide valuable information on factors that predict success among this student group. As previously discussed, student engagement following admission to an institution of higher education is predictive of student success and degree completion (Astin et al., 2012; Holliman et al., 2018; Tight, 2020). However, our results indicate that differentiation exists in student success even among the highly engaged group. This study

population was more likely than the average student to be engaged with on-campus social activities such as Greek participation. They had high rates of living on campus, and reported high rates of using on campus study services. Beyond these measures, by participating in the study they showed some level of engagement with the university, given that student email was used as the communication channel. A regular focus of student success programming is to encourage student engagement following enrollment. The overwhelming majority of the current study sample was retained to their sophomore year, with a rate of 99%. Yet, 10% failed to complete their degree, and 37% did not graduate within four years of initial enrollment. It is important to ask what differences may exists among these engaged students that predict their success. Therefore, this study finding exposure to ACEs may be a possible predictor of reduced rates of degree completion among engaged students who are likely to be retained into their second year is valuable.

ACEs and Student Success

ACE Score, Student Success, and Pre-Admission Variables

The study found several important associations between rates of stress exposure in childhood and demographic groups. This becomes important to explore as it may help to provide information on groups with a higher risk of not completing their degree. As discussed previously, the student population in higher education has shifted over previous decades, with increased enrollment being found among female students, first-generation students, minority students, and students from middle and low-income communities. Many of these populations fail to meet the student success rates seen among their peers (DeBerard et al., 2004; Fernandez et al., 2017; Lee & Ferrare, 2019; Tight, 2020; Weir,

2017). Research has found that historically underrepresented minority students are significantly less likely to graduate from a post-secondary institution when compared to their White peers (Fernandez et al., 2017; Swail, 2003; Weir, 2017). Similarly, first generation students have historically failed to achieve academic success at the rate of students who had at least one parent complete a bachelor degree or higher (McLean, 2015; Pike & Kuh, 2005). In fact, these students have been found to be twice as likely to depart from an institution prior to the start of their second year when compared to non-first generation students (Choy, 2001). Therefore, it is important to note that the current study found higher risk of ACE exposure among female students, first-generation students, students who were eligible for Pell Grants, and underrepresented minority populations included non-Hispanic Black students, Hispanic students, and American Indian or Alaskan Native students. This may not be surprising, as ACEs have repeatedly been found to be higher among many of these subgroups within the general population. Knowing this differentiation in ACE exposure extends to the undergraduate student population may provide an opportunity for universities to build targeted services to support student populations with potentially higher rates of childhood stress exposure. This in turn, may provide an opportunity to improve rates of student success and degree completion among these student populations.

Another important area to explore is the relationship between pre-admission academic preparedness and exposure to childhood stress. Academic preparedness, as measure through HSRI, was associated with both ACE score and degree completion. It was also found to be a statistically significant control variable in the logistic regression models. This was expected, as research strongly supports an association between ACE

score and academic engagement and success within K-12 education. The impact of ACEs on educational success begins early, with children who have high rates of ACE exposure having increased risk of developmental delay by the age of 5 (Cprek et al., 2019). This trend continues into K-12 schools, with elementary school children with high ACE scores being found to have increased risk for poor school attendance, behavioral issues, and failure to meet grade level standards in mathematics, reading and writing (Blodgett & Lanigan, 2018). Further, studies among middle school children found rates of ACEs to be correlated with increased behavioral problems in school, which negatively impacts school performance (Hunt et al., 2017). Finally, the trend continues among high schoolers, with those reporting high ACEs being more likely to have poor reading achievement and more likely to drop out than their peer with low or no ACEs (Morrow & Villodas, 2018). The current study indicates the pattern continues, with students with high ACE scores having an increased risk of being less academically prepared than their peers with low ACE exposure. This literature suggests students in K-12 education with high ACE scores may have been less likely to meet admission standards for a four-year baccalaureate program. This supports the previously discussed possibility that students enrolled in a four-year undergraduate institution may not be comparable to the general U.S. population in regards to toxic stress exposure. It also suggests that students with high ACE scores who do choose to enroll in a four-year university may still be at a disadvantage to their peers with low ACE exposure.

ACE Score, Student Success, and Post-Admission Variables

Several other variables were found to be associated with ACE score and degree completion that occur during a student's time on campus. Students who reported lower

rates of ACE exposure in childhood had higher participation in Greek organizations while enrolled at the university. Students enrolled in Greek organizations were also more likely to complete their degree, and to complete it within four years. Similarly, students with lower reported rates of childhood toxic stress were more likely to utilize on campus study resources such as tutoring services. Astin (1984) suggested one of the most important elements of student retention in the first year is student involvement. Students who are more involved and who report increased number of close peer connections perform better and are found to be more likely to remain at the institution (Pritchard & Wilson, 2003). Further, participation in campus organizations such as Greek organizations and Living Learning Communities have been found to increase social connections and to be positively associated with increased student success and retention rates (Baker & Pomerantz, 2000; Bowman & Holmes, 2017; Pritchard & Wilson, 2003). While living in campus housing was not found to be associated with ACE score or degree completion, the two other measures available to assess student engagement seem to indicate students with higher ACE scores may be less involved, while also being less likely to complete their degree. However, it is important to mention that using Greek affiliation as a measure of involvement has limitations. Greek involvement is also commonly dependent on family income, which is historically inversely associated with ACE score and a positive relationship with pre-admission academic preparation.

Another important predictor of student success is academic success in college. Grades earned during a student's first year are a strong predictive of bachelor degree completion (Adelman, 2006). In fact, Spady identified academic performance as the primary factor related to student retention in his 1971 publication. However, we saw a

difference in academic success among students with and without ACE exposure. While the vast majority of students in the study persisted into their sophomore year, other academic differences were notable. Students with high ACE scores were significantly more likely to have at least one semester eligible for academic probation and academic suspension. Similarly, these students were much more likely to not complete their degree. As discussed in chapter four, when evaluating four-year degree completion, 37% of students who were eligible for probation and 13% who were eligible for suspension completed their degree within four years. In comparison, the four-year graduation rates were 77% for those never meeting probation eligibility and 68% for those never eligible for suspension.

Students with high ACE scores were also more likely to have a gap in enrollment and to have at least one semester with part-time enrollment. These factors were also statistically associated with a reduced rate of completing a degree and completing a degree on time. This relationship is important, because even among the study sample which are engaged students, we see academic differences between those with and without high childhood stress exposure.

Adverse Childhood Experiences and Student Success Models

Higher education has a significant focus on retention models. As a study looking at variables that are associated with student success, it is important to explore how the results align with the historical literature on the topic. Tinto's (1975) Student Integration Model states that student retention is impacted by academic experiences and student social integration. A key focus of his work centered around the first-year experience. The current study assessed the association between ACE score and several relevant variables

in alignment with this model. Participation in a freshman seminar class was not found to be associated with ACE score. Similarly, living in on-campus housing had no relationship with exposure to childhood stress. However, as previously discussed, Greek affiliation was found to be associated with ACE exposure, as was utilization of on campus study resources. This may point to students with high ACE score being less engaged on campus, which may impact their success.

Bean's Student Attrition Model (1980) stressed factors such as academic performance, student demographics, distance from home, and student satisfaction as factors influencing retention. While many components of this model were unable to be incorporated, distance from home was included through the in-state versus out of state variable. A relationship was found between in-state and out of state students and ACE scores, where in-state residents had higher rates of ACE exposure. ACEs and academic performance and student demographics have been explored previously explored.

Another important model taken into consideration in the development of this study was Astin's Model of Student Involvement (1984), which identified three key elements influencing student retention. These items included: student demographics and prior experiences; environment including experiences that occur while in college; and student characteristics such as knowledge, attitudes and beliefs (Demetriou & Schmitz-Sciborski, 2011; Pascarella & Terenzini, 2005). Astin's model allows for the incorporation of ACE exposure as a factor in his student "inputs" item, or prior experiences that occur within a student's life prior to admission into an institution of higher education. This makes it a better fit than the previously discussed historical

models in its ability to incorporate toxic stress in childhood as a factor to be considered with attempting to improve student success.

Later research and models on student retention and success shifted focus to emphasize collaboration between student recruiting, admissions, academic services, curriculum and financial aid (Burke, 2019; Hornor, 2020; Swail, 2004). Wyckoff (1998) emphasized the importance of effective counseling for students experiencing stress, as well as the importance of quality academic advising. In further support of this idea, Tinto (2004) stated that universities who provide easily accessible academic, personal and social support services would positively impact student retention. It is also important to note the changing student body, and to evaluate if these older models continue to effectively predict and influence retention rates.

Burke (2019) reviews more recent research on student retention models, highlighting the current attention on social systems including co-curricular programming such as Living Learning Communities, honors programs, service-based learning groups. It is suggested that as students sense of belonging increases, so does the rate of retention. Interestingly, this is supported with our study, which appears to have both a disproportionately high rate of student engagement and student retention when compared to the general student population. It should be noted that as student populations change, the models used to predict and positively influence student success may become less effective or obsolete. Levine and Dean (2012) discussed millennial undergraduate students by exploring their expectations, attitudes, values, believes, social connections, politics, and academics. Their findings suggest the current undergraduate students may

have significantly different needs that the students who came before them, calling into question the usefulness of historical retention models.

The association between ACE exposure and many of the key retention model variables is important. If ACE exposure is correlated with factors such as academic preparedness, social integration, and student demographics, it may help to explain why differences persist in student success rates and support many of the models that are used today.

Study Limitations

There are several important limitations to the study which should be explored. As mentioned previously, the timing of the sample and recruitment strategy of contacting through student email resulted in a study population that may have been more engaged that the general student population. The survey being administered in April also prevented the ability to capture responses from students who were not retained following their first semester enrollment. This limits the interpretability of the study results to a general undergraduate population. However, the findings remain important for other measures of student success. Given the focus on likely higher engaged students, the association between ACE score and degree completion is important. These are students who are likely to engage in university lead activities to support student success, which make them a prime population for an intervention.

It is important to also discuss methods and challenges to measuring some factors related to student success. Many of the pre-admission characteristics that have been found to be predictive of student success have been systematically collected throughout the application and admission process. In this study, student demographics, such as

gender, race, and geographic location were ascertained through the university registrar. Similarly, high school GPA and college entrance exam scores such as the American College Test (ACT) and the Scholastic Assessment Test (SAT) are typically utilized in the admission process, and therefore collected through the applications. As previously mentioned, the university uses high school GPA and standardized test score to calculate a High School Readiness Index (HSRI) which is used to evaluate admissibility. These measures are meant to identify aptitude, college readiness, and academic preparation. Unfortunately, there are flaws with these measures. High school GPAs are based on grades earned at institutions throughout the nation. Research has long found high schools have variance in rigor and grading standards, which make high school GPA as a comparative measure across groups challenging (Ziomek & Svec, 1997). Because of this, universities have long focused on standardized test scores such as the ACT and SAT, as it was believed these normalized student scores across the nation (Geiser & Santelices, 2007). Unfortunately, studies have found this may not be the case. Research indicates SAT and ACT scores are significantly influenced by family income and parent education and may not be effective measures of college readiness or intellectual ability (Zwick & Greif Green, 2007). Studies are conflicted on if high school GPA or SAT/ACT scores are better at predicting student academic readiness for college, however the majority of studies reviewed acknowledge that both measures may be flawed in predicting student success in higher education (Anderson, 2010; Geiser & Santelices, 2007).

It is important to note that while this study population was randomly sampled and the study will utilize a longitudinal design, causation cannot be determined within this study. Many of the other variables discussed throughout previous chapters including pre-

admission and post admission factors were not able to be included in this project due to information not being available. Factors such as parent support, student expectation, school choice, faculty-student interactions, student satisfaction, and student health may be related to student degree completion. Further, internal and external factors that influence factors included and excluded from analysis are multifaceted, therefore it is impossible to effectively control for them all within an observational study. Because of this, the current study is unable to assign causation when discussing factors related to ACEs and degree completion.

While we cannot assign causation to the results found in this study, the value of the study is high. Understanding how ACEs relate to student success remains important. Identifying than an association exists between ACE score and degree completion provides an opportunity to better understand the impact of stress on the student population. Understanding this relationship may also help to develop interventions and student support services focused on potential root causes of student attrition.

Future Recommendations

The purpose of this study is to better understand the relationship between traumatic events in childhood and student success in order to better inform and enhance student support services. Institutions of higher education hope to ensure that all students who begin college will be able to be successful and graduate. Understanding factors that predict this, and identifying students who may need additional support, is crucial to improving the rate of students who meet this goal. Given the findings, this study has implications for a variety of student support services, including academic advising, student health, behavioral health, disability resource centers, and other organizations

across campus that work to support students. Future projects could work on partnering with these groups to build student programing in order to support student success, and in turn positively impact health outcomes among students who have experienced trauma.

Research is needed on the impact of social and emotional factors on student success. Specifically, evaluation of the impact of childhood stress occurring prior to admission is recommended. A potential underexplored strategy for addressing these issues among college students is to increase resiliency among the population, which has been found to reduce the negative impact of ACEs and mental illness (Gouin, Caldwell, Woods, & Malarkey, 2017; Uddin et al., 2020). Resilience refers to one's ability to achieve positive outcomes "in spite of serious threats to adaptation or development" (Masten, 2001). It is important to note that resilience can be developed and is not simply based on natural ability (Masten, 2001). While understudied, this idea is not novel. Eisenberg, Lipson and Posselt (2016) discuss the importance of building student resilience and addressing mental health as a retention strategy, where they site a lack of student resilience as a contributing factor in the campus mental health crisis. They theorize that increasing resilience can directly impact academic outcomes including retention by improving student's ability to handle academic adversity, and improve their ability to work through mental health challenges including managing depression and anxiety.

There are model universities currently incorporating resilience into their student support services. For example, the Penn Resiliency Program at the University of Pennsylvania is an evidence-based training program that uses strength-based programing to support students found to be vulnerable to stress-related mental illness. The program

teaches resilience related skills and has impacted more than 30,000 individuals (Eisenberg et al., 2016). First year experience programs also commonly foster aspects of holistic student development and may include components that build resiliency. For example, the University of Nevada-Reno incorporated an online program based on Acceptance and Commitment Therapy into their first-year experience. This program focused on cognitive flexibility and was found to decrease depression and anxiety among students (Levin, Pistorello, Seeley, & Hayes, 2014). Other institutions, including Harvard and the University of Michigan have programs focused on normalizing failure, which have been found to positively build student resilience (Eisenberg et al., 2016).

Institutions of higher education have actively moved towards addressing the needs of the whole student through increased investment in programs that support student health and wellness. There is an opportunity to work with these programs to better assess factors that may be negatively impacting student retention and degree completion. Assessing ACEs among student populations may provide an opportunity to better support the complex social and emotional needs of those experiencing high rates of trauma. Alternatively, incorporating practices that would support the physical, mental, and emotional health of all students, assuming some within the student body have childhood experiences that may be complex and traumatic, may normalize these interventions and increase usage. Research has found positive sleep habits, regular exercise, quality nutrition, and practicing mindfulness significantly reduce the negative impact of ACEs (Traub & Boynton-Jarrett, 2017). These are practices that would benefit all students and could be incorporated in programing already provided across student services within institutions of higher education.

Traumatic life events are not limited to childhood. While no similar standardized measure as the ACEs survey exists for assessing these traumatic events among undergraduate students, studies have documented the rates of specific types of trauma within this population. The Association of American Universities found that 11.7% of college students experienced nonconsensual sexual contact, 47.7% reported sexual harassment, 9.8% reported intimate partner violence and 4.2% experienced stalking within the academic year (Cantor, 2017). Multiple other studies have documented high rates of violence among college students (Fisher, Daigle, & Cullen, 2010; Fisher, 2000; Gross, Winslett, Roberts, & Gohm, 2006; Harned, 2001). While literature in the area is limited, work has also been done investigating the relationship of violence victimization among college students and student success outcomes. Two studies have found relationships between physical assault or harassment and post-secondary retention (Amar & Gennaro, 2005; Smith, White, & Holland, 2003). A 2014 study assessed the impact rape and sexual assault had on educational outcomes, using high school and college GPAs as a comparison for academic performance change, which found a significant relationship between victimization and poor educational outcomes (Jordan, Combs, & Smith, 2014). Several additional recent studies have assessed this relationship, and a consistent correlation has been found between sexual victimization on women's GPAs and graduation rates (Baker et al., 2016; Mengo & Black, 2016; Potter, Howard, Murphy, & Moynihan, 2018). Previous research has found that undergraduate college students who experience violence are more likely to perform poorly in classes, have a lower cumulative GPA, change majors, or transfer to another school compared to students who have not experienced violence (Henok, 2015; Marilyn Metzler, 2016). Given the

prevalence of interpersonal violence among college students, this may be a commonly overlooked influence on student retention and graduation rates within undergraduate education, and further study is recommended.

Conclusion

Student retention and degree completion have long been the primary goal of institutions of higher education. Understanding factors that influence or predict rates of achieving these goals is critical to ensuring students have the highest possible likelihood of success. Historically student health is an under studied yet important variable potentially influencing student retention and degree completion. Factors such as positive and negative health behaviors, acute and chronic illness, and mental illness may impact student's ability to connect and engage with academic and social offerings during their time on campus. Similarly, family history and potential exposure to toxic stress in childhood have rarely been looked at in association with student success. Yet we know from the literature that these stress exposures are strongly correlated with many factors previously identified as predictors of bachelor degree completion.

This study has provided important insight into the relationship between ACEs and bachelor degree completion. A clear and consistent dose response relationship was identified, whereas ACE scores increase, students' odds of degree completion decrease. These results held with the addition of control variables accounting for student demographics, academic preparedness, academic performance in college, and student engagement. This data provides an opportunity for universities to consider how to help students address family and social factors including toxic stress exposure while they are

enrolled at their institutions. Providing resources and resilience practices may improve both the health of the students, and their rates of academic success.

Appendix A

Thank you for your interest in our survey!

This is a study looking at the prevention of dating violence and sexual violence. We are interested in knowing more about how to prevent dating and sexual violence on college campuses.

You have a choice to complete the questionnaire. If you do participate, you are free to skip any questions or discontinue at any time. The survey takes about 20-30 minutes to answer all questions.

Your response to the survey will be kept confidential to the extent allowed by law. This study is protected by a Certificate of Confidentiality which means that the researchers can refuse to disclose identifying information in any civil, criminal, or other proceeding, whether at the federal, state, or local level. You should understand that we will in all cases take actions necessary, including reporting to authorities, to prevent serious harm to yourself, your child or others such as in cases of child abuse or neglect.

Some questions may make you upset or feel uncomfortable and you may choose not to answer them. If some questions do upset you, at the end of the survey we will provide information for you including people who may be able to help you with these feelings and resources on campus and in your community.

Because of the sensitive nature of some of these questions, you may prefer to complete this survey in a private setting. If this is not a good time or place, please close this window now and return to the survey when you can.

If you have complaints, suggestions, or questions about your rights as a research volunteer, contact the staff in the [redacted]

Thank you for participating!

***Do you want to complete the survey now?**

- Yes
- No

***How old are you?**

- 17 or younger
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25 or older

What is your year in school?

- Freshman
- Sophomore
- Junior
- Senior
- Other, please specify

What is your sex?

- Male
- Female

How would you describe yourself? Check all that apply.

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic or Latino/Latina
- Native Hawaiian or Other Pacific Islander
- White
- Other, please specify

What is the highest level of schooling your mother has completed?

- Some elementary, middle, or high school
- High school graduate
- GED
- Vocational school
- Some college
- College graduate
- Master's degree
- Doctorate
- Professional degree such as MD or JD

What is the highest level of schooling your father has completed?

- Some elementary, middle, or high school
- High school graduate
- GED
- Vocational school
- Some college
- College graduate
- Master's degree
- Doctorate
- Professional degree such as MD or JD

People are different in their sexual attraction to other people. Which best describes you?

- Only attracted to females
- Mostly attracted to females
- Equally attracted to females and males
- Mostly attracted to males
- Only attracted to males
- Not sure

***Which of the following best describes your dating status? By "dating", we mean anything from a casual to a committed relationship, including all of the following: Hooking up with someone, doing something sexual with someone, having an open relationship in which you are also dating other people, going out on dates with someone, being in a committed relationship with a boyfriend or girlfriend, living with a boyfriend or girlfriend.**

- Casual dating, not in a committed relationship
- Doing something sexual with someone, not in a committed relationship
- Not currently dating, but I have dated since the beginning of the Fall 2014 semester
- Not currently dating, but I have in the past (before the beginning of the Fall 2014 semester)
- I am in a committed relationship with my boyfriend or girlfriend, not living together
- Living with my boyfriend or girlfriend, or married
- None of the above

Have you ever been pregnant or gotten someone pregnant?

- Yes
- No
- I don't know

Have you ever been pregnant or gotten someone pregnant?

- Yes
- No
- I don't know

These next questions are about things that may have happened to you. Since the beginning of the Fall 2014 term, how many times were you afraid for your personal safety because the following situations happened?

***Someone showed up where you live, work or go to school when you did not want them to.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Who did this?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger

***You received unwanted phone calls, emails, text or instant messages, or comments/pictures posted on social networking sites (for example, Facebook or Twitter), or unwanted gifts.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Who did this?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger
- I don't know who did this.

***Someone posted mean, insulting, or humiliating comments about you either online (for example, Facebook page or blog) or in emails, text or instant messages, or voicemails.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Who did this?

- ○ Current partner
- ○ Previous partner
- ○ Friend
- ○ Acquaintance
- ○ Stranger
- ○ I don't know who did this.

These next questions are about things that may have happened to you. Since the beginning of the Fall 2014 term, how many times were you afraid for your personal safety because the following situations happened?

***Someone showed up where you live, work or go to school when you did not want them to.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Who did this?

- ○ Current partner
- ○ Previous partner
- ○ Friend
- ○ Acquaintance
- ○ Stranger

***You received unwanted phone calls, emails, text or instant messages, or comments/pictures posted on social networking sites (for example, Facebook or Twitter), or unwanted gifts.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Who did this?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger
- I don't know who did this.

***Someone posted mean, insulting, or humiliating comments about me either online (for example, Facebook page or blog) or in emails, text or instant messages, or voicemails.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Who did this?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger
- I don't know who did this.

Since the beginning of the Fall 2014 term how many times have these things happened with a current or previous partner? By partner, we mean any current or former spouse, boyfriend, girlfriend, or dating partner or any person with whom you have ever been romantically or sexually involved.

***My partner shouted, yelled, insulted or swore at me.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

***My partner posted mean, insulting, or humiliating comments about me either online (for example, Facebook page or blog) or in emails, text or instant messages, or voicemails.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

***My partner threatened to hit, throw something at, or otherwise physically hurt me.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

***My partner destroyed something that belonged to me on purpose.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

***My partner tried to control me by always checking up on me, telling me who I could be friends with or telling me what I could do and when.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

***My partner pushed or shoved me.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

***My partner threw something at me that could hurt.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

***My partner punched or beat me up.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

***My partner used a knife, gun or something that could hurt me.**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner posted mean, insulting, or humiliating comments about me either online (for example, Facebook page or blog) or in emails, text or instant messages, or voicemails.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner threatened to hit, throw something at, or otherwise physically hurt me.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner destroyed something that belonged to me on purpose.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner tried to control me by always checking up on me, telling me who I could be friends with or telling me what I could do and when.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner pushed or shoved me.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner threw something at me that could hurt.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner punched or beat me up.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

My partner used a knife, gun or something that could hurt me.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Have you ever been physically hurt or injured by a partner?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Was being physically hurt or injured by your partner so frightening, horrible or upsetting you:

Had nightmares about it or thought about it when you did not want to?

- ○ No
- ○ Yes, since the beginning of the Fall 2014 term
- ○ Yes, but not since the beginning of the Fall 2014 term

Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Were constantly on guard, watchful, or easily startled?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Felt numb or detached from others, activities, or your surroundings?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Since the beginning of the Fall 2014 term:

Have you talked to a friend, family member, or counselor, called a hotline, gone online, sought medical care or called police as a result of being physically hurt or injured by your partner?

	No	Yes, since the beginning of the Fall 2014 term	Yes, but not since the beginning of the Fall 2014 term
Talked with a friend	○	○	○
Talked with a family member	○	○	○
Talked with a Resident Advisor (RA) for my dorm	○	○	○
Talked with a victim advocate	○	○	○
Talked with a counselor, therapist or other mental health provider	○	○	○
Contacted the Violence Intervention and Prevention (VIP) Center	○	○	○
Gone online to get help	○	○	○
Contacted [redacted] Health Services	○	○	○
Contacted Counseling Center at [redacted]	○	○	○
Sought medical care off-campus	○	○	○
Called a hotline	○	○	○
Called police	○	○	○

Have you missed classes or work because your partner physically hurt or injured you?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Have you turned in assignments or taken exams late, or were you unable to complete assignments or take exams, because your partner physically hurt or injured you?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Have your grades gotten worse because your partner physically hurt or injured you?

○ Yes

○ No

Have you thought about leaving this university because your partner physically hurt or injured you?

- Yes
- No

My partner hid, damaged or threw away my birth control method to prevent me from using it.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Not applicable	Choose not to answer

My partner refused to use a condom or other protection when I wanted him or her to.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

My partner said to me, "You want us to use birth control, condoms, or other protection so you can sleep around with other people" or something similar.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

My partner said to me, "If we have a baby, you will never have to worry about me leaving you. I will always be around" or something similar.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Not applicable	Choose not to answer

My partner made me have sex without using birth control, condoms or other protection so you would get pregnant.

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

My partner told me not to use any birth control (like the pill, shot, ring, etc);

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Not applicable	Choose not to answer

If not applicable, please leave this page blank.

Please describe more about what happened when your partner wouldn't let you use birth control, condoms or other protection when you wanted to or made other statements about wanting to have a baby with you.

As a result of the things your partner did/said about birth control and/or condoms, did you have sex that made you afraid of getting pregnant when you didn't want to or getting a sexually transmitted infection?

Did you stop using birth control or condoms because of what your partner wanted?

Were you afraid of what your partner might do if you didn't do what he or she wanted?

If your partner said "If we have a baby, you will never have to worry about me leaving you. I will always be around" or something similar, what did you think he or she meant by that?

Since the beginning of the Fall 2014 term, how many times did someone:

Make gestures, rude remarks or use sexual body language to embarrass or upset you?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Keep asking you out on a date or asking you to hookup even though you said "No"?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

***Since the beginning of the Fall 2014 term, have you ever sent a nude, nearly nude or sexually explicit photograph or video of yourself to someone?**

- ○ Yes
- ○ No
- ○ Choose not to answer

***Were you asked by someone known (e.g., intimate partner, date, acquaintance, hookup) or a stranger to send the photo or video?**

- ○ Someone known
- ○ Stranger
- ○ No, not asked by anyone
- ○ Choose not to answer

As a result of sending the photo or video, did any of the following occur (check all that apply):

- ☐ Felt existing relationship improved
- ☐ Felt upset
- ☐ Felt embarrassed
- ☐ Felt afraid
- ☐ Received positive attention from someone else/other people
- ☐ Received negative attention from someone else/other people
- ☐ It was shared with others
- ☐ None of the above

Other (please specify)

***Were you asked by someone known (e.g., intimate partner, date, acquaintance, hookup) or a stranger to send the photo or video?**

- ○ Someone known
- ○ Stranger
- ○ No, not asked by anyone
- ○ Choose not to answer

How much were you bothered by being asked?

- ○ Not at all
- ○ A little
- ○ A lot
- ○ A great deal

Since the beginning of Fall term, have you distributed nude, mostly nude or sexually explicit photographs or videos of another person without their permission?

- ○ No
- ○ Yes
- ○ Choose not to answer

How did you distribute these photographs or videos? (Check all that apply)

- ☐ Text message
- ☐ Email message
- ☐ Posted online
- ☐ Physical photograph or video
- ☐ Other

Other (please specify)

What relationship did you have with the subject of these photographs or videos?

- ○ Current partner
- ○ Previous partner
- ○ Friend
- ○ Acquaintance
- ○ Stranger

Did you distribute these photographs/videos to get back at the person?

- ○ No
- ○ Yes

Did you have other reasons to distribute these photographs/videos? (Check all that apply)

- ☐ Humiliate
- ☐ Control
- ☐ Boast/Brag
- ☐ Gain respect from others
- ☐ Scare
- ☐ Get money
- ☐ I don't know
- ☐ Other

Other (please specify)

***Since the beginning of the 2014 Fall term, have you ever received a nude, nearly nude or sexually explicit photograph or video of someone?**

- ○ Yes
- ○ No
- ○ Choose not to answer

Did you ask the person who sent the photo or video to send it?

- ○ Yes
- ○ No

Was the photo or video of the person who sent it?

- ○ Yes
- ○ No
- ○ Unsure

As a result of receiving the photo or video, did any of the following occur (check all that apply):

- ☐ Felt existing relationship improved
- ☐ Felt upset
- ☐ Felt embarrassed
- ☐ Felt afraid
- ☐ Received positive attention from someone else/other people
- ☐ Received negative attention from someone else/other people
- ☐ It was shared with others
- ☐ None of the above

Other (please specify)

How much were you bothered by receiving it?

- ○ Not at all
- ○ A little
- ○ A lot
- ○ A great deal

How many times has anyone photographed or filmed you nude or mostly nude?

- ○ 0 times
- ○ 1 time
- ○ 2 times
- ○ 3-5 times
- ○ 6-9 times
- ○ 10 or more times
- ○ Yes, but not since the beginning of the Fall 2014 term
- ○ Choose not to answer

Who did this?

- ☐ Current partner
- ☐ Previous partner
- ☐ Friend
- ☐ Acquaintance
- ☐ Stranger
- ☐ I don't know who did this

Since the beginning of Fall term, has anyone distributed nude, mostly nude or sexually suggestive photographs or videos of you without your permission?

- ○ No
- ○ Yes
- ○ Choose not to answer

How were these photographs or videos distributed? (Check all that apply)

- ☐ Text message
- ☐ Email message
- ☐ Posted online
- ☐ Physical photograph or video
- ☐ Other

Who distributed these photographs or videos?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger
- I don't know who did this

Did this person distribute these photographs/videos to get back at you?

- No
- Yes
- Choose not to answer

Are there other reasons this person distributed these photographs/videos? (Check all that apply)

- Humiliate
- Control
- Boast/Brag
- Gain respect from others
- Scare
- Get money
- I don't know
- Other

Other (please specify)

These next questions are about unwanted or nonconsensual sexual activity you may have experienced. Unwanted sexual activity means someone sexually touching private areas of your body, or sexual penetration by a penis, fingers or object inside your vagina or anus, or oral sex when someone's mouth or tongue contact your genitals . The person could be someone you know or don't know. Since the beginning of the Fall 2014 term, how many times have you:

***Had unwanted sexual activities with someone because they threatened to end your relationship if you didn't, or you felt pressured by someone's arguments or begging or someone promised to reward you?**

- 0 times
- 1 time
- 2 times
- 3-5 times
- 6-9 times
- 10 or more times
- Yes, but not since the beginning of the Fall 2014 term
- Choose not to answer

Who did this?

- Current partner
- Previous partner
- Friend
- Faculty or instructor
- Acquaintance
- Stranger

Since the beginning of the Fall 2014 term, how many times have you:

***Had unwanted sexual activities with someone because you were passed out, asleep, or too drunk or high on drugs to consent or stop what was happening?**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Who did this?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger

Since the beginning of the Fall 2014 term, how many times have you:

***Had unwanted sexual activities because someone threatened to use or used physical force (twisting your arm, holding you down, etc.)?**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Who did this?

- ○ Current partner
- ○ Previous partner
- ○ Friend
- ○ Acquaintance
- ○ Stranger

Since the beginning of the Fall 2014 term, how many times have you:

***Had unwanted sexual activities with someone because you were passed out, asleep, or too drunk or high on drugs to consent or stop what was happening?**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Who did this?

- ○ Current partner
- ○ Previous partner
- ○ Friend
- ○ Acquaintance
- ○ Stranger

Since the beginning of the Fall 2014 term, how many times have you:

***Had unwanted sexual activities because someone threatened to use or used physical force (twisting your arm, holding you down, etc)?**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer
○	○	○	○	○	○	○	○

Who did this?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger

***Have you been hurt as a result of unwanted sexual activities?**

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Please tell us how you were hurt by unwanted sexual activity.

- I was physically hurt
- I was emotionally hurt
- Other, please specify

Was the unwanted sexual activity so frightening, horrible or upsetting you:

Had nightmares about it or thought about it when you did not want to?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Were constantly on guard, watchful, or easily startled?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Felt numb or detached from others, activities, or your surroundings?

- No
- Yes, since the beginning of the Fall 2014 term
- Yes, but not since the beginning of the Fall 2014 term

Have you talked to a friend, family member, or counselor, called a hotline, gone online, sought medical care or called police as a result of unwanted sexual activities?

	No	Yes, since the beginning of the Fall 2014 term	Yes, but not since the beginning of the Fall 2014 term
Talked with a friend			
Talked with a family member			
Talked with a Resident Advisor (RA) for my dorm			
Talked with a victim advocate			
Talked with a counselor, therapist or other mental health provider			
Contacted the Violence Intervention and Prevention (VIP) Center			
Gone online to get help			
Contacted [redacted] Health Services			
Contacted Counseling Center at [redacted]			
Sought medical care off-campus			
Called a hotline			
Called police			

Have you missed classes or work as a result of unwanted sexual activities?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Have you turned in assignments or taken exams late, or were you unable to complete assignments or take exams, because of unwanted sexual activities?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Have your grades gotten worse as a result of unwanted sexual activities?

- Yes
- No

Have you thought about leaving this university as a result of unwanted sexual activities?

- Yes
- No

While you were growing up, during your first 18 years of life:

Did a parent or other adult in the household often or very often swear at you, insult you, put you down, or humiliate you?

- No
- Yes

Did a parent or other adult in the household often or very often act in a way that made you afraid that you might be physically hurt?

- No
- Yes

Did a parent or other adult in the household often or very often push, grab, slap, or throw something at you?

- No
- Yes

Did a parent or other adult in the household often or very often ever hit you so hard that you had marks or were injured?

- No
- Yes

Did an adult or person at least 5 years older than you ever touch or fondle you or have you touch their body in a sexual way?

- No
- Yes

Did an adult or person at least 5 years older than you ever attempt or actually have oral, anal, or vaginal intercourse with you?

- No
- Yes

Did you often or very often feel that no one in your family loved you or thought you were important or special?

- No
- Yes

Did you often or very often feel that your family didn't look out for each other, feel close to each other, or support each other?

- No
- Yes

Did you often or very often feel that you didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?

- No
- Yes

Did you often or very often feel that your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

- No
- Yes

Were your parents ever separated or divorced?

- No
- Yes

Was your mother or stepmother often or very often pushed, grabbed, slapped, or had something thrown at her?

- No
- Yes

Was your mother or stepmother sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard?

- No
- Yes

Was your mother or stepmother ever repeatedly hit at least a few minutes or threatened with a gun or knife?

- No
- Yes

Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

- No
- Yes

Was a household member depressed or mentally ill, or did a household member attempt suicide?

- No
- Yes

Did a household member go to prison?

- No
- Yes

Since the beginning of Fall 2014 term how many times have you experienced any of the following behaviors online?

	0 Times	1 Time	2 Times	3 - 5 Times	6 - 9 Times	10 or More Times	Yes, but not since the beginning of the Fall 2014 term
Harassment							
Unwanted sexual advances							
Threats of physical harm							
Identity or financial information stolen							
Online program hacked (e.g., social network, email, etc.)							
Receive a virus, malware, or spyware							

Since the beginning of Fall 2014 term how many times has anyone used or attempted to use any of the following without your permission?

	0 Times	1 Time	2 Times	3 - 5 Times	6 - 9 Times	10 or More Times	Yes, but not since the beginning of the Fall 2014 term
Credit Card Information							
Bank Account Information							
Other Personal Information (e.g. Social Security #)							

Did you report this experience to law enforcement (e.g., municipal police, campus police)?

- No
- Yes
- Not applicable (N/A)

Did this experience cause you to worry about your personal safety?

- No
- Yes
- Not applicable (N/A)

Do you consider these experiences to be cyberstalking?

- No
- Yes
- Not applicable (N/A)

When you were in high school or middle school, did you hear a talk or attend a training about preventing dating violence or sexual violence?

- Yes
- No

***While a student at [redacted] have you heard a Green Dot talk or speech?**

- Yes, one time
- Yes, two times
- Yes, more than two times
- No
- Choose not to answer

This section asks your opinion about sexual violence and dating violence. Thinking about your own feelings and beliefs, please indicate how much you personally agree or disagree with each statement. There are no right or wrong responses.

I have the skills to help prevent dating violence and sexual violence on my campus.

Strongly disagree	Disagree	Agree	Strongly agree

I believe my peers will listen to me if I speak out against dating violence and sexual violence.

Strongly disagree	Disagree	Agree	Strongly agree

I believe that dating violence and sexual violence on my campus can be prevented.

Strongly disagree	Disagree	Agree	Strongly agree

I feel that my personal efforts can make a difference in reducing dating violence and sexual violence.

Strongly disagree	Disagree	Agree	Strongly agree
○	○	○	○

I have personally been affected by dating violence or sexual violence, because it happened to me or someone I know.

Strongly disagree	Disagree	Agree	Strongly agree
○	○	○	○

The following is a list of things you may have done to help another student or friend who has experienced unwanted online behaviors such as harassment, threats, or sexual solicitations. Since the beginning of the Fall 2014 term, how many times have YOU done the following:

Helped or got help for someone who:

	No opportunity/Have not faced such a situation to speak up	0 Times	1 Time	2 Times	3 - 5 Times	6 - 9 Times	10 or More Times	Yes, but not since the beginning of the Fall 2014 term
Received unwanted texts, instant messages, emails, or other online communications	○	○	○	○	○	○	○	○
Received mean, insulting, or humiliating comments online, or in texts, instant messages, emails, or other online communications	○	○	○	○	○	○	○	○
Received unwanted sexual materials online, or in texts, instant messages, emails, or other online communications	○	○	○	○	○	○	○	○
Was harassed or threatened online, or in a text, email, or instant message	○	○	○	○	○	○	○	○
Had nude, mostly nude or sexually explicit photos or videos of them posted online or sent to others without their permission	○	○	○	○	○	○	○	○

Discussed the possible dangers of:

	No opportunity/Have not faced such a situation to speak up	0 Times	1 Time	2 Times	3 - 5 Times	6 - 9 Times	10 or More Times	Yes, but not since the beginning of the Fall 2014 term
Communicating with strangers online	○	○	○	○	○	○	○	○
Revealing personal information online	○	○	○	○	○	○	○	○
Sexting (sending nude or semi-nude pictures of oneself through text messages or other electronic methods)	○	○	○	○	○	○	○	○

Spoke up when I heard someone had:

	No opportunity/Have not faced such a situation to speak up	0 Times	1 Time	2 Times	3 - 5 Times	6 - 9 Times	10 or More Times	Yes, but not since the beginning of the Fall 2014 term
Repeatedly sent unwanted texts, instant messages, emails or other electronic communications								
Posted mean, insulting, or humiliating comments about someone online, or in texts, instant messages, emails, or other online communications								
Sent someone unwanted sexual materials online, or in texts, instant messages, emails, or other online communications								
Harassed or threatened someone online, or in a text, email, or instant message								
Posted nude, mostly nude or sexually explicit photos or videos of someone online or sent to others without their permission								

On a scale from 0 (Not Likely at All) to 10 (Very Likely), how likely do you think it is that you will experience the following in the next year online?

	0	1	2	3	4	5	6	7	8	9	10
Harassment											
Unwanted sexual advances											
Threats of physical harm											
Identity or financial information stolen											
Online program hacked (e.g., social network, email, etc.)											
Receive a virus, malware, or spyware											

On a scale from 0 (Not Afraid at All) to 10 (Very Afraid), how afraid are you that you will experience the following in the next year online?

	0	1	2	3	4	5	6	7	8	9	10
Harassment											
Unwanted sexual advances											
Threats of physical harm											
Identity or financial information stolen											
Online program hacked (e.g., social network, email, etc.)											
Receive a virus, malware, or spyware											

How much control do you feel you have over these things?

	1 (No Control)	2	3	4 (Total Control)
Significant others	○	○	○	○
School	○	○	○	○
Job	○	○	○	○
Recreation	○	○	○	○
Society	○	○	○	○
Other People	○	○	○	○

How much control do you feel these things have over you?

	1 (No Control)	2	3	4 (Total Control)
Significant others	○	○	○	○
School	○	○	○	○
Job	○	○	○	○
Recreation	○	○	○	○
Society	○	○	○	○
Other People	○	○	○	○

Please rate your level of agreement with the following statements:

	Strongly Disagree	Disagree	Agree	Strongly Agree
I often act on the spur of the moment without stopping to think	○	○	○	○
I don't devote much thought and effort to thinking about the future	○	○	○	○
I often do whatever brings me pleasure here and now, even at the cost of some distant goal	○	○	○	○
I'm more concerned with what happens to me in the short run than in the long run	○	○	○	○
I frequently try to avoid projects that I know will be difficult	○	○	○	○
When things get complicated, I tend to quit or withdraw	○	○	○	○
The things in life that are the easiest to do bring me the most pleasure	○	○	○	○
I dislike really hard tasks that stretch my abilities to the limit	○	○	○	○
I like to test myself now and then by doing something a little risky	○	○	○	○
Sometimes I will take a risk just for the fun of it	○	○	○	○
I sometimes find it exciting to do things for which I might get in trouble	○	○	○	○
Excitement and adventure are more important to me than security	○	○	○	○
If I had a choice, I would almost always rather do something physical than something mental	○	○	○	○
I almost always feel better when I am on the move than when I am sitting and thinking	○	○	○	○
I like to get out and do things more than I like to read or contemplate ideas	○	○	○	○
I seem to have more energy and a greater need for activity than most other people my age	○	○	○	○
I try to look out for myself first, even if it means making things difficult for other people	○	○	○	○
I'm not very sympathetic to other people when they are having problems	○	○	○	○
If things I do upset people, it's their problem not mine	○	○	○	○
I will try to get things I want even when I know it's causing problems for other people	○	○	○	○
I lose my temper pretty easy	○	○	○	○
Often, when I'm angry at people, I feel more like hurting them than talking to them about why I am angry	○	○	○	○
When I'm really angry, other people should stay away from me	○	○	○	○
When I have a serious disagreement with someone, it's usually hard for me to talk calmly about it without getting upset	○	○	○	○

The next question is in regard to the way you may have felt about things.

Have you ever felt so sad or hopeless almost every day for 2 weeks or more in a row that you stopped doing some usual activities?

- ○ No
- ○ Yes, since the beginning of the Fall 2014 term
- ○ Yes, but not since the beginning of the Fall 2014 term

The next questions are about drinking alcohol (this includes beer, wine, wine coolers, and liquor such as rum, vodka, bourbon or whiskey). Drinking alcohol does not include drinking a few sips of wine for religious reasons.

***In the past month, on how many days did you have 5 or more drinks of alcohol in a row (within a couple of hours)?**

- I never drink
- 0 days
- 1-2 days
- 3-9 days
- 10-19 days
- 20-31 days
- Choose not to answer

During the past month, where have you typically been drinking alcohol?

- At my home
- At someone else's home
- At a dorm
- At a fraternity or sorority
- At restaurants/bars near campus

Other (please specify)

During the past month, when you have been drinking alcohol, about how many people were you with?

- I was by myself
- 1
- 2-5
- 6-20
- 21-50
- 51-100
- 101+

On average, approximately how many of the people who were there did you know?

- No one
- A few of them
- About half
- Most of them
- Everyone

During the past month, have you:

Been unable to remember things that happened while you were drinking alcohol? (things you would normally remember)

- No, never
- Yes, in the past month
- Not in the past month, but in the past year

Done things when drinking alcohol that you normally would not do and you now regret doing?

- No, never
- Yes, in the past month
- Not in the past month, but in the past year

The next question is about drug use, by this we mean both illegal and prescription drugs.

In the past month have you used drugs other than those required for medical reasons?

- No, never
- Yes, in the past month
- Not in the past month, but in the past year

These questions are about you, where you live, and how you spend your time..

Are you a full-time or part-time student?

- Full-time
- Part-time
- Other, please specify

Are you on an athletic team?

- Yes
- No

Are you...

- In a Greek fraternity
- In a Greek sorority
- Neither

Where do you currently live?

- On-campus dorm, apartment or house
- On-campus fraternity or sorority house
- Off-campus fraternity or sorority house
- Off-campus

With whom do you live?

- Live alone
- With my parents or other adult relatives
- With a roommate/roommates (not a romantic partner)
- With my husband/wife, boyfriend/girlfriend or other romantic partner

The next series of questions will ask you about your activity or experience online or using electronic devices.

In an average day, how many hours do you spend online doing the following activities?

	0 Hours	1 Hour	2 Hours	3 - 5 Hours	6 - 9 Hours	10 or More Hours
Sending and/or responding to email						
Social networking (on website such as Facebook and Twitter)						
Communicating with someone through instant messaging						
Video chatting (e.g. Skype)						
Blogging (reading or writing)						
Downloading music, films, or podcasts						
Participating in chat rooms or other forums						
Watching TV, YouTube videos, or listening to the radio						
Participating in class discussions (e.g. on Blackboard)						
Visiting pornographic websites						

How often do you send and receive text messages?

- Never
- Less than once a week
- At least once a week
- At least once a day
- Several times a day

How often do you send and receive text messages from friends?

- Never
- Less than once a week
- At least once a week
- At least once a day
- Several times a day

How often do you send and receive text messages from a boyfriend/girlfriend/partner?

- Never
- Less than once a week
- At least once a week
- At least once a day
- Several times a day

How often do you send and receive text messages from family?

- Never
- Less than once a week
- At least once a week
- At least once a day
- Several times a day

How often do you send and receive text messages from strangers or people you have not met?

- Never
- Less than once a week
- At least once a week
- At least once a day
- Several times a day

How often do you use your phone to send or receive emails?

- Never
- Less than once a week
- At least once a week
- At least once a day
- Several times a day

How many individuals do you talk to online who you have not met in real life?

- 0 people
- 1 person
- 2 people
- 3-5 people
- 6-9 people
- 10+ people
- Choose not to answer

What percentage of your friends do you know post mean, insulting, or humiliating comments about others either online (for example, Facebook page or blog) or in emails, text or instant messages, or voicemails?

- 0%-25%
- 26%-50%
- 51%-75%
- 76%-100%

What percentage of your friends do you know have sent any nude, nearly nude or sexually explicit photographs or videos of themselves to someone?

- 0%-25%
- 26%-50%
- 51%-75%
- 76%-100%

How many friends do you have on your social networks?

- Under 100
- 100-500
- 500-1000
- Over 1000

How many of these friends do you talk to on a weekly basis?

- 0%-25%
- 26%-50%
- 51%-75%
- 76%-100%

What, if any, personal information do you post online? (Check all that apply)

- Full name
- Phone number
- Email
- Address
- Work/School
- Relationship status
- Sexual orientation
- Addresses for other social network/blog sites
- Interests/Activities
- Photos of myself
- Videos of myself
- I do not post personal information online

What, if any, personal information do you share with people you meet online? (Check all that apply)

- Full name
- Phone number
- Email
- Address
- Work/School
- Relationship status
- Sexual orientation
- Addresses for other social network/blog sites
- Interests/Activities
- Photos of myself
- Videos of myself
- I do not share personal information online

How often do you update your social network accounts?

- Less than once a month
- Once a month
- Once a week
- A few times a week
- Everyday
- Multiple times a day
- Other

What protection settings do you use on your social media accounts? (Check all that apply)

- My account is public
- Only friends and friends of friends can view my account
- Only friends can view my account
- I have to give permission before anything is posted to my account
- Other

Is your computer password protected?

- No
- Yes
- Choose not to answer

Does anyone else know your computer password?

- No
- Yes
- Choose not to answer

Does your computer have antivirus software installed?

- No
- Yes
- Choose not to answer

Is your phone password/passcode protected?

- No
- Yes
- Choose not to answer

Does anyone else know your password for your phone?

- No
- Yes
- Choose not to answer

Does anyone else know your password for email or social media accounts?

- No
- Yes
- Choose not to answer

Since the beginning of Fall term, how many times has someone used or copied your social media accounts without your permission?

0 times	1 time	2 times	3-5 times	6-9 times	10 or more times	Yes, but not since the beginning of the Fall 2014 term	Choose not to answer

Who used or copied your social media accounts without permission?

- Current partner
- Previous partner
- Friend
- Acquaintance
- Stranger
- I don't know who did this

Why did this person use or copy your social media accounts?

- As a joke
- To post rude, humiliating or threatening comments, photographs or videos
- To check up on me
- I don't know why they did this
- Other

On a scale from 0 (Not Likely at All) to 10 (Very Likely), how likely do you think it is that you will experience any of the following next year?

	0	1	2	3	4	5	6	7	8	9	10
Physical harm by another person	○	○	○	○	○	○	○	○	○	○	○
Inappropriate sexual touching, forced kissing, forced oral sex, or forced sexual intercourse	○	○	○	○	○	○	○	○	○	○	○
Repeated unwanted contact, following, receiving unwanted gifts or attention from the same person	○	○	○	○	○	○	○	○	○	○	○
Verbal threats of physical harm	○	○	○	○	○	○	○	○	○	○	○

On a scale from 0 (Not Likely at All) to 10 (Very Likely), how afraid are you that you may experience any of the following next year?

	0	1	2	3	4	5	6	7	8	9	10
Physical harm by another person	○	○	○	○	○	○	○	○	○	○	○
Inappropriate sexual touching, forced kissing, forced oral sex, or forced sexual intercourse	○	○	○	○	○	○	○	○	○	○	○
Repeated unwanted contact, following, receiving unwanted gifts or attention from the same person	○	○	○	○	○	○	○	○	○	○	○
Verbal threats of physical harm	○	○	○	○	○	○	○	○	○	○	○

We would like to update our records for future surveys. Please provide us with the email address that you regularly use.

We sometimes conduct other studies related to this one. Can we contact you by email and invite you to participate in another study? Please note that other studies may or may not have an incentive and that your answer will not affect your receiving the incentive for this study.

○ Yes

○ No

Appendix B

Adverse Childhood Experience (ACE) Questionnaire

Finding your ACE Score

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household often …

   Swear at you, insult you, put you down, or humiliate you?

   or

   Act in a way that made you afraid that you might be physically hurt?

   Yes No If yes enter 1 _____

2. Did a parent or other adult in the household often …

   Push, grab, slap, or throw something at you?

   or

   Ever hit you so hard that you had marks or were injured?

   Yes No If yes enter 1 _____

3. Did an adult or person at least 5 years older than you ever…

   Touch or fondle you or have you touch their body in a sexual way?

   or

   Try to or actually have oral, anal, or vaginal sex with you?

   Yes No If yes enter 1 _____

4. Did you often feel that …

   No one in your family loved you or thought you were important or special?

   or

   Your family didn't look out for each other, feel close to each other, or support each other?

   Yes No If yes enter 1 _____

5. Did you often feel that …

   You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?

   or

   Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

   Yes No If yes enter 1 _____

6. Were your parents ever separated or divorced?

Yes No If yes enter 1 _____

7. Was your mother or stepmother:

Often pushed, grabbed, slapped, or had something thrown at her?

or

Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?

or

Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

Yes No If yes enter 1 _____

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

Yes No If yes enter 1 _____

9. Was a household member depressed or mentally ill or did a household member attempt suicide?

Yes No If yes enter 1 _____

10. Did a household member go to prison?

Yes No If yes enter 1 _____

Now add up your "Yes" answers: _____ This is your ACE Score

Appendix C

Table 14

Unadjusted and Adjusted Logistic Regression Models Predicting Non- Degree Completion by Adverse Childhood Experience (ACE) Score (n=1,894)

	Unadjusted OR (95% CI)	Model 1* Adjusted OR (95% CI)	Model 2** Adjusted OR (95% CI)	Model 3*** Adjusted OR (95% CI)	Model 4**** Adjusted OR (95% CI)
Ever Degree Completion					
ACE Score 0	Reference	Reference	Reference	Reference	Reference
ACE Score 1	1.09 (0.72-1.63)	1.08 (0.72-1.62)	1.03 (0.66-1.59)	0.97 (0.63-1.51)	1.01 (0.63-1.62)
ACE Score 2-3	1.91† (1.27-2.85)	1.89† (1.25-2.85)	2.03† (1.31-3.63)	1.71† (1.09-2.68)	1.74† (1.06-2.85)
ACE Score 4+	2.81† (1.79-4.40)	2.74† (1.72-4.38)	2.19† (1.33-3.63)	2.41† (1.45-4.02)	1.91† (1.08-3.39)
Demographic Controls					
Gender					
Male		Reference			Reference
Female	-	1.44† (1.06-1.96)	-	-	1.13 (0.78-1.63)
Instate Status	-				
No		Reference			Reference
Yes		0.69† (0.50-0.96)	-	-	0.76 (0.50-1.15)
First Generation	-				
No		Reference			Reference
Yes		1.68† (1.18-2.38)	-	-	1.29 (0.84-1.97)
Race					
White		Reference			Reference
Non-white		1.38 (0.98-1.94)			1.35 (0.90-2.03)
Pre-Admission Control					
HSRI	-	-	0.92† (0.90-0.94)	-	0.98 (0.94-1.01)
Post-Admission Controls					
Academic Classification					
First Year				Reference	Reference
Second Year	-	-	-	0.56† (0.38-0.83)	0.55† (0.36-0.85)
Third Year	-	-	-	0.25 † (0.15-0.41)	0.27† (0.16-0.45)
Forth Year				0.13† (0.07-0.22)	0.14† (0.08-0.25)
First-year Cumulative GPA	-	-	-	0.25† (0.19-0.23)	0.28† (0.20-0.40)
Part Time Enrollment					
No	-	-	-	Reference	Reference
Yes	-	-	-	2.74† (1.90-3.96)	2.61† (1.74-3.93)
Transfer Student	-	-	-		
No				Reference	Reference
Yes				0.37† (0.21-0.66)	0.32† (0.14-0.71)
Greek Affiliation					
No				Reference	Reference
Yes	-	-	-	0.65† (0.44-0.94)	0.60† (0.40-0.90)

† Statistically significant result; *Adjusted for gender, in-state residency, race, and first-generation status;

**Adjusted for high school readiness index, which is a compilation measure of high school GPA and ACT score;

***Adjusted for academic classification, first year cumulative GPA, ever part time enrollment, transfer student, and Greek

**** Adjusted for all controls in Models 1-3

Table 15

Unadjusted and Adjusted Logistic Regression Models Predicting Non- Four-Year Degree Completion by Adverse Childhood Experience (ACE) Score (n=1,894)

	Unadjusted OR (95% CI)	Model 1* Adjusted OR (95% CI)	Model 2** Adjusted OR (95% CI)	Model 3*** Adjusted OR (95% CI)	Model 4**** Adjusted OR (95% CI)
Ever Degree Completion					
ACE Score 0	Reference	Reference	Reference	Reference	Reference
ACE Score 1	1.12 (0.88-1.42)	1.16 (0.91-1.48)	1.05 (0.81-1.36)	1.09 (0.84-1.42)	1.11 (0.83-1.48)
ACE Score 2-3	1.32† (1.00-1.74)	1.40† (1.05-1.85)	1.37† (1.04-2.17)	1.30 (0.96-1.76)	1.43† (1.02-2.00)
ACE Score 4+	1.99† (1.42-2.80)	2.10† (1.48-2.99)	1.50† (1.04-2.17)	1.67† (1.14-2.44)	1.42 (0.93-2.16)
Demographic Controls					
Gender					
Male		Reference			Reference
Female	-	1.89 (1.55-2.30)	-	-	1.70† (1.34-2.14)
Instate Status	-				
No		Reference			Reference
Yes		1.16 (0.93-1.45)	-	-	1.18 (0.90-1.55)
First Generation	-				
No		Reference			Reference
Yes		1.38 (1.08-1.76)	-	-	1.09 (0.82-1.46)
Race					
White		Reference			Reference
Non-white		1.16 (0.92-1.47)			1.10 (0.83-1.45)
Pre-Admission Control					
HSRI	-	-	0.94 (0.92-0.95)	-	0.98 (0.96-1.00)
Post-Admission Controls					
Academic Classification					
First Year				Reference	Reference
Second Year	-	-	-	0.94 (0.70-1.26)	1.03 (0.75-1.42)
Third Year	-	-	-	0.89 (0.66-1.20)	0.90 (0.65-1.25)
Forth Year				1.61† (1.2-2.16)	1.62† (1.18-2.22)
First-year Cumulative GPA	-	-	-	0.30 (0.24-0.37)	0.31† (0.24-0.41)
Part Time Enrollment					
No	-	-	-	Reference	Reference
Yes	-	-	-	4.48† (3.38-5.94)	5.22† (3.80-7.18)
Transfer Student	-	-	-		
No				Reference	Reference
Yes				0.26† (0.17-0.40)	0.23† (0.13-0.39)
Greek Affiliation					
No				Reference	Reference
Yes	-	-	-	0.81 (0.65-1.01)	0.83 (0.65-1.06)

† Statistically significant result; *Adjusted for gender, in-state residency, race, and first-generation status;

**Adjusted for high school readiness index, which is a compilation measure of high school GPA and ACT score;

***Adjusted for academic classification, first year cumulative GPA, ever part time enrollment, transfer student, and Greek

**** Adjusted for all controls in Models 1-3

Table 16
Unadjusted and Adjusted Logistic Regression Models Predicting Non- Six-Year Degree Completion by Adverse Childhood Experience (ACE) Score *(n=1,894)*

	Unadjusted OR (95% CI)	Model 1* Adjusted OR (95% CI)	Model 2** Adjusted OR (95% CI)	Model 3*** Adjusted OR (95% CI)	Model 4**** Adjusted OR (95% CI)
Ever Degree Completion					
ACE Score 0	Reference	Reference	Reference	Reference	Reference
ACE Score 1	1.13 (0.77 -1.66)	1.13 (0.77-1.67)	1.10 (0.73-1.66)	1.02 (0.68-1.55)	1.10 (0.71-1.72)
ACE Score 2-3	1.82† (1.23-2.69)	1.85† (1.24-2.76)	1.94† (1.27-2.96)	1.62† (1.04-2.50)	1.71† (1.06-2.75)
ACE Score 4+	2.73† (1.76-4.23)	2.75† (1.74-4.34)	2.20† (1.35-3.57)	2.26† (1.38-3.69)	1.93† (1.11-3.35)
Demographic Controls					
Gender					
Male		Reference			Reference
Female	-	1.65 (1.23-2.23)	-	-	1.32 (0.93-1.88)
Instate Status	-				
No		Reference			Reference
Yes		0.75 (0.54-1.04)	-	-	0.76 (0.51-1.13)
First Generation	-				
No		Reference			Reference
Yes		1.64 (1.16-2.30)	-	-	1.27 (0.84-1.91)
Race					
White		Reference			Reference
Non-white		1.32 (0.95-1.84)			1.27 (0.86-1.88)
Pre-Admission Control					
HSRI	-	-	0.93 (0.91-0.95)	-	0.99 (0.96-1.03)
Post-Admission Controls					
Academic Classification					
First Year				Reference	Reference
Second Year	-	-	-	0.59† (0.40-0.88)	0.60† (0.39-0.91)
Third Year	-	-	-	0.28† (0.18-0.45)	0.29† (0.18-0.49)
Forth Year				0.22† (0.14-0.36)	0.25† (0.15-0.41)
First-year Cumulative GPA	-	-	-	0.26† (0.20-0.34)	0.27† (0.19-0.38)
Part Time Enrollment					
No	-	-	-	Reference	Reference
Yes	-	-	-	3.18† (2.30-4.50)	3.02† (2.07-4.42)
Transfer Student	-	-	-		
No				Reference	Reference
Yes				0.35† (0.20-0.61)	0.30† (0.14-0.68)
Greek Affiliation					
No				Reference	Reference
Yes	-	-	-	0.58† (0.41-0.84)	0.56† (0.38-0.83)

† Statistically significant result; *Adjusted for gender, in-state residency, race, and first-generation status;

**Adjusted for high school readiness index, which is a compilation measure of high school GPA and ACT score;

***Adjusted for academic classification, first year cumulative GPA, ever part time enrollment, transfer student, and Greek

**** Adjusted for all controls in Models 1-3

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Vita

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