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Collegiate and Post-Undergraduate Experiences Among African American STEM Alumni at the University of South Carolina

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COLLEGIATE AND POST-UNDERGRADUATE EXPERIENCES AMONG AFRICAN
AMERICAN STEM ALUMNI AT THE
UNIVERSITY OF SOUTH CAROLINA

by

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DEDICATION

I dedicate this to Morayo Musu Sarah Akinrotiba and Ireoluwa Tiwatope

Mariama Akinrotiba; the world is yours.

ACKNOWLEDGEMENTS

I would like to thank every family member, educator, mentor, and peer support who poured greatness into me. Thank you to my dissertation committee and committee chair Dr. Spencer Platt. A special acknowledgment to every study participant; your contributions are invaluable.

ABSTRACT

This study was designed to explore the undergraduate and post-undergraduate experiences of African American STEM alumni from the University of South Carolina from a strengths-perspective. The method utilized for this qualitative study was phenomenological analysis. Semi-structured interviews were conducted with 10 African American alumni who graduated between 2010 and 2020 and majored in science, technology, engineering, or math (STEM). Critical Race Theory and community cultural wealth served as theoretical frameworks for this research. The findings indicate that African American students: 1) want to smoothly transition from high school to college curriculum being equally exposed to collegiate materials at the high school level, similar to their White peers, 2) want culturally relevant meaningful and supportive experiences in higher education, 3) want to build rapport with faculty and teaching instructors to improve learning outcomes and develop mentorship opportunities, 4) want to build rapport with well-versed administrative officials who have their best interest at heart, and 5) want to be prepared for the industry upon graduation and transition smoothly into the workforce.

Keywords: **African American alumni, African American students, STEM, Critical Race Theory, community cultural wealth, predominantly White institutions (PWIs), undergraduate experience, high-impact activities, phenomenological**

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CHAPTER 1

INTRODUCTION TO THE STUDY

An understudied area in education is how higher education experiences contribute to the career development for Science, Technology, Engineering, and Math (STEM) African American alumni. This understudied area calls for close attention with respect to institutional ethics, impact, and sustainability. While there is widespread research on factors that contribute to higher education success and the impact of college on students (Astin, 1993), little research reveals how alumni make sense of their undergraduate experiences at predominately white institutions (PWIs), and what specific undergraduate experiences contribute to career development beyond monetary findings. Additionally, research ignores the racialized experiences of minoritized students throughout the education and career development process from a persistence perspective. Current scholars have called for more focus on perseverance in STEM educational outcomes.

A 2006 study found that Whites and Asians received over 70% of STEM bachelor's degrees, while African American received only 9% (National Science Foundation, 2009). As of 2013, around 12% of African American graduates ages 22-27 were unemployed versus the all graduate percentage rate of around 5.6% (Jones & Schmitt, 2014). Of more concern during this time, more than 50% of recent African American graduates who were employed were underemployed (Jones & Schmitt, 2014). African American STEM undergraduates fare only slightly better. From 2010 to 2012,

African American engineering undergraduate unemployment rates were a staggering 10% and their underemployment rates topped 32% (Jones & Schmitt, 2014). While racial discrimination in the labor force speaks to some of the challenges African American alumni face in the labor force, additional factors that contribute to alumni transitions following undergraduate completion must be explored for a more conclusive understanding of post-undergraduate experiences, both positive and negative.

According to the National Center for Education Statistics (2019), as of 2017, African American college enrollment has increased from 31% to 36%. African Americans are attending college with various career expectations including gaining financial independence, economic stability, and improving career options (Phinney et al., 2006). Various studies reveal that African Americans have equal probability of declaring a STEM major as compared to their White counterparts (Chen, 2009; Garrison, 1987; Riegle-Crumb & King, 2010; Xie, Fang, & Shauman, 2015). Are these expectations being realized? If so, what experiences do African American STEM alumni attribute to this success? If not, why not?

A 2010 study found that 66% of African American females have earned their baccalaureate degrees alongside 34% of African American males (Kim & Hargrove, 2013). With regard to workforce figures, 6.4% of African Americans are unemployed compared to the 3.1% White unemployment rate (Williamson & Wilson, 2019). Additionally, African Americans with a college degree are more likely to be underemployed at a rate of 3.5% compared to 2.2% of the Caucasian workforce (Williamson & Wilson, 2019).

Urgency of this Study and Why We Should Care

There are both workforce and higher education implications for assessing and improving how racialized alumni make sense of their undergraduate experiences at PWIs, and what specific undergraduate experiences contribute to career development. In terms of workforce, the federal government has expressed a need for increased numbers in the STEM workforce to maintain economic distinction and remain a global leader in scientific modernization and technological advances (National Academy of Science, 2010). Moreover, to broaden the available pool of STEM labor there must be an investment in both STEM education along with the recruitment of historically underrepresented minority students to create such a pool (Building Engineering and Science Talent, 2004; Committee on Science Engineering, and Public Policy, 2007).

In terms of higher education, alumni who have more positive experiences during their undergraduate tenure can be strong assets to their alma mater. In many cases alumni may express their pleasure with positive educational experiences through recommendations of the institution to potential attendees (Thomas & Galambos, 2004), through their financial giving (McAlexander & Koenig, 2001; Monks, 2003), or by providing mentorship and employment opportunities to fellow graduates from their alma mater (Mael & Ashforth, 1992; Hartman & Schmidt, 1995). Additionally, alumni may serve as guest speakers for college classes and may choose to speak positively or negatively about their higher education experience in their local communities. These opportunities can impact student recruitment, enrollment, and retention. Therefore, it becomes critical that higher education institutions hear from alumni regarding their experiences, particularly African American alumni, in hopes that these former students

will serve as positive ambassadors for their institutions; doing so will better assess how African American alumni make sense of their undergraduate experiences at PWIs, and what specific undergraduate experiences contribute to career development.

Literature on minoritized STEM students has traditionally taken on a deficit approach that primarily amplifies the failures of racialized students instead of seeking insights into STEM students' success (Harper, 2010; Schmidt, 2008). There is a resounding call for a more strengths-based approach to exploring impacts and outcomes for minority students in STEM education and STEM fields. Therefore, the purpose of this phenomenological study was to investigate how STEM African American alumni from the University of South Carolina (UofSC) make sense of their undergraduate studies, explain their undergraduate experiences, and perceive their post-undergraduate careers and career development using an anti-deficit framework developed by critical race and community cultural wealth theories. A critical understanding of how students steer their way through college and university experience is helpful for all who are looking to wisely invest public and private institutional resources, as well as those who seek to encourage supportive campus communities that benefit student development and accessibility (Harper, 2007).

The problem statement, purpose summary, and research questions are presented as a means of focusing the research and to ground the study. Finally, critical race theory and community cultural wealth are detailed as the theoretical frameworks to introduce and analyze the racialized experiences of African American alumni. Therefore, the purpose of this study is then introduced to 1) highlight gaps in existing research on the topic of the African American STEM higher education experience, 2) explore the

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limitations of current collegiate research on racial diversity and student post-undergraduate experiences, and 3) analyze the need to explore differences in undergraduate experiences and post-undergraduate experiences from the African American perspective. The rationale and significance of the study are then discussed, summarizing ways in which the results can benefit various student affairs professionals and higher education leadership officials, particularly because alumni can serve as strong assets for their former institutions.

Background and Context

Chapter Two provides a complete overview of the literature that served as the foundation for this study. This section provides an overview of motivations for college attendance and post-undergraduate experiences. Additionally, research on trends pertaining to the African American higher education experience and the context of this experience are shared to lay the groundwork for the need to explore racial intersectionality in higher education and post-undergraduate experiences.

Young adults choose to attend college for many reasons. College attendance is perceived as a steppingstone after high school (Phinney et al., 2006). Motivations young adults use when choosing to attend college are critical to consider, as this factor significantly contributes to influences on academic engagement and post-undergraduate experiences (Phinney et al., 2006). Phinney et al. (2006) studied student typologies and noted six goals which motivate students to attend college. These include 1) the goal of obtaining a good job, 2) achieving success and reaping financial rewards, 3) professional development and intellectual growth, 4) improving the world, and 5) meeting the expectations of parents and family members, and/or 6) the goal of avoiding less desirable

options including remaining idle or menial labor. Additional studies occurred in 2014 to determine if these motivations expanded and the following goals were added: 7) better supporting and assisting family, 8) proving to others that one could succeed academically and 9) the goal of responding to mentorship received that encourages the pursuit in higher education (Phinney et al., 2006).

Prominent race and education researchers argue that although race has played a significant role in creating inequity throughout society and within educational institutions, race, as a focus of research, continues to be under-researched (Ladson-Billings & Tate, 1995). While a comprehensive analysis of how college affects students has been provided by researchers Pascarella and Terenzini (1991, 2005), much remains unclear around how college is experienced, given particular contexts such as race. A look at the literature reveals that attending college is done with the intent of achieving various goals, for many. But it is unclear as to how the higher education goal-achievement process is experienced by African Americans who were STEM majors. A study focused on how African American alumni make sense of their undergraduate experiences at PWIs, and what specific undergraduate experiences contribute to career development will add to this critical literature need.

Along with this focus on STEM majors, one of the reasons individuals choose to invest in higher education has been associated with improved occupational and career post-undergraduate experiences (Roska & Levey, 2010). Student expectations for attending college include being provided the necessary basic skills for competitive career preparation (Crebert et al., 2004). Quite often it has been purported that to achieve upward mobility, postsecondary admittance and completion are the most effective means

to progress in life (Foster et al., 2011). A closer look into the above motivations will explore if the findings are generalizable to undergraduate African American STEM alumni from the University of South Carolina.

Moreover, although motivation encourages college attendance, experiences of African American STEM majors highlight numerous barriers. These challenges include inadequate career information, strenuous course loads, cultural and social segregation, as well at stereotype threat (Seymour & Hewitt, 2000; Steele, 1997; Wilson, 2000). To address these challenges, several activities were deemed critical to racialized student achievement in the STEMs. These areas included 1) social and academic integration, 2) skills and knowledge development, 3) inspiration and encouragement, as well as monitoring and advising (Maton & Hrabowski, 2000). A more in-depth look into each of these are detailed in the literature review.

An Introduction to Higher Education Post-Undergraduate Career Studies

Post-undergraduate experiences can be framed and interpreted in many ways including return on investment (ROI), satisfaction, or others. Research has found that there are both positive and negative perceptions of the return on investment for college. These perceptions are explored both individually and socially for postsecondary degree attainment for college attendees, with more positive associations with attending college. Overall, some works demonstrate that higher education completion can increase the likelihood for alumni to improve their socio-economic standing (Oreopolulos & Petronijevic, 2013; Roska & Levey, 2010). However, most higher education studies assess post undergraduate experiences using quantitative approaches such as earnings. Qualitative explorations of higher education experiences are scarce.

A quantitative study conducted between the years 2000 and 2008 showed approximately 31% of middle-class college graduates who attended a four-year institution moved to the top income quintile, compared with only 12% of those without an equivalent degree (Baum, Ma, & Payea 2013). Enrollees also expected that a higher degree would yield increased earnings with respondents estimating increased earnings of $20,000 a year from a bachelor's degree (Taylor et al., 2011). While some literary works explore if well-being and the ability to thrive are achieved by alumni, few explore in detail the context and the diversity within these achievements for African American alumni and linkages back to specific undergraduate experiences.

A 2005 quantitative satisfaction study found that more than 80% of college graduates were satisfied with their college experience (Kuh, 2005). Reasons behind this satisfaction have included an increase in potential income, opportunities for personal development, and learning more about civic engagement (Bowen, 1997). Typically, research scientists have used standards like self-reports or behavioral indicators. These indicators include activities such as returning to the alma mater. This qualitative study sought to explore rates of satisfaction as well as reasons for a more detailed and nuanced view into contributing factors to education and post education experiences.

The purpose of this phenomenological study was to investigate how the higher education experiences of African American STEM alumni shape career development. African American STEM alumni were selected from across various university affinity groups including the Office of Alumni Services, African American alumni associations, and the like. The perspective, represented by this group of participants, informed an

understanding of the college experience of African American STEM students and their status following post-undergraduate completion.

In this study, examinations of how the higher education experiences of African American alumni have shaped career development were examined. Particular attention was paid to some of the specific reasons African American students attend college, which include gaining financial independence, economic stability, and improving career options (Xiao et al., 2014).

Research Purpose

The purpose of this study was to explore how African American STEM alumni from the University of South Carolina experience their undergraduate education and what specific experiences they attribute to their current status. Additionally, this study sought to learn more about African American STEM students' transitions after college. This qualitative examination sought to better understand the undergraduate experiences of recent African American STEM alumni and the goal was to reflectively identify high-impact activities, within higher education intuitions, attributed to positive post-undergraduate experiences. Additionally, the research aimed to identify those practices that African American students engage in which, they feel, contribute to significantly to their professional experiences. It was hoped that the ways in which these opportunities are designed, marketed and implemented might inform how campus administrators organizing events to increase African American student engagement and improve experience.

Problem Statement

The alignment between higher education and post matriculation career experiences of African American students remains a question. These questions have typically been answered in terms of matriculation data or employer post-undergraduate experiences with the graduate pool. Research highlights the motivations for attending college, which include post-matriculation success. Specifically, current research focuses on perceptions of employers on workplace readiness (Gallup, 2014; The PreparedU Project in the News, 2018; Zimmer, 2014). However, little research explores if these motivations are achieved from the African American alumni perspective. Moreover, research does not explore the diversity in higher education post-undergraduate experiences, particularly for African American STEM alumni. The objective was to better understand the kinds of types of experiences specific African American alumni have during college along with their experiences following successful matriculation according to their employment type.

Study Significance and Research Questions

Overall, the percentages of college students in America who identify as minorities has increased. The enrollment of Hispanic, Asian/Pacific Islander, and African American students has steadily improved for more diversity in higher education (Musu-Gillette et al., 2017). With regard to African Americans, the percentage of African American students increased from 10% in 1976 to 14% in 2015 (Musu-Gillette et al., 2017). Therefore, this study sought to understand how African American STEM alumni make sense of their higher education and post-undergraduate experiences, and what they

attribute to their success and/or challenges. The research questions this study sought to answer were:

1) How do African American STEM alumni from the University of South Carolina (UofSC) make sense of their undergraduate experiences at the predominately white institution (PWI)?

2) What are the post-undergraduate experiences?

These questions helped explore how African American alumni perceive their campus experience during their undergraduate years along with post-undergraduate understandings. Critical Race Theory (CRT) and Community Cultural Wealth (CCW) served as the theoretical lens for this study.

Conceptual/Theoretical Perspectives

Critical Race Theory (CRT) is an academic framework that maintains that society is divided along racial lines into white oppressors and African American victims (Bell, 1976). Critical Race Theory purports that race exists as a social construct that impacts multiple aspects of life and is deeply entrenched in every fabric of society (Ladson-Billings, 1998). The goal of CRT has been to uncover what is typically overlooked in the exploration of race and privilege patterns of exclusion in America including education (Parker & Villalpando, 2007).

Continued research examines the critical role CRT plays in seeking inclusive and diverse higher education experiences. Hiraldo (2010) analyzed how CRT is used to promote the more intricate analysis of how various types of social and economic inequalities are reinforced in higher education (Bernal & Villalpando, 2002; DeCuir &

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Dixon, 2004; Ladson-Billings, 1998; McCoy & Rodricks, 2015). The development of CRT emerged as a result of a framework that includes: 1) counter-storytelling, 2) the permanence of racism, 3) whiteness as property, 4) interest convergence, and 5) critique of liberalism (Bell, 1976).

Tenets of CRT include counter-storytelling, which provides faculty, staff and students the opportunity to voice their narratives in discussion of their marginalized experiences at higher education institutions. Tenet two is the permanence of racism, which speaks to how racism controls the political, social, and economic realms of American society are rooted in racism. Critical Race Theory then, regards racism as inherent to civilization. Resultantly, this privileges White persons over people of color in higher education and impedes diversity strategic plans. The third tenet defines "Whiteness" as property. This tenet argues that racism embedded in America originates where whiteness functions at various levels including civil rights, ranging from possession, enjoyment, exclusion, and disposition (DeCuir & Dixon, 2004; Ladson-Billings, 1998; Ladson-Billings & Tate, 1995).

Tenet four is interest conversion, which argues that Whites are the people who benefit primarily from legislation pertaining to civil rights (DeCuir & Dixon, 2004; Ladson-Billings, 1998; McCoy, 2006). These authors noted that this unequal benefit is one of the reasons affirmative action and diversity initiatives grew. Tenant five is a critique of liberalism. Social responses to racism include "color-blindness, the law of neutrality" and "equal opportunity for all." Tenet five argues that "colorblindness" promotes law neutrality and equal opportunity. This fifth tenet argues that color blindness promotes an ignoring of racism, racist policies, and privilege through social

inequality. Within higher education this can be seen in lack of inclusivity in the classroom and in the academic curriculum (Ladson-Billings, 1998). The use of CRT as a framework for studying higher education inequality calls for a revealing of higher education's racist pockets while prescribing and implementing solutions that are radical in nature. Critical Race Theory best incorporates the intersectionality between educational experience and race.

Most student development theories minimally discuss race and the challenges of racism in higher education (Savas, 2014). While helpful in considering one-dimensional dynamics of psychosocial development, student development theories explore the deeper aspects of identity development for many students on a limited basis (Winkle-Wagner, 2012). Thus, an integration of CRT can assist colleges and universities with managing diverse undergraduate expectations and post-graduate experiences for African Americans.

Student affairs administrators are called to examine how students make meaning of time spent during their educational experience, how they go about valuing their time and if the students interpret co-curricular programming as worth the effort based on post-undergraduate status (Astin, 1999). The rules and norms with which the alumni use to guide their decisions to participate and/or not participate in co-curricular activities are shared in order to improve campus engagement and provide a more holistic experience for improved post-undergraduate experience. Critical Race Theory is used as a perspective to challenge the more common deficiency-focused analyses of racialized experiences in higher education and corrective interventions that generate deficit approaches (Freire, 1973; Garcia & Guerra, 2004). Critical Race Theory argues

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that the cultural practices of racialized students can nurture and empower (Bernal, 2002; Delgado, 2001). The extension of this analysis provides for the introduction of community cultural wealth (CCW) in exploring how cultural practices, or cultural capital, improves higher education experiences, developments, and post -undergraduate outcomes.

Community cultural wealth, as defined by Yosso (2005), incorporates CRT and expands the view of cultural capital theory to include the experiences of racialized individuals and reveals assets and resources of people of color. Community cultural wealth is a collection of expertise, skills, capabilities, and contacts possessed and utilized by persons of color to survive and resist oppression at the micro, mezzo, and/or macro level (Yosso, 2005). Critical Race Theory provides an opportunity to view how people of color utilize cultural wealth through six forms of capital including 1) aspirational, 2) navigational, 3) social, 4) linguistic, 5) familial, and 6) resistant (Yosso, 2005). Each are briefly summarized to connect with the higher education experiences of African American STEM alumni.

Aspirational capital is the ability to retain optimism and ambitions in the face of direct and indirect challenges. In higher education, this speaks to familial and/or cultural norms that encourage higher education pursuits despite limited realities of education success within direct families (Yosso, 2005). Navigational capital is the skill to maneuver through institutions not created with communities of color in mind. Social capital is networks of community supports and people. In higher education, this speaks to persistence beyond racially hostile and/or unwelcoming classroom and campus environments (Yosso, 2005).

Linguistic capital are experiences with communication and the social and intellectual skills received through those communication exchanges. In higher education, linguistic capital speaks to having multiple language and communication skills which broadens relatability and the ability to connect with multiple groups using diverse language and communication (Yosso, 2005). Familial capital includes cultural knowledge that this nurtured among families and extended families which then bring about a sense of community. In higher education settings, familial capital includes bonds and relationships between similarly racialized students who seek each other out for morale supports (Yosso, 2005). Resistant capital includes awareness and skills acquired through oppositional behaviors which speak out against social injustices. This form of capital is an extension of social justice movements, quite familiar to racialized students who attend college and use these histories to inform their critical consciousness and develop oppositional interventions (Yosso, 2005). These forms of capital connect with CRT by challenging more traditional types of cultural capital to celebrate the variety of cultural expertise, resilience, and skills used by marginalized racial groups.

Rationale for Using Critical Race Theory and Community Cultural Wealth

The use of CRT in education research is growing and has contributed to more intentional and nuanced analysis of successes and challenges with race and racism in higher education contexts (Harper et al., 2016). Community cultural wealth permits this nuanced analysis of racialized experiences to be done so from a strengths- perspective. For this study, CRT and CCW were the best applicable amongst student development theories due to most theories being limited in their review and discussion of

race. Generally, theories on student development present one dimension of student identities ignoring intersectionality, which compound life experiences (Winkle-Wagner, 2012). Moreover, CRT and CCW can assist colleges and university studies through the focus on revelation of exclusion, privilege, and race (Ladson-Billings, 1998; Parker & Villalpando, 2007). In doing so, CRT and CCW argue that diversity solutions to higher education challenges regarding race must move beyond simply increasing the number of students of color. Instead, diversity initiatives must be intentional in addressing issues pertaining to campus climate and competency as expressed through faculty, staff, and administrators. The goal then is to unearth ingrained racially discriminatory ideologies to create more diverse and inclusive campuses so African American students can fully prosper.

Moreover, through CRT research participants tell stories from their own perspective, their own narratives, and their own points of view and not from the researcher's interpretation (Bell, 1995). This format works especially well with interpretative phenomenological analysis because this analysis provides space for the researcher to gather detailed narratives from individuals that are personal and representative of their experience (Smith et al., 2009). These personal narratives provide space for the researcher to better interpret integral experiences through questions that encourage the participant to openly make meaning of lived experiences within particular contexts (Smith et al., 2009).

Specifically, it has been found that African American students are more inclined to segregate themselves at PWIs in response to perceived and actual forms of racial microaggressions by White students (Feagin et al., 1996). This in turn leads African

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American students to feel a sense of alienation from the general campus community (Feagin et al., 1996). Critical Race Theory moves to critically examine, push against and breakdown racially oppressive environments. Therefore, a change in the PWI campus culture would move to improve the collegiate experience of all students. Additionally, this change in campus culture would also benefit staff, faculty, and administrators as diversity is reflected in the creation and promotion of a deep rich learning environment that celebrates a range of cultures and experiences. Community cultural wealth demonstrates how engagement in ethnic organizations and campus activities contributes to a sense of belongingness, encourages persistence, and contributes to a sense of satisfaction within the campus community (Bourke, 2010).

In all, CRT and CCW provided a frame for this research that specifically identified the most ideal approach to answering the research question through the use of open-ended semi-structured interviews in order to gather the stories and views of African American STEM alumni who attend a southern PWI. Through these experiences, solutions can be developed to improve the experiences of both current and future students.

Participants

Participants in this study were 10 African American STEM alumni selected from the University of South Carolina (UofSC), who graduated no more than ten years from the start of the study. The perspective represented by this group of participants informed an understanding of the aspects of the African American STEM educational, co-curricular, and campus experience which are deemed most impactful following post-undergraduate completion. Moreover, this study amplified African American STEM

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alumni persistence and achievement. It focused on enablers of African American STEM alumni achievement using a methodology that takes an anti-deficit achievement approach to analyze African American STEM alumni from the UofSC at different stages including undergraduate attainments into science research and industry careers (Harper, 2010).

Findings

Study findings include that African American STEM alumni from the UofSC were motivated to pursue studies at the institution based on the University being in close proximity to family in addition to having a lower financial burden as a result of in-state tuition benefit. Additionally, strong recommendations by friends and family also served as a motivator to pursue studies at the University. The study also found that although highly motivated to attend the UofSC, many African American STEM alumni encountered academic challenges in transitioning from high school to college, particularly as it pertained to STEM courses. The significant influence of faculty/teaching instructors on student experience was also illuminated by both positive and negative interactions. Similarly, the significant influence of positive and negative interactions with administrative personnel on student experiences was also revealed through the study. To best adapt to curricular and campus climate transitions, the study found that bonds formed with like-minded individuals contributed to positive experiences for African American STEM UofSC alumni. Finally, a significant finding from the study noted that transition from undergraduate experience to continuing education or the workforce were positive, negative, and indifferent. A majority of the transition experiences were positive due to undergraduate internship participation.

Conclusion

In accordance with the literature review, as detailed in Chapter Two, there are several areas of institutional practices that higher education institutions should pay careful attention in order to enhance the undergraduate experience of African American STEM students. These include improving the high school to college transition experience for African American students, creating more inclusive environments for diverse students, institutionalizing culturally competent mentorship, advisement, and tutoring support efforts, and diversify the curriculum.

The aforementioned activities are recommended by the researcher to be implemented both within and outside of each academic unit and should be led by students and alumni within any respective major. Moreover, diversity initiatives must be intentional in addressing issues pertaining to campus climate and competency as expressed through faculty, staff, and administrators. The goal then is to unearth ingrained racially discriminatory ideologies to create more diverse and inclusive campuses so African American students can fully prosper.

CHAPTER 2
REVIEW OF THE LITERATURE

Chapter One introduced this study that explored how African American STEM alumni from the University of South Carolina (UofSC) experienced their undergraduate education and what specific experiences they attributed to their current status. This chapter and the proceeding sections provide introduction and discussion of the foundational concepts and literature surrounding this topic. Chapter Two serves as the context and basis for why this study was important and fills a void in the current literature.

History of Higher Education, the Sciences, and Career Development

From the early 1600s when US colleges and universities were first founded to today, higher education has moved beyond being perceived as an elite privilege to being viewed as a critical career resource (Bogue & Aper, 2000). Some of the first American colleges offered a broad liberal arts curriculum that focused on divinity and educating young Puritan ministers. In the 17th century, Harvard University graduated over 60% clergymen, by the 19th century this was reduced to around 10% (Bogue & Aper, 2000). During the 1800s higher education attendance interest grew based on the large numbers of working-class individuals, the increased social status attendance provided, and the increased earnings potential (Thelin, 2019).

Higher education has evolved beyond the traditional liberal arts curriculum and seminary schools to encompass science and vocational trainings. The development of subcultures and social networks between students grew as attendance grew (Thelin, 2019). Secret societies, athletic organizations, written production organizations and a host of other activities provided positions of power and affluence for attendees (Thelin, 2019). Moreover, during this time, colleges and universities also experienced significant drop-out rates and lower levels of bachelor's degree completion (Thelin, 2019). President Woodrow Wilson critiqued the over-emphasized shift in student and institutional focus on social activities at the expense of academic rigor. Thelin (2019) found this to be in conflict with the ideals of higher education which now promoted conformity while discouraging innovation. This gave way to the launch of student affairs to provide more control and oversight during the late 1800s and early 1900s (Thelin, 2019). During this evolution, higher education institutions built intentional relationships with the workforce industries and drew funding from private sector relationships to develop an educated workforce (Golden & Katz, 1998). Around the year 1910, fewer than five percent of Americans ages 18-20 attended college. Administrators largely marketed and recruited from private high schools that served as feeders to ensure their student body was prepared academically for a college classroom (Thelin, 2019). By the early 1950s course offerings expanded to include both the arts and sciences.

As part of this evolution of higher education, public research institutions shifted from a secular focus to a practical focus. An early advocate of this expansion of higher education was United States President Thomas Jefferson. He urged America to support and contribute to a more educated citizenship base as the growing economy and market

sectors required a more skilled workforce. Jefferson's suggestion was heeded as United States President Abraham Lincoln approved the Morrill Land-Grant Act, which donated public lands to states for the development of colleges and universities that focused on agriculture and mechanical arts (American Council on Education, 2017).

With the Morrill Land-Grant Act, there came a surge in the establishment of new universities. In 1800, there were only 23 higher education institutions and by 1897 there were 821 (American Council on Education, 2017). Moreover, these institutions focused on workforce mandates in demand at the time, including the promotion of agriculture, science, and technology, along with the expansion of liberal arts education to include applied and social sciences. Attending college was now becoming an experience that was central to the American way of life (Thelin, 2019)

As the early 20th century approached, the higher education landscape continued to focus on workplace skills development in industrial production. As a result, chemistry and physics departments grew exponentially in response to this demand for trained scientists (American Council on Education, 2017). Campus-life and co-curricular experiences outside the classroom became a national interest and an effective marketing tool with school colors, theme songs, university clubs, and mascots creating a sense of community and exclusivity that connected students and alumni (Thelin, 2019). The formation of student unions and athletics diversified interested in attending higher education, but institutions continued selectivity in an effort to remain homogenous (Thelin, 2019). A well-rounded educational experience was considered critical to workforce development which relied on skilled and literate staff. Over the past decade

there has been increasing calls for higher education institutions to better prepare students for post-undergraduate experiences.

Large bodies of work explore the correlation between earnings gained and college education (Pascarella, 2008; Pascarella & Terenzini, 2005; Paulsen, 2001; Toutkoushian & Paulson, 2016; Wolniak, Seifert, Reed, 2008; Zhang & Thomas, 2005). As most employment sectors require a 2-year or 4-year degree, attending college has been socially normalized as part of the career spectrum (Kurtzleben, 2014). While college/university attendance is often viewed as a life goal, it has been increasingly seen as the primary factor in student preparation for employment and participation in the workforce. Of particular interest in this study was the experiences of African American STEM alumni, during their tenure in higher education, and their career development.

History of African Americans in Higher Education

Historically, colleges and universities were primarily comprised of upper-class white males, even after the establishment of women and minority colleges following World War II. While the cost of attending college saw little change between the years 1890 and 1910, attending was still cost prohibitive for racialized minorities and women with white men receiving higher wages and higher status-oriented employment opportunities (Thelin, 2019). However, two major events increased minority access and participation in higher education. These events included the GI Bill and the Civil Rights era (Golden & Katz, 1998).

The GI Bill was a postwar education initiative to assist service members, veterans, and their dependents with becoming re-tooled while easing the economy back into

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normalcy (Herbold, 1994). At the time, the GI Bill paid for the college education of eight million returning servicemen (Golden & Katz, 1998). As the GI Bill changed the historic college student body, in doing so, it removed a major cost barrier to accessing higher education. Moreover, the GI Bill was perceived to have linked higher education to the "American Dream," and what was perceived by many to be an improved life. By providing aid, the federal government took on the obligation of supporting higher education and ensuring equality to access.

As a point of diversification, college attendees from lower socioeconomic groups were finally represented on campus. Enrollments doubled in the 1940s from over 1.4 million to over 2 million in the 1950s including a surge in veteran enrollees (Golden & Katz, 1998). While this initiative would appear to address access disparities beyond class to include race, African Americans were unable to access GI Bill benefits due to continued discriminations. Howard and Fisk Universities committed to developing knowledge, skillsets, and leadership development for African Americans (Thelin, 2019). Those who were able to access benefits were encouraged to pursue training for menial jobs. Frustration at being segregated into career paths by the GI Bill also influenced the Civil Rights Movement (Herbold, 1994).

It was not until the Civil Rights movement that student diversity at colleges and universities increased African American participation. The idea of multiculturalism evolved from a pledge to integrate African Americans in higher education to action (Herbold, 1994). This recognition spoke to the necessity that having a culturally diverse student body enriches the educational experience for all students. Commitments to diversity inclusion at the higher education level were then exhibited through affirmative

action policies (Herold, 1994). Additionally, the landmark *Brown vs. Board of Education* decision marked the end of legal segregation in public accommodations, particularly schools, and is often lauded as a triumph for racial reconciliation (Tate, Ladson-Billings, & Grant, 1993).

Affirmative action is a policy designed to level the playing field of applicants, or in this case perspective college enrollees, through the provision of special advantages to students who encountered more challenging paths to higher education as a result of discrimination. Affirmative action greatly benefits African Americans in terms of access to higher education, but this legislation become controversial in the twentieth century. By the 1990s at least three states, California, Washington, and Texas, did away with affirmative action calling the policy a form of reverse discrimination.

As some equity and access opportunities have been stripped from prospective African American college students, those enrolled have historically faced challenges inside and outside the classroom as well as in their post-undergraduate development (Harper, 2009). Very limited information is known of how African American college students experience higher education, how they overcome challenges in and outside the classroom, or the sociopolitical strategies used by those who overcome the odds and defy racial stereotypes in higher education (Harper, 2009). Instead, many higher education empirical research studies focus primarily on minoritized student challenges and failures. Moreover, researchers have written much less on students who persist and successfully matriculate.

Attempts to address these racial higher education literature limitations include leading academicians such as Shaun Harper, Gloria Ladson-Billings, William Tate,

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Daniel Solorzano, Tara Yosso, and a host of others. These critical race and community cultural wealth theorists examine phenomena in higher education that draw attention to ongoing racial inequities, racialized experiences of minoritized students, and other topics related to African American student success. Moreover, Critical Race Theory and community cultural wealth have proven useful in these analyses to explore the contextual nuances of African American experience in higher education. Critical Race Theory and community cultural wealth are also useful frameworks to examine the experiences of African American students in STEM majors.

STEM and the African American Pre-collegiate and Collegiate Experiences

Riegel-Crumb, King, and Irizarry (2019) found that STEM disparities persist from high school. White students often receive more academic opportunities in K-12 education than African American students, which prepare high school graduates for coursework in the field (Kelly & Price, 2011). They also are given more advanced opportunities outside the classroom in relation to their African American peers, which positions them at a greater academic advantage when entering college (Lewis & Diamond, 2015). African American youth are often deterred from enrolling in advanced preparatory coursework (Lewis & Diamond, 2015). This deterrence sets African American high school graduates interested in STEM studies at a disadvantage upon entering college as an individual's pre-college demographics, including characteristics like social class, are often associated with persistence in STEM majors by race (Arcidiacono et al., 2016; Griffith, 2010). Subsequent research revealed racial and ethnic differences in academic preparation as a contributing factor to differences in STEM persistence (Chang et. al., 2014; Price, 2010; Seymour & Hewitt, 1997). Moreover, these

high school achievement gaps significantly impact collegiate transition experiences in STEM studies as these majors typically require that entering students have already mastered certain skillsets and prerequisites (National Academies of Science, Engineering, and Medicine, 2016).

Previous studies suggested African American undergraduate students depart from STEM majors at higher rates, relative to their White counterparts (Chang, Sharkness, Hurtado & Newman, 2014; Eagan, Hurtado, Figuera & Hughes, 2015). In a study of Ohio public universities, more than 60% of White STEM majors remained STEM majors through their third year of college while only 48% of African American students remained (Price, 2010). Additional studies also reflected similar disparities in STEM persistence (Chang et al., 2014; Eagan et al., 2015; Griffith, 2010). Even more concerning, around 40% of White students who elected to major in STEM received their degree while only around 22% of African American students in STEM successfully graduated (Eagan, 2015).

Classroom and Workforce Experience Perceptions by Undergraduate Alumni

Working in a job that corresponds with the bachelor's degree attained increases earnings between 10% and 13% (Robst, 2007). Alumni perceptions of higher education experience has primarily hinged on experiences within the classroom (Ness, 2003). Volkwein and Cabrera (1998) found that academic activities contributed tremendously to post-undergraduate experiences. Prior to this, Tinto (1997) found that college classrooms were a focal point where social and academic experiences intersect. These social and academic experiences influenced alumni post-undergraduate experiences.

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An analysis of data collected by the Cooperative Institutional Research Program (CIRP), encompassing over three hundred postsecondary institutions in the United States, revealed that academic activities such as classroom engagement influenced alumni post-undergraduate experiences (Astin, 1977). Because these studies did not differentiate between race and ethnicity, a critique of this research is the inability of the findings to be generalized to select racial and ethnic groups. There is a need to further research on experiences of African American students with these activities and their perceptions of these experiences. Post-undergraduate experiences have been studied in various ways including immediately following each classroom experience or several years after the course has occurred. Alumni recollections of classroom experiences can provide a holistic view of the collegiate experiences, which can then be balanced by employment experiences, which studies of current students might overlook in analyzing higher education experiences.

Prior research conceptualized classroom experience according to various factors. These factors are used then to define perceptions of course experience and include 1) perceptions of quality of classroom discussions, 2) perceptions of knowledge of faculty, 3) perceptions of approachability and friendliness of faculty, and 4) perceptions of class size (Chadwick & Ward, 1987). Additionally, 5) perceptions of the use of diverse instructional approaches, and 6) perceptions of institutional concern for student well-being are common factors explored during post-undergraduate experiences research (Graham & Gisi, 2000). While many use similar factors to measure alumni post-undergraduate experiences, such as the aforementioned, additional variables of interest include measuring post-undergraduate experiences with 7) their perceived intellectual

growth and 8) social engagement and meeting people (Knox, Lindsay & Kolb, 1992). These factors connect with elements of community cultural wealth. The unique identities and educational experiences of students of color are left out of this exploration. A look into how race impacts classroom experience, using community cultural wealth, is critical to explore if post-undergraduate experiences are impacted by racial identity.

Undergraduate Community Cultural Wealth and Post-undergraduate Experiences

Mentor programs, peer support groups, student organization participation, internships, study abroad, service learning, career services, practicum and other co-curricular initiatives are a common part of the undergraduate experience that provide hands-on practical engagement and pre-employment experience. Clotfelter (2003) noted that alumni post-undergraduate experiences are linked to particular types of experiences alumni have while on campus as students. Nine out of 10 four-year colleges now offer some type of field experience, internship, practicum or structured work program related to students' post-undergraduate interests or majors (Gault et al., 2000). The experiences of African American students with these opportunities need to be further explored using a community cultural wealth lens. Specifically, how African American alumni make sense of their undergraduate experiences at predominantly White institutions (PWI), and what specific undergraduate experiences contribute to career development must be examined.

Many African American high school graduates anticipate attending college to maximize earnings potential. As of 2010, 66% of African American females earned their baccalaureate degrees alongside 34% of African American males (Kim & Hargrove, 2013). In noting the significant difference between African American male and female baccalaureate completion, the literature concludes that African American males are much

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more unlikely to find peer support groups beyond same-race groups at PWIs, and these types of supports are needed to increase their post-undergraduate experiences with collegiate experience (Strayhorn, 2008). Active engagement is also critical to the higher education experience. While African American females were more often found to be engaged in activities on campus, participate in service on various campus committees, and hold leadership roles across while in college, African American males did not (Cuyjet, 2006). Again, community cultural wealth, and its experiences with such need to be further reviewed.

Connections between co-curricular experiences and workforce experiences remains a mystery in educational studies on matriculated undergraduates let alone African American graduates (Terenzini et al., 1994). As key stakeholders of higher education, it becomes imperative that students, higher education administrators, policy makers, and researchers develop a keen understanding as to how specific college experiences impact social and economic expectations and post-undergraduate experiences for students and alumni, from diverse backgrounds. Exploring these nuanced experiences using community cultural wealth provides this opportunity.

Ross (2014) found that over 12 percent of African American graduates between the ages of 22 and 27 were unemployed while the average for all college graduates was 5.6 percent. Overwhelmingly, research points to persistent discrimination in the labor market (Ross, 2014). According to renowned sociologist David Wellman, unemployment for all African American men increased relative to that of Caucasian men, however it increased significantly for African American men with college degrees. During the late 1960s and toward the end of the Civil Rights Movement the

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unemployment for African American and White men was the same. However, in the 1980s African American men with college degrees were three times more likely to be unemployed in comparison to their White counterparts (Brown, 2013). So how is unemployment disparity explained according to race and what are the experiences of recent African American STEM graduates attempting to transition after completing their undergraduate degree?

Little research has been conducted to determine the specific post-undergraduate experiences of higher education on African American students, and the contributing factors to positive alumni professional and economic perceptions, for African Americans, after undergraduate completion. Federal and state funding has subsidized student experiences to increase accessibility and affordability for long term post-undergraduate experiences that deem higher education as a value to society through the contributions of well-trained citizens. Moreover, higher education has come under scrutiny as federal and state governments examine higher education post-undergraduate experiences, high student debt, return on investment (ROI) through student funding provisions, and alumni quality of life. Additionally, higher education has been criticized as alumni occupy employment positions that do not require a degree or unemployment persists as sectors identify skills gaps between recent graduates and company entry level needs. The inability of some colleges and universities to demonstrate and/or articulate post-undergraduate experiences has led to divestment in higher education and political movements including the "Student Right to Know Before You Go Act" and the "College Scorecard" (Block, 2013). However, a closer look at the functions of higher education and the workplace reveal the challenges for colleges and universities to ensure that

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students are prepared for the workforce. Reasons for such difficulty have included university learning and activities tending to be more individual focused while post-undergraduate settings are social and cooperative. Additionally, university curriculum, at times, can be broad while workforce settings are task specific.

Since the early 1990s some research has explored the relationship between postsecondary education and post-undergraduate advancement (Brewer, Eide & Ehrenberg, 1999; Dale & Krueger, 2002; Rumberger & Thomas, 1993; Weisbrod & Karpoff, 1968; Wise, 1975). Much of this work has solely focused on economic post-undergraduate experiences including financial returns or earnings in comparison to college majors and/or institutional ranking in addition to the selectivity of the institution (Lui et al., 2010). A theoretical examination into this also revealed a framing of higher educational post-undergraduate experiences using the human capital theory, which purports that students' decision regarding educational pursuits are driven by perceived costs and benefits or returns (Becker, 1964; Paulsen, 2001; Toutkoushian & Paulsen, 2016).

In 2007, the American Association of Colleges and Universities published a report on the most effective activities that contribute to student learning and success (Kuh, 2008). Within this report, programs such as diversity learning, global engagement, undergraduate research, service-learning, capstone experiences, and internships were noted as being the most effective activities. In support of these activities, employers have agreed that recent graduates who have participated in activities such as community volunteering, interning, senior thesis, or group problem solving tasks are more prepared for post-undergraduate tasks, roles and

responsibilities (Hart Research Associates, 2013). The literature goes on further to note that there is a strong correlation between activities alumni engage in during college and what they cite as being the most influential in their learning and development as students (Astin, 1993; Chickering & Gamson, 1991; Hu & Kuh, 2003; Pascarella & Terenzini, 2005). However, the extent to which this correlation reflects in post-undergraduate experiences is minimal. Even further, the nuanced ways in which this correlation is explored, considering critical race and community cultural wealth, is minimal.

Significantly less research has explored post-undergraduate experiences for college graduates as it pertains to collegiate experiences and activities of engagement (Hu & Wolniak, 2013). Few studies have focused on the impact of higher education or on perspectives regarding non-monetary facets of jobs including promotions, outcomes, benefits, and work conditions (Liu et al., 2010; Locke, 1976; Solmon, 1981; Wolniak & Pascarella, 2005; Zhang, 2008). Additionally, little has been researched regarding the non-monetary impact of higher education participation or post-undergraduate experiences and attitude for African American students. Critical race and community cultural wealth explorations provide for a more diversified and strengths-based look into the racialized experiences and persistence of African American STEM students and their post-undergraduate experiences in answering the research question of how do African American STEM alumni from the University of South Carolina make sense of their undergraduate experiences at the predominately White institution (PWI), and what are the post-undergraduate experiences.

The Gallup's Education and Workforce Development's 2015 alumni survey found that 43% of African American graduates from non-historically African American colleges and universities felt they were "thriving" with positive "well-being" and over 50% of historically Black colleges and universities (HBCU) alumni felt they too were thriving and experiencing a positive well-being post-undergraduate college graduation. Financially, however, 29% of African American graduates from non-HBCUs felt their financial well-being was prosperous compared to 51% of HBCU graduates (New, 2015). Research that has been conducted on the experiences of students of color and higher education post-undergraduate experiences include studies by Hu and Wolniak (2013). Hu and Wolniak (2013) examined early career earnings based on levels of college student engagement among students of color deemed low-income and high achieving. Variables controlled for in the study included major and institutional characteristics. Findings for students of color were significant in that positive earnings were observed in conjunction to social engagement. Astin's (1999) theory of student involvement suggests that student time is deemed by the student as the most valuable resource.

What undergraduate activities contribute to African American STEM alumni post-undergraduate experiences with their undergraduate time and their career development? The Association of American Colleges and Universities National Survey of Student Engagement defines key educational experiences as "high-impact activities." High-impact activities are organizational and structural practices that are effective in providing the most optimal learning and developmental impacts for students (Kuh, 2008). These include both academic and non-academic activities and

much research exists that explores the connection between undergraduate experience and post-undergraduate experiences post-college (Pascarella, 1985). Examples of high-impact activities include student-faculty research, study abroad, and capstone projects.

Astin's (1993) analysis of high-impact activities focused on factors pertaining to the environment that affect student participation and engagement while Pascarella (1985) additionally looks at the quality of effort. Secondly, the concept of socialization and "interactions with agents" is explored in Pascarella's (1985) model, while similar activities in an additional model from Weidman (1989) connects aspects of how undergraduates socialize with career choice decision making as a vital aspect of high education post-undergraduate experiences. Recent findings from the National Survey of Student Engagement examined the correlation between high-impact activity participation and career ambitions, employment research and acquisition (Kuh, 2008). Miller et al. (2015) more recently examined correlations between seniors in college who participated in high-impact activities along with post-undergraduate aspirations including securing employment, employment that has already been secured and those who planned to pursue additional postsecondary education.

While the results of this examination need to be replicated, it is considered highly possible that being active in high-impact activities contributes to aspirations surrounding education and future career decision-making (Miller et al., 2015). Moreover, to generally apply assertions of high-impact activity effectiveness it has been critical to explore how these activities impact racially minoritized students

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(Foertsch et al., 1997). Therefore, critical race and community cultural wealth must be used in this analysis.

Researchers noted that for programs and practices to be meaningful, the construction and implementation must consider diverse backgrounds, environments, and identities of students who participate (Hathway, Nagda, & Gregerman, 2002). To improve the effectiveness of the higher education experience, programs, and services it is critical that an integration of students' backgrounds, as a reflection of diversity, be incorporated (Tierney, Colyar, & Corwin, 2003). Subsequent research supports this assertion as Museus's (2014) Cultural Engaging Campus Environment model calls on the creation of campus communities that are culturally engaging to improve student success in post-undergraduate experiences.

Although the literature is expansive when it pertains to the importance of engagement in higher education, limited research exists on the impacts of African American students' experiences on post-undergraduate development. Hu and Wolniak (2013) explored how collegiate experiences affect early career earnings. Although some research shows that experiential learning opportunities and internships have positive effects on persistence and matriculation post-undergraduate experiences (Anderson, 1981; DesJardins, Ahlburg, & McCall, 1999; Luzzo, McWhirter & Hutchenson, 1997; Velez, 1985), few extend this research beyond graduation to include post-college, career, economic post-undergraduate experiences and the like (Hu & Kuh, 2003; Carini, Kuh & Klein, 2006; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). Conducting research into the correlation between college experiences and post-undergraduate experiences is critical to provide more concrete evidence on the value

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placed on higher education and specific experiences to promote intentional engagements in areas, deemed by alumni, as contributing positively to experience and post-undergraduate experiences.

Unless higher education institutions examine post-undergraduate experiences beyond retention and graduation rates, for African American students, the relevance of higher education will continue to be questioned. A strength-based approach to the exploration of how African American alumni experience higher education and factors that contribute to post-undergraduate experiences will serve well to improve the holistic experience of students, through a myriad of activities and thus improve employability experience and post-undergraduate status.

Undergraduate Experience and Campus Climate

Continued studies illustrated ongoing patterns of racial discrimination against African American college and university students both in and outside the classroom (Solorzano, Ceja, & Yosso, 2000). Campus racial climate is considered the overall racial environment of a university or college campus (Solorzano & Yosso, 2000). Studying the university racial atmosphere is a critical part of exploring higher education accessibility, persistence, and matriculation. In doing so, researchers have identified four criteria to categorize a higher education climate as racially positive. The criteria included 1) the inclusion of students, faculty, and staff of color, 2) a curriculum that reflects the previous and current experiences of people of color, 3) programs and services that encourage the recruitment, retention and matriculation of students of color, and 4) a higher education mission that that illustrates the college or university's commitment to diversity (Solorzano & Yosso, 2000). Therefore, racial climate in its negative form does not reflect these four criteria. Moreover, a negative campus climate that is also considered

non-supportive is associated with poor academic performance and higher dropout rates for African American students (Allen, Epps, & Haniff, 1991; Benjamin & Carroll, 1998; Hurtado et al., 1998). A look at microaggressions and race is explored in the next section with respect classroom experiences.

Racial Microaggressions in Collegiate Classroom Settings

Solorzano et al. (2000) found that African American students reported racial microaggressions in classroom settings. These findings included tense race climates both in and outside the classroom. Specifically, students detailed feelings of invisibility. Also, African American students reported feeling like a "number," and based on being the minority in class number, there concerns were often minimized or ignored. With regard to the curriculum focus, students reported that African American stories and histories were often times distorted, omitted, or stereotyped in content presentation (Solorzano et al., 2000).

Interviewees reported that racial microaggressions in student-faculty interactions included instructors, at times, displaying low expectations of minorities and accusations of cheating and/or plagiarism, in some cases, where minorities excelled on assignments. These situations often caused students to feel a sense of self-doubt in their performance (Solorzano et al., 2000). To counter this the African American students stated the importance of having other African American students in classes to contribute supports against microaggressions and other stereotype threats (Solorzano et al., 2000). This continued questioning of African American student intellect permeated in student group work as well. Students interviewed in the study shared instances in which non-African

American classmates isolated African American peers due to perceptions of intellectual inferiority (Solorzano et al., 2000). Blatant racism was also noted in African American student experiences. An African American student experienced being told directly she was not a desirable academic partner because she was African American (Solorzano et al., 2000). Additionally, some White colleagues assumed that African American peers were beneficiaries of affirmative action. These implicit and explicit racial biases of White peers create challenging environments for African American students. African American students feel racially conscious, diminished, defensive and drained by these microaggressions (Solorzano et al., 2000). These racialized microaggressions extend outside the classroom into campus experiences noted in the next section.

Racial Microaggressions Outside Academic Settings

Through student interviews conducted by Solorzano et al. (2000), negative collegiate experiences were documented outside the classroom. African American students reported feeling uncomfortable racial tensions as a result of microaggressions (Solorzano et al., 2000). Specific examples of these racial microaggressions included White faculty expressing feeling unsafe upon seeing African American students walk the hall and locking their office doors. Further, African American students reported feeling as if their presence was not wanted in non-classroom settings, including places like the library. In one instance, African American students reported receiving long and uncomfortable stares in going to the library to study during the evening (Solorzano et al., 2000). These instances define negative racial climates and contribute to African American students' lack desire to access student services on their campus. One can

image how these experiences negatively impact the learning, social, and positive development experiences of African American students in a collegiate setting.

Both within and outside the classroom setting, it can be noted that racial microaggressions are syphoned through various racial stereotypes (Solorzano et al., 2000). That is, generalizations are used to justify deficiency-focused perceptions about all African American students, while positive attributes are considered exceptional cases amid the African American group's overall failure (Solorzano, et al., 2000). Such considerations make for and anxiety-driven environment that makes learning and engagement challenging for African American students.

Racial Microaggressions in Collegiate Social Spaces

Beyond the classroom walls and halls racial microaggressions permeate in social spaces, which make for discomforting experiences for African American students on collegiate campuses (Solorzano et al., 2000). Students report that they often feel the target of safety protocol instead of being protected by the procedures. For example, African American students report that they feel monitored wherever they go, unlike their White counterparts (Solorzano et al., 2000). They also feel that more overt racist practices take place in social settings including extracurricular activities and parties. Racialized experiences both in and outside the classroom contribute to negative educational experiences, which can impact African American students (Solorzano et al., 2000).

Impact of Racial Microaggressions on Collegiate Experience

The previously mentioned higher education experiences place enormous negative stress on African American students. The impact of such experiences includes isolation, frustration, and self-doubt (Solorzano et al., 2000). Experiencing the above implicit and explicit biases places tremendous stress on African American students, all while they endeavor to perform in the classroom. African American students in the 2000 study lamented the pressures to maintain good grades all while dealing with social and emotional challenges stemming from racism (Solorzano et al., 2000). Some African American students described anxiety-driven considerations for accessing student support services including advisement and faculty support (Solorzano et al., 2000). Additionally, the negative impact of racial microaggressions on African American students included the pressure to be a representative of their entire race in classroom and public settings, and the fatigue such pressures bring. This left some African American students feeling as if their academic performance had been negatively impacted (Solorzano et al., 2000). Some African American students admitted changing their majors due to negative racial climates on campus, nearly dropping out of school, and transferring to historically African American colleges (HBCUs) due to racism (Solorzano et al., 2000). While some African American students succumbed to the pressures of negative racial campus climates, some rose above and endeavored to beat the odds. To navigate through the racial challenges and experiences they encounter, African American students have developed coping mechanisms and counter strategies to persist beyond racial microaggressions.

Creating Counter-spaces to Address Racial Microaggressions in Collegiate Settings

To counter the negative racial climate African Americans experience in collegiate settings, some have developed "counter-spaces," both on and off campus (Solorzano et al., 2000). These demonstrate and speak to community cultural wealth. These spaces serve as a haven where African American students can challenge racial biases and notions of collegiate deficit while creating a positive racial climate that celebrates diversity (Solorzano et al., 2000). These spaces are established within student organizations for African Americans, offices that provide services for multicultural students, fraternities and sororities, peer groups and African American curricular groups. Additional spaces include those established by African American faculty in classroom settings (Solorzano et al., 2000).

The positive impact of these academic counter-spaces, as community cultural capital, is that African American students are able to foster their own personal learning in supportive and nurturing settings where their experiences are made valid and considered vital contributions to knowledge (Solorzano & Villalpando, 1998). Moreover, this community of cultural wealth permits African American students the opportunity to share challenges with others who have similar experiences in addition to connecting on these and other supports and challenges (Solorzano & Villalpando, 1998). Examples of these counter-spaces included African American themed dormitory floors, intentionally seeking out minority staff for student services, and joining African American fraternities and sororities (Solorzano & Villalpando, 1998).

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Additionally, African American interviewees reported community cultural wealth practices in forming African American study groups to improve academic performance and noted that the additional benefits of such study groups include building genuine community support, establishing intentional friendships, and sharing cultural experiences (Solorzano & Villalpando, 1998). It cannot be understated that through their position of marginality on college campus, these African American students were resilient and created academic and social counter-spaces to improve their collegiate experience (Solorzano & Villalpando, 1998). These recollections of the different academic road that African American undergraduates travel lends itself in the critical discussion around the successes of African American alumni and the contributing factors to their persistence in order to improve their academic and social conditions while using a strengths-based lens (Jones & Schmitt, 2014). Next, the specific racial experiences of STEM students are explored in the literature.

Racialized Student Success in STEM

Prominent researchers emphasized the significance supports like intentional social and curricular integration contribute to positive student outcomes (Tinto, 1993). When compared to their White and Asian peers, African American students at PWIs are more likely to experience challenges integrating both inside and outside the classroom (Cole & Barber, 2003; Nettles, 1991). Although many African Americans have attended colleges and universities with the intent to acquire a STEM degree, a limited number successfully complete foundation coursework (Triesman, 1992). As this study aimed to take a strengths-based approach, the endeavor was to unearth and focus on the success of those students who persist and what contributing factors permitted this persistence. Some

strengths-based research in this area revealed that creating on-campus communities of intellectual shared interest, assists students with social and academic integration (Treisman, 1992). This also includes a collective of strong African American students reduces the likelihood of racialized marginalization and promotes positive student outcomes (Fries-Britt, 2000; Gandara & Maxwell-Jolly, 1999).

Of additional concern for African American STEM students is their knowledge and skill development including aptitude and critical thinking which are critical for successful matriculation and overall achievement (Astin & Astin, 1992; Bonsangue & Drew, 1995; Springer, Stanne, & Donovan, 1999; Treisman, 1992; Barlow & Villarejo, 2004). To address these concerns explicit curricular design has been found to be effective (Bennett et al., 2004). Having a curriculum that is specific and unambiguous provides more African American students the opportunity to focus on the learning and encourages the further development of skilled abilities that are important to academic success (Bennett et al., 2004; Gordon & Bridglall, 2006). Supplemental supports in collegiate settings is examined in the next section.

Additional Supports in Higher Education

The development and use of effective study habits as well as the targeted use of resources on campus have been found to promote success in students' academics (Bridglall & Gordon, 2004; Gandara & Maxwell-Jolly, 1999). Furthermore, study groups are also utilized to encourage robust study habits in addition to growing additional strengths ranging from effective communication skills around course instruction and improving outcomes through peer sharing (Bennett et al., 2004). Moreover, peer study groups permit students to discover that success in academics does not solely need quick

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problem-solving skills, but persistent problem-solving skills (Bennett et al., 2004). The comfortability of African American students to engage in the above recommended strategies are important to explore from the PWI experience.

Subsequent higher education supports including familial, financial, faculty, institutional, and self-motivating strengths have been identified as critical for minority student achievement. Because STEM coursework requires a significant allocation of time, it has been found that students who are STEM majors find it difficult to complete assignments when balancing competing priorities like outside work; and so provisions of scholarships and other funding have become necessary to ensure their success (Callan, 1994; Garrison, 1987).

Ongoing assistance for STEM majors is necessary as students throughout higher education institutions describing encounters with teaching faculty as off-putting, elitist, and unsupportive (Newman, 1998). A need to balance these challenges pertaining to learning in STEM calls for solid supports ranging from faculty engagement, to intentional research opportunities, along with curriculum-focused peer groups, in addition to engagement with university staff, mentorship, and tutoring (Astin & Astin, 1992; Barlow & Villarejo, 2004; Doolittle, 1997; Fries-Britt, 1998; Grandy, 1998; May & Chubin, 2003; Seymour & Hewitt, 1997). Additional systems of support ranging from fellow peers, family members, mentors and role models, university personnel, are critically important for racialized student persistence (Grady, 1998; Herndon & Hirt, 2004; Fries-Britt, 2000). Additional research discovered that racialized students who said support from minority role models, fellow peers in their racialized ethnic groups, along with

assistance from minority staff members at their respective college more likely contributed to their persistent in STEM by their sophomore term (Grady, 1998)

A final area found to contribute to racialized student success in the STEM sciences is advisement and monitoring. Advisement and monitoring have been found to assist STEM majors with course selection and progression, graduate study planning, life skills including personal life management, and the development and maintenance of healthy and productive relationships. This community cultural wealth model extends beyond universities' typical provision of orientation and academic advisement (Treisman, 1983). Moreover, the above interventions have been found to increase racialized student's scores in math as well as major retention (Treisman, 1983). Additionally, ongoing monitoring assists with the identification of signs and warning of potential coursework and personal problem that might negatively impact student retention. Additionally, proper advisement has been found to also provide benefits to racialized students through the provision of authentic assessment of strengths, challenges, and career advancement (Gandara & Maxwell-Jolly, 1999; Seymour & Hewitt, 1997). Engagement with those able to push and acknowledge the experiences of students and provide structure is critical for racialized student success (Terenzini et al., 1994).

Career Development Perceptions

Research in the 1980s sought to correlate classroom experience with occupational attainment. Making a connection between classroom experiences and occupational attainment, Menges and Kuliek (1984) noted that direct experiences in the classroom were critical to students achieving post-undergraduate goals and financial stability post-undergraduate. Whereas historical and traditional perceptions of higher education spoke

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of enlightenment and learning the philosophies of life, changing trends in the 1980s reflected that more students opted to attend college to improve their financial status (Menges & Kuliek, 1984). This gave more reason for higher education institutions to consider and implement strategies that promote workforce preparation (Menges & Kuliek, 1984).

A focus on colleges and universities preparing students for gainful employment and the post-undergraduate experiences of such preparation was the focus of studies such as Belcheir's in 2002. In a review of a decade's worth of exit interviews, Belcheier (2002) found that more recent graduates placed higher values on employment prospects when compared to earlier graduates. As previously stated, today's student cites the acquisition of a satisfactory job as their primary reason for attending college (Hartman & Schmidt, 1995). This sentiment is consistent across research. To explore more closely the alignment or misalignment with post-undergraduate expectations around career success, Vance in a 2007 review of the Association of American Colleges and Universities' (AACU) response noted that they too were concerned about the quality of graduate preparation for the global economy (Vance, 2007).

Pike (1994) explored the relationship between career post-undergraduate experiences and perception of education experience. In this study, alumni who shared perceptions of their careers post-undergraduate experiences were more likely to share positive experiences with their higher education experience; whereas those who were dissatisfied with their current careers were also dissatisfied with their higher education experience (Pike, 1994). Prior to Pike (1994), Smart (1986) found a correlation between perceptions of career post-undergraduate experiences among alumni.

Prior studies around perceptions of career post-undergraduate experiences for alumni, held responses to single items or variables (Chadwick & Ward, 1987). This limited circumstantial and environmental variances between students. Specifically, Chadwick and Ward (1987) used the method of factor analysis to determine occupational factors. Specific items included survey respondents answering questions as to whether their education prepared them for work or whether they felt their program held a good reputation. Separately, Pike (1994) utilized specific factors to explore occupational variables. These included 1) perceptions of wages, 2) perceptions of work-related duties and responsibilities and 3) if currently searching for employment.

More importantly, through his research design, Pike (1994) took into consideration the common nature for alumni to have negative perceptions regarding university community fit and that this level of fit can persist for lengthy period into post-undergraduate completion. Taking into account salary differentials and varied work expectations between non-students of color and students of color, it becomes critical to differentiate perceptions behind post-undergraduate experiences and experiences to account for gross differences between racial groups in order to balance sentiment and expectation. In relation to the African American student and alumni STEM experience, African Americans only make up 5% of the workforce and time and attention has been put forward to increase the number of African Americans both in college and in the workforce (National Action Council for Minorities in Engineering, 2013).

Career Development and Alumni Perceptions

Over the past few years "workplace readiness" has been of great interest as an outcome of higher education. Increasing precedent has been given to the subject and how the field of higher education has managed this expectation, in terms of graduate preparation for transition into the workforce. As the work environment has evolved, special attention is being paid to the skill sets identified by employers and alumni alike, that have been determined as being needed to move into the workforce. While not a new area of focus, workplace readiness and the identification of skills key to employment has been the focus of several major studies (ACT, 2015; Bentley University PreparedU Project, 2014; Casner-Lotto & Barrington, 2006; NACE, 2014; NACE, 2015b). Not to be confused with industry-specific skills, workplace skills are transferable. Specifically, workplace readiness is defined as an individual's possession of skills which are key to meet minimal qualifications for specific employment (ACT, 2015; Winograd & Hais, 2014; United States Department of Education, 2015).

The theory of vocational behavior looks at how personality development impacts attitude and decision-making (Holland, 1997). When the theory of vocational behavior is applied to experiences in education, students can undergo personality changes based on environmental factors that, in turn, have the potential to impact long term goals and attitudes. Selections of course of study and post-undergraduate goals evolve or become refined, through this theory, based on aspirations, interests, and values socialized in youth and either affirmed or adjusted in college; this then, shapes job attitude. The work of Holland (1997) guides exploration on education pursuits and career development as impacted environmental factors, which in turn impacts

perceptions of success. How African American STEM students navigate these developmental changes as part of their college experience leaves to question how this affects post-undergraduate experiences.

Research from the early 1980s through 1990 were the driving force behind advocacy for the need to clearly define broad skills necessary for the workforce. These studies included those conducted by the National Academy of Science in 1984, the Committee for Economic Development in 1985, and the Secretary's Commission on Achieving Necessary Skills (SCANS). In the National Academy of Science's research, a panel of representatives from the education, public sector, private sector, and government were convened to identify employability skills needed to be successful in one's career (National Academy of Science, 1984). The key competences identified by the team included the following: 1) strong oral communication, 2) computation, 3) science and technology, 4) reading and writing, 5) reasoning and problem-solving, 6) interpersonal skills, and 7) personal work habits and attitudes. In 1985, the Committee for Economic Development released the *Investing in our Children,* report which included an assessment that identifies professional traits including the following: 1) working well with others, 2) effective communication, 3) strong problem-solving skills, and 4) effective decision-making skills.

The 1990 Secretary's Commission on Achieving Necessary Skills (SCANS) was created around the need to concretely outline the characteristics needed to find success in the workforce. While it was found that college alumni were lacking skills necessary to complete in the workforce, the US Department of Labor noted commendations for institutions working directly in areas of career development and workplace readiness (US

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Department of Labor – Employment and Training Administration, 1990). The two studies provided the platform for more current research in the areas around students' professional development preparation and workplace competency expectations. The 2006 report *Are they really ready to work?* (2006), was organized by the Society of Human Resource Management, among others, and highlighted a series of applied skill sets and basic knowledge skill sets job candidates need to be successful in their careers. Some of these skills included: 1) teamwork and collaboration, 2) diversity, 3) creativity and innovation, 4) professionalism and work ethic, and ethics and social responsibility. Basic skills included: 1) English language acquisition, 2) reading comprehension, 3) strong writing, 4) mathematics and computation, 5) science, 6) government and economics general knowledge, 7) humanities and arts, 8) foreign language, and 9) geography.

Most often employers relay that the applied skills of critical thinking and teamwork/collaboration are the most vital for success in the workforce (Casner-Lotto & Barrington, 2006). It has also been noted that in addition to having a strong educational credentials, it is imperative that job applicants be able to analyze and synthesize information in additional to being able to work effectively as a team member (The National Center on Education and Economy, 2007). As the current economy is considered knowledge driving and information changes at a rapid-pace, employees are now expected to be immediately employable and for a consistent period. Workers are expected to maintain and build upon knowledge areas and skill sets that are specific to their area of expertise while holding broad skills, dispositions, and traits that can easily to mobile to various occupational settings (Bridgstock, 2009).

However, there appears to be a bit of inconsistency across the literature. Despite various studies noting the importance of career preparation in college, consistent language and terminology around this need varies. Also known as "key competencies," "transferable skills," or "core skills," developing a universal language, that is controversial given the interest and focus of higher education, seek critical in pushing the movement to better integrate career development in higher education forward (Kearns, 2001 and Mayer 1992). To create a more communal language and effort within the discipline, the National Association of Colleges and Employers (NACE) created a committee included corporate executives and college representatives tasked with developing a formalized employment process for recent college alumni. From this committee a group of stakeholders convened to define key character traits that if mastered would provide for a workplace ready college graduate. These competencies would then be integrated into a career services curriculum for all college and university partners of NACE. This effort has been deemed as one of the most successful efforts between industry and higher education in the preparation of graduates for the workforce (NACE, 2015).

The dispositional theory of job satisfaction speaks to the processing of educational experiences as they relate to outlooks and interpretations of career development and opportunity (Staw, Bell, & Clausen, 1986). The effect of individuals and the maintenance of such demeanor highlights a negative or positive tendency towards life and the evaluations thereof. These tendencies impact thought process on life. The way one's environment and environmental experiences are interpreted depends on one's disposition (Staw & Ross, 1985). The concept of "disposition" is

critical to conversations around college experience and post-undergraduate experiences to discern how and why persons perceive experiences and what causes these sentiments to change; feelings to work career are key to considerations around life and the quality thereof (Mirvis & Lawler, 1984).

Over 80% of participants in the "Prepared U Project," felt that college and universities needed to work more closely together with businesses to improve career service delivery (Bentley University PreparedU Project, 2014). Through collaboration on the development of consensus efforts for increasing the preparation of students for the workforce, additional communication lines have opened and constrictive boundaries diminished. This has been thought to be an effective strategy to close the gap between colleges and universities and the workforce (NACE, 2015).

Similar to the National Academy of Science, The Committee for Economic Development, and the Society for Human Resource Management the competencies overlap and are defined in detail. NACE defines *critical thinking and problem solving* as the capability to use reasoning that is sound to make decisions that address challenges. One who demonstrates strong critical thinking skills is one who spends time gathering the necessary information to make adequate preparation for response. One who is inventive, creative, and use originality are considered high valuable to employers (NACE, 2015). Moreover, critical thinking and creativity incorporate elements of innovation, which the workforces deem as the way forward in employee acquisition (Wegner, 2010). Today's workforce calls for employees to embody critical thinking skills to solves workplace challenges on demand including the ability to intuitively ask

questions, improve product development, or streamline service delivery (Schramm et al., 2008).

Oral and written communication constitutes the ability to clearly and concisely articulate ideas and engage the public effectively (NACE, 2015). These communications include written memos, letters, and technical reports (NACE, 2015). Used properly, strong oral and communication skills aid in project development tasks as well as project management and staff oversight (Wagner, 2008). Considered the foundation for organizational and business success, written and oral communication skills are considered one of the most critical characteristics for employees (Casner-Lotto & Barrington, 2006).

Workplace readiness speaks new employees' abilities to assume workplace roles and tasks with minimal training. As defined by NACE, workplace readiness is a competency that involves teamwork and collaboration (NACE, 2015). Both teamwork and collaboration are defined by one's ability to build relationships with clients and fellow peers and the ability to demonstrate cultural competency through these relationships (NACE, 2015). As teams form much of the basis for how the workforce is structured and functions within most levels of any organization (Wegner, 2010). Therefore, it is expected that new employees can work collectively, work effectively within a group setting, negotiate and balance between individual and collective needs and manage conflict well (NACE, 2015). Moreover, companies are seeking innovation through collaboration and teamwork to expand organizational outreach and capacity (Wegner, 2010). It is believed that the skill of being a team player, among diverse

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individuals, is critical to success in such complex and multicultural modern society (Olson, 2014).

The next competency that demonstrates workplace readiness is the ability to use and apply information technology skills. Demonstrating this skill includes the use of appropriate software and technical equipment to complete tasks (Bennett, 2011). With advancements in technology, the incoming workforce is expected to adapt and be able to use technology to provide service and solve challenges (NACE, 2015). The workforce of today must have advanced technical and professional skills. Moreover, it is estimated that annually, information technology services will grow around 6% (Bureau of Labor Statistics, 2010). Along with this growth industries rely on the development and application of sophisticated technologies. As baby boomers begin to retire (Judy & D'Amico, 1999).

From as early as the 1930 alumni post-undergraduate experiences research has been conducted (Graham & Cockriel, 1989). Prior to this, most graduates matriculated from private higher education institutions; as a result, accountability and transparency were not mandates (Pace, 1979). However, at the start of the 1930s, public institutions of higher education launched evaluative alumni surveys of graduating students. The leading institution that conducted what is considered the first alumni survey was the University of Minnesota in 1937 (Pace, 1979). Questions from this survey of undergraduate alumni centered on gathering information on post-undergraduate experiences with job acquisition. Additional assessment questions inquired as to changes with career status, perceptions with advancement opportunities from current career

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positions, perceptions with regard earnings, and the graduate's assessment of job relatability to the major pursued to their undergraduate career.

As apparent in the previously mentioned background and history of higher education post-undergraduate experiences studies, alumni studies have not exclusively been conducted by educational institutions. In the United States Department of Education's national study, alumni from higher education institutions who graduated between the years 1928 and 1935 were surveyed (Pace, 1979). Subsequently, in 1947 *Time* Magazine completed a national study of over 17,000 undergraduate alumni from the over 1,000 institutions who participated in the study. Areas of focus for the *Time* magazine survey ranged from gathering feedback on perceptions of course experience and career acquisition to name a few (Pace, 1979). Moreover, alumni experience surveys have primarily centered on post-undergraduate experiences and have also included questions on cognitive and affective sentiments.

Indicators of Alumni Perceptions

Historically, most alumni report being satisfied with their undergraduate university experiences (Bowen, 1997; Delaney, 2004; Kern, 1976; Kuh, 2005). Questions regarding this research centers on the diversity of these studies and number of minoritized alumni from specific majors, specifically African American alumni, who participated. A 1952 study of 9,000 alumni from 1,000 various universities and colleges concluded that 84 percent would attend the same college if given the opportunity again (Bowen, 1997). Pace's (1984) alumni survey reported that alumni expressed general perceptions with their higher education experience with around four percent expressing dislike in college experiences. A critique of the study finds that the nature and of those

who disliked their experience was not explored in depth. This in-depth exploration might have included the total sample number and demographic information including race, which might have evidenced how racial groups experienced higher education during this time. Alumni studies by Kuh (2005) discovered that over half of college graduates stated they were "somewhat" or "very" satisfied if the quality of their experience (p. 154).

While early studies of broad group perceptions with regard to higher education experience demonstrated broad insights with college and university experience, multiple reasons for insights have been noted. Some alumni stated their insights were linked to personal development while others cited high income potential, and civic awareness as the source of experience perception (Bowen, 1997). To better garner all sources of alumni perceptions with college experience, researchers in higher education used multiple indicators as measuring tools for alumni post-undergraduate experiences. Some researchers on self-reports while others have used behavioral indicators. For example, some behavioral indicators of alumni perception of their higher education post-undergraduate experiences included return to the institution for continuing education (Martin, Milne-Home, Barrett, Spalding, & Jones, 2000), financial donations and/or contributions (Hartley & Berkowitz, 1983; McAlexander & Koenig, 2001; Monks, 2003), marketing the institution to prospective students, or joining alumni associations (Hartly & Berkowitz, 1983).

Post-graduation and pre-graduation indicators have also been analyzed to include perception of classroom experience (Ness, 2003; Volkwein & Cabrerra, 1998) and university community integration and fit (Graham & Gisi, 2000; Smart, 1986). Perceived fit includes perceptions and experiences with peer-to-peer relationships, student-to-

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faculty relationships and student-to-academic unit/department relationships. A keen focus on how racial identity impacts these factors will be the focus of this study as it is hypothesized that there will be variances in experiences based on race and ethnicity.

Alumni Contributions towards Higher Education

The importance of exploration into alumni perceptions of higher education experience cannot be understated. Alumni exhibit how satisfied or dissatisfied they are through donations and giving (McAlexander & Koenig, 2001; Monks, 2003). Alumni also impact marketing and recruitment through recommendations of their former alma mater to potential students (Thomas & Galambos, 2004). Additionally, alumni who enjoy their time at college are more likely to graduate from institutions they have attended (Hartman & Schmidt, 1995). As former participants in advanced education, alumni contribute valuable input to institutional development, curriculum and instruction, as well as co-curricular improvements (Gallo & Hubschman, 2003).

Alumni who have positive higher education experiences are more likely to provide mentorship opportunities for students in the form of mentorship opportunities and guest lectures (Mael & Ashforth, 1992). Additionally, alumni perception significantly impacts community perception by speaking positively or negatively about university experience in their local communities. Most importantly, post-baccalaureate graduation, one of the top achievements correlated with alumni post-undergraduate experiences is perception of occupational attainment (Pike, 1994).

Research on Alumni Postgraduate Experience and Career Development

Research around alumni post-undergraduate experiences and career development is multifaceted. Typically, alumni research waits until former students are working and takes place several years after students have graduated. Researchers collect data several years following graduation as correlations around post-undergraduate experiences are not visible immediately after graduation, instead data is collected as graduates become more aware of connections between their educational experience and workforce realities (Bowen, 1997; Delaney, 2004; Menges & Kulieke, 1984). However, this rationale cannot be generalized to all majors as some majors offer internships which increase the likelihood of employment offers prior to graduation. A 2017 study by the National Association of Colleges and Employers (NACE) revealed that exposure to multiple internships assists students in acquiring employment or continued education within six months of graduating (NACE, 2017).

Research around higher education experiences from the alumni perspective serve as investment opportunities for higher education expansion and institutional sustainability. The state of Maryland serves as a primary example. Results from satisfaction surveys from alumni have impacted the funding amounts received by state universities (Porter, 2004). Keeping in line with state government requirements to include alumni and input in government funding requests, institutional accrediting bodies mandate that colleges and universities include assessments on alumni as part of re-accreditation (Kuh, 2005). Similar to Maryland, other universities use surveys of graduates as performance indicators measures (Kuh, 2005). Moreover, in order for

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higher education institutions to urge alumni to serve as positive ambassadors, a focus on critical issues of importance to alumni post-undergraduate experiences must be explored.

Documentation sent to government officials on alumni post-undergraduate experiences details reasons attributed to positive or negative post-undergraduate experiences. A close analysis of these studies also asserts that perception of post-undergraduate experiences is classified as either cognitive (thinking) or affective (emotional) (Pascarella & Terenzini, 2005). Specifically, affective perception of post-undergraduate experiences could be classified as undergraduate classroom experience, perceptions of post-undergraduate experiences with occupational attainment, and perception of fit amongst peers and faculty at institution. Furthermore, literature supports considerations of affective characteristics and expressions of feelings (Gable & Wolf, 1993).

Like prior studies including Hartman and Schmidt (1995), this particular study examined affective sources of alumni perceptions. The areas that will be specifically explored include 1) perceptions of classroom experience, 2) perceived fit with university community, and 3) perceptions of occupational attainment.

Alumni Perceptions of Perceived Fit Within the University Community and Post-undergraduate Experiences

Course grades provide a limited perspective on student experience and post-undergraduate experiences and are typically used to measure cognitive development. While a student might have received high marks in a course, their day-to-day classroom moments may have been fraught with conflict and aggression. Additionally, course grades may not reflect positive perception within a

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course whereby students might have received high marks. This provides further reasoning for why future studies should pay particular attention to qualitative experiences. Moreover, Bowen (1997) noted that more than half of what is learned in the classroom is forgotten within one year. Thus, affective attributes, those resulting from feelings and/or emotions, held more lasting effects. More detail on the impacts of affective experiences provides more aspect on this concept.

Variables and/or factors considered effective in nature include relationships formed within the classroom setting. Classroom relationships have been found to significantly contribute to classroom perception of experience, however this research does not detail if specific racial groups experience this outcome. Smart (1986) noted that affective factors including social integration indirectly impacted perceptions of post-undergraduate experiences of undergraduate education experiences. Outside of the classroom, Graham and Gisi (2000) noted the degree to which affective development is significantly impacted by the level of connectedness they feel to the larger campus. Further exploration into the significance of social relationships, both in and outside the classroom, for African American students would better assert if this is the case for these particular students of color as well.

Sentiments around higher education experience have also been discerned through an examination of the current relationships with higher education institutions. McAlexander and Koenig (2001) explored this as a factor by looking at the relationship's alumni have with their alma mater as a measure of perceived fit. Specifically, these researchers explored the extent to which alumni engaged with faculty during their enrollment period of the alumni's undergraduate enrollment and the

comparative levels after graduation. While this particular question might lend itself to explain changing relationship dynamics, it can be argued that such correlations move beyond perceptions and expectations of workforce post-undergraduate experiences. Additionally, such research does not constitute expectations for which current students and alumni state are expectations of higher education. Pearson (1999) explored the concept of perceived institutional fit and alumni post-undergraduate experiences using donation giving self-reports and alumni event attendance as well. Again, these measures present a skewed view and perspective on higher education experience and job post-undergraduate experiences whereby student expectations and behavioral indicators which demonstrate positive perceptions do not classify giving and attendance at postgraduate activities as relevant. Moreover, additional exploration into the level of alumni involvement in donations and alumni event attendance provide a limited scope in which to analyze behavioral indicators of institutional and occupational post-undergraduate experiences. Such questioning does not take into account competing priorities and the purpose varied alumni association with their educational experience.

In review of the three primary ways perceptions of higher education experience has traditionally been calculated, 1) using classroom experience as an indicator, 2) using occupational attainment as an indicator, and 3) using perceived fit as an indicator, limitations of generalizable conclusions has been noted based on varied student and identities and the need to reflect the diversity of student identities within the research for more generalizability. Therefore, a closer look into each of the three areas using demographic profiles will provide a more contextual overview of perceptions pf post-undergraduate experiences. A review on how the research has examined relationships

with higher education experience using characteristics including race and ethnicity are explored.

Demographic and Profile Characteristics and Higher Education Post-undergraduate Experiences

In addition to affective variables being used to describe perceptions of post-undergraduate experiences with income, form of work, and other variables, it can also provide explanation for feelings and emotions of alumni from various racial and minoritized groups and their perceptions of their educational experience. Post desegregation, African American enrollments at primarily White institutions (PWIs) increased. Experiences of these alumni have varied and have been documented to note the successes and challenges of integration. A few alumni studies have analyzed the ways in which experience varies according to racial group identification. Notable research includes Flowers and Pascarella (2003) and Umbach and Porter (2002). Additionally, membership in voluntary extracurricular organizational have had some suggestive factors for racial and ethnic groups and serves as an indicator for perceived institutional fit with campus community (Hartman & Schmidt, 1995). These and other post-undergraduate experiences variables were used in the design of the following research project examining higher education and perceptions of post-undergraduate experiences amongst African American alumni.

Impact of Racial Microaggressions in College and Career Development Experiences

Recent college undergraduates have experienced some challenges in attempting to transition into the labor force. However, African American undergraduate alumni have encountered even more challenges beyond their White counter parts due to racial

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discrimination (Jones & Schmitt, 2014). Pager's (2003) audit study trained African American and White male respondents, who each held identical resume experiences. They were tasked to apply for the same jobs in Milwaukee and Pager (2003) found that African American applicants were more likely than White candidates, with the exact same credentials, to receive a call back from prospective employers. Of even greater concern is that even White applicants with hypothetical criminal records were more likely to receive call backs than African American applicants without any prior criminal history (Pager, 2003). Follow-up reports including one by Bart Bonikowski and Bruce Western revealed similar discriminatory practices against African American entry-level applicants (Jones & Schmitt, 2014). This study showed the same rejection experiences among African American job applicants and even showed that African American applicants were placed last behind Latino applicants (Jones & Schmitt, 2014).

Similar studies, such as Bertrand and Sendhil's (2004) "name study" found that resumes with names that sounded White received 50% more call backs than those with African American sounding names. Similar types of racial discriminations also took place in workplace performance assessment for African American versus Whites. In a 2011 study by the consulting firm Nextions, attorneys at a law firm gave lower marks to the same legal brief if the lawyer was African American compared to if the author was White (Nextions, 2014). Even further, when under the impression that the author was African American, partners were more likely to note grammatical errors if under the impression the author was African American (Nextions, 2014). These and other racial discriminatory practices compound the already challenging process of post-undergraduate development. A more detailed discussion with recent African American alumni will

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determine if these same or different experiences speak to their transition following successful matriculation.

The African American Collegiate Experience Missing from Literature

While a significant number of studies on African American higher education experiences focuses on the challenges this minoritized group experiences, a growing counternarrative seeks to amplify those who achieve despite the odds (Harper & Nichols, 2005). The overlooked population of African American colleges students who are academic achievers, student leaders who thrive outside the classroom, and those who overcome institutional racism are the focus of research studies whereby the goal is to identify strengths of those who successfully navigate their college experience and achieve career goals (Harper & Nichols, 2008).

Research on African American college student persistence reveal that few students who perform well have been asked about how they were able to do so. Interviews with African American students about this reveal that there has been limited inquiry into how African American students positively navigate through their collegiate experience, or what compelled them to actively access institutional resources, or what they attribute to their academic performance, or their experiences with racial microaggressions. Moreover, literature on African American student college experience and educational post-undergraduate experiences is critiqued as being problem-focused (Cuyjet, 2006), which lends itself to inadequate educational responses that are preoccupied with problem students instead of using high-performing students for solutions development (Harper, 2009). Shaun Harper, leading racial equity expert critiques social science and education studies, arguing that there are limited published

insights with focus on positive enabling practices that positively contribute to African American student achievement (Harper, 2009).

Community Cultural Wealth, STEM Students, and STEM Professionals

When the experiences of African American STEM professionals have been researched it has often been found that during their time as students, they have encountered many obstacles (Chen, 2017; Dortch & Patel, 2017). As these challenges have remained present over the years, this has impacted African American STEM representation in professional and career fields (Archer & Osbourne, 2015; Russell & Atwater, 2005).

While most literature explores these challenges from a deficiency perspective, there has been a shift in thinking about challenges STEM students and professionals experience that takes on an anti-deficit approach (Museus et al., 2011). This anti-deficit achievement approach seeks to address matriculation and career barriers for African American STEM professionals by identifying mechanisms of success instead of focusing on student failures (Riegle-Crumb, King, & Irizarry, 2010). This calls on researchers to look at the success of African American STEM alumni and not their failures (Strayhorn, 2015).

In research, an anti-deficit approach involves the reframing of questions to unearth strengths instead of deficiencies. Questions like why do many African American students leave science majors or have difficulty finding gainful employment is reframed as achievement-oriented questions like why do African American students persist in

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science majors and post undergraduate workforce transition (Harper, 2010; Harper, 2012).

Few studies on African American student collegiate experiences take on an anti-deficit approach or move beyond the undergraduate experience, but a 2014 study conducted by Virginia Tech and Clemson University researchers explored how extracurricular activities assist engineering African American students and alumni in becoming more marketable (Simmons et al., 2014). The study focused on three activities African American STEM students often engage in. These three activities included participation in their campus chapter of the National Society of African American Engineers (NSBE), Minority Education Programs (MEPs), and African American/Black Greek Organizations (BGOs) (Simmons et al., 2014). The study categorized these three activities as professional organization, student support services and fraternities and sororities respectively.

Overall, the impact of co-curricular participation has been found to be positive (Astin, 1994; Kuh et al., 1999). Studies on the impact of these specific extracurricular activities has found that they provide opportunities to acquire role models and mentorship, along with attendance and participation at national conference, in addition to opportunities interact with industry professionals (Omer et al., 1999). Specifically, these activities have been found to provide students with extended familial bonding, sense of community, and peer academic supports that contribute to retention (Frehill, 2011; Maine, 2001; May & Chubin, 2003). In a look at the connections between undergraduate and career experiences prior engineering research has found that participation in the above co-curricular activities assist with social integration and curricular supports for

African American students, which contribute to these same alumni acquiring characteristics that contribute to the development of professional traits (Trenor, Simmons, & Archer, 2010).

The 2014 quantitative study with Simmons and colleagues used a 2004 report by the National Academy of Engineers which identified ten traits students must possess to overcome workplace and/or professional challenges. The traits were 1) analytical skills, 2) practical ingenuity, 3) creativity, 4) effective communication, 5) business and management skills, 6) strong moral and ethical standards, 7) professionalism, 8) effective leadership, 9) flexibility, and 10) a commitment to lifelong learning (National Academy of Engineering, 2004). The study identified African American alumni who participated in NSBE, BGOs, and/or MEPs to see if they felt they developed any of the ten traits through participation. The study used a Likert Scale for alumni to rate influence of each trait from no influence (rate of 1) to high influence (rate of 5). Findings including NSBE influencing the development of professionalism, business and management, leadership and communication skills, while BGOs influenced the development of ethical standards, and MEPs developed analytical skillsets (National Academy of Engineering, 2004). And while these findings are insightful it becomes critical to contextualize them through the qualitative responses to detail how the traits were acquired through participation.

This study aimed to explore the "why" and "how" of the African American STEM experience at the University of South Carolina, specifically by giving voice to the students who have successfully matriculated, and who can identify not only challenges, but resources from their undergraduate experience which they found most beneficial. The next chapter will delve into how this study will take an achievement-oriented

approach to answering the research question of how do African American STEM alumni from the University of South Carolina make sense of their undergraduate experiences at the predominately white institution (PWI), and what are the post-undergraduate experiences.

CHAPTER 3

METHODS

Chapter Two provided a detailed overview of the literature related to the key topics for this study. The literature provided context for the importance of studying the experiences of African American STEM alumni and areas where further research is needed. This chapter provides an overview of the study's research questions and a detailed analysis of the methods and methodology used to conduct the study. Participant selection, data collection, and data analysis are discussed. Trustworthiness, ethical considerations, positionality, and researcher bias are also addressed.

Problem Statement and Research Questions

This study sought to emphasize the unique strengths African American STEM alumni use to persist through higher education and their career development. For this reason, an anti-deficit achievement approach was set as a goal of the study. Therefore, to achieve this goal, a community cultural wealth framework guided the study. The specific research questions for this study were:

1) How do African American STEM alumni from the University of South Carolina make sense of their undergraduate experiences at the PWI?

2) What are the post-undergraduate experiences?

Methodology

As education is often lauded as a pathway to the "American Dream," that pathway can be riddled with racialized and discriminatory obstacles, which further isolate already marginalized persons, particularly African Americans. By unpacking the meaning African American STEM alumni place on their experiences during their undergraduate tenure, colleges and universities can better advocate and advise youth on ways to maximize their potential in higher education, during school, and after graduation using community cultural wealth as a guide. This information can then hopefully be used as a marketing strategy and institutional improvement process for long term student success.

Astin (1993) asked "what matters in college?" and noted this question is often answered using quantitative assessments and data that is most often used in institutional research offices. Critics of this method cite the limitations of such techniques in answering what matters to college students. Additionally, quantitative methodology does not elaborate on student persistence or reasons for withdrawal, and this methodology lacks depth in speaking to student and alumni experiences. Such studies do not explore the impact of student and alumni campus experiences and contributing factors (Harper, 2007). Harper (2007) further noted that talking and listening to students continue to be uncommon methods in institutional research. This study fills literature gaps through exploring how African American alumni make sense of their undergraduate experiences at predominately white institutions (PWIs), and what specific undergraduate experiences contribute to career development.

To encourage more diversified methodology in gathering information from current and former college students, researchers advocate for more intentional

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methodology in gathering data in order to better understand both individual and collective experiences (Harper, 2007). Not doing so presents incomplete assessments of higher education experiences that lack density, depth, personal accountability, and voice (Kuh, 2005). Additionally, study participants do not have the opportunity reflect more deeply on what they learn from their collegiate experiences and the ways in which programs, services, interventions, and key personnel add or take value from their college life and educational plans (Kuh, 2005). It has been argued that not permitting research participants the opportunity to reflect and have voice in institutional studies privileges the researchers over those being researched (Harper, 2007).

A more detailed and nuanced way of gathering information about college experience and navigation through higher education is critical towards an overall understanding of impact. The US Department of Education's 2006 report on higher education called for an examination of the areas of improvement and expansion and called for more expansive data to illustrate educational interventions that are effective (Harper, 2007). While quantitative methods can reveal what works in higher education, this methodology is limited in demonstrating how things work, contributing persons, challenges incurred, and the meaning participants attribute to experiences.

Arguably, a full critical analysis of higher education and the conditions which contribute to experiences is limited when voice is not given to those involved (Harper, 2007). Harper (2007) further argued that the quantitative ways of assessing higher education are one-sided in nature and only focus on outcomes, which does not provide a critical view on how these outcomes come to be. Those who believe that qualitative methods limit the ability to ascertain effects are in fact purporting that participants are

incapable of reflecting with sensibility and truth regarding their firsthand experiences. Moreover, strategies designed to assist students during trying times can be better developed using qualitative data, which provides greater detail (Harper, 2007).

Over the years, statistical significance and effect sizes have exclusively been used in research on how environmental stimuli, campus climates, and experiences have affected students. Claims that specific contributing factors cause students to behave a particular way or make particular choices or experience particular changes have traditionally been permissible when explored through quantitative means (Harper, 2007). Qualitative studies exploring effect or impact have often received critical comments from reviewers, and graduate programs have often erroneously generalized that causation is primarily determined through statistical analysis (Harper, 2007). Harper (2007) argued that this is wrong and socially oppressive.

Using Harper's STEM-adapted National African American Male College Achievement Study methodology, this study reviewed and analyzed factors and enablers of African American student achievement in the STEM field for both African American men and women in STEM fields at the University of South Carolina (Harper, 2010). This phenomenological study sought to unpack the experiences of African American STEM alumni at the University of South Carolina in analysis of their experiences as undergraduate students along with perceptions of their post-undergraduate status. Manen (1990) defined a phenomenological study as an "inquiry into what people experience regarding some phenomenon and how they interpret experience. This study highlighted lessons learned from African American STEM alumni who maximized their collegiate

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experiences through institutional agents, policies, programs, and various tools to achieve desired educational and career outcomes (Harper, 2010).

Phenomenology

Phenomenological studies bring together many philosophical ideas including phenomenology, hermeneutics, and ideography. Described as a method that explores the change in the view of the environment based on core experiences of a specific individual engaged in a specific act, phenomenological studies embody the idea that knowledge of the world can be based on our senses and not solely the content of the experience or basic reason (Creswell, 1998; Creswell et al., 2007). Moreover, phenomenology purports that a person, who is the subject, experiences the world based on relationships within it (Lincoln & Denzin, 2000).

Husserl is considered the founder of phenomenology, which has changed over time (Gubrium & Holstein, 1997). Specifically, Husserl moved from a mathematical interpretation of the world to a philosophical understanding, which was influenced by Franz Brentano, a German philosopher and psychologist who examined the difference between a perceived item and how that item is perceived by others. Sadala and Adorno (2002) considered that Husserl's concept of phenomenology focuses on the overview of an experience more than the explanation of that experience. The authors also articulated that the broad overview of Husserl's view is that before any objective reality exists as a subject who experiences that reality and a world that exists prior to objectivity and that knowledge begins after the experiences occurs since knowledge is based on life. In short, Husserl believed that there must be differentiations that put aside assumptions about the real word to better understand our perceptions of the world (Smith et al., 2009).

The German philosopher Gadamer who focused on the hermeneutic viewpoint that analyzes the participants' preconceived notions, bias perspectives, and their unique understanding of the world, noted that these contributing factors cannot be ignored (Gadamer, 2004). Defined as the interpretation, hermeneutics is considered a critical portion of the overall interview process. Making sense of phenomenon is part of the interpretation of the details provided by the alumni participants. Moreover, this calls for the researcher to be mindful of assumptions and acknowledge preconceptions which become shaped by experiences during the process of interviewing participants (Smith et. al, 2009). Therefore, when analyzing the data, the researcher must be mindful about their preconceived notions regarding undergraduate and post-undergraduate experience.

This research methodology underscores that the researcher would experience the alumni participant's story as shared by the alumni (Smith, 2009). Therefore, the primary focus was on the African American alumni sense making process (Smith et al., 2009). Moreover, the researcher attempted to demonstrate cultural humility and empathy while investigating. Specifically, the researcher attempted to understand and make sense of the experiences of the STEM African American alumni participants while also looking at the experiences as an outsider questioning various aspects of the time period (Ricoeur, 1970; Smith et al., 2009). Again, the phenomenological part of the process involved gaining as much of an accurate perspective on the experience of the African American STEM alumni participant (Smith et al., 2009).

The outcome in using phenomenological methodology for this research allowed interpretation of the undergraduate experiences of African American STEM alumni who graduated from the University of South Carolina. Furthermore, this study allowed for

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analysis of the experiences shared and exploration of whether the experiences shared could provide context as to what African American alumni experience following undergraduate completion. This study approach sought to allow African American alumni to recount, in their own words, their specific stories, along with their detailed and interpretive analysis. While individual thoughts may not be generalized to entire populations, they are helpful for assessment and program enhancement purposes.

Method

The methodology used required the researcher to conduct in-depth interviews of a particular phenomenon while attempting to understand participants' experiences as shared by the participants being studied (Smith, Flowers, & Larkin, 2009). Open-ended interview questions sought to make connections between post-undergraduate experiences and college experience. These open-ended questions permitted the group of African American STEM alumni to discuss their individual undergraduate experiences, highlighting significant relationships and interactions with peers, faculty, and administrative officials, activities in which they were involved, and significant events that occurred during their tenure on campus. Using community cultural wealth as the lens, this study did not focus on earnings, rather it focused on capital STEM alumni possess in the form of knowledge, skills, abilities, and contacts they have used for academic and career success. In making any connections, the participants also detailed their post-undergraduate experiences.

The overall interview strategy permitted participants to make sense of their personal accounts and assess whether their narratives have any influence on their perspectives of their current post-undergraduate status. The target population for this

study included recent African American STEM alumni from the University of South Carolina. This study explored the phenomena identified as the undergraduate experience of African American STEM alumni from the University of South Carolina. Data were gathered through interviews, which captured qualitative data designed specifically for the targeted group.

Participants reflected on their undergraduate tenure at the University of South Carolina including who they were before they attended school, how they developed college aspirations and goals, methods they used for selecting and institutions, facilitators and/or barriers to adjustments, the role of significant others including peers, parents, and educators in their experiences, their experiences in residence halls and classrooms, explanations behind their active or passive engagement while in school, environmental conditions that encouraged changes in their attitudes and behavior, and gains and outcomes accrued through their participation in enriching educational experiences. A phenomenological study was chosen because it permitted the researcher to focus on the lived experiences of participating African American STEM alumni.

Of specific interest was the experience of African American STEM alumni in isolating specific in-class experiences, programs, services, initiatives, and activities that potentially affected students' post-undergraduate experiences according to the six categories of community cultural wealth. Additionally, interview questions inquired as to the role of parental figures, fellow peers, and any significant others in the formation of college aspiration (Harper, 2010). These question types assisted in better understanding what compelled African American STEM alumni to become active both inside and

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outside the classroom along with how they experienced community cultural wealth (Harper, 2010).

Additionally, this study sought to investigate experiences of African American STEM alumni at the University of South Carolina and what, if any, identity conflicts, social experiences with peers, and campus climate instances impacted their time during their academic tenure and post undergraduate completion. Moreover, the study sought to better explore and connect the experiences of higher education for minoritized students with post-undergraduate experiences in a positive manner (Harper, 2010). This anti-deficit achievement framework utilized critical race and community cultural wealth in terms of seeing African American STEM alumni from the University of South Carolina as key experts on their experiences, particularly their experiences of success as counternarratives to deficiency-focused lenses traditionally used (Harper, 2010). Appendices A, B, and C contain the interview protocols and interview questions.

Setting

The University of South Carolina (UofSC) is one of the oldest public higher education institutions in the United States with various campuses throughout South Carolina. Established in 1801, South Carolina College, was founded as part of a public college movement in the south promoted by Thomas Jefferson (Green, 2013). The institution was established with the goal of bringing together South Carolinians following the American Revolution. Leaders viewed this establishment as a way of promoting order and unity within the state. Following the College's establishment, Georgia, North Carolina, and Virginia followed suit (Tools & Resources, n.d.). During this period South

Carolina College was known as one of the most influential colleges in the South, particularly for the training of elites (Tools & Resources, n.d.).

In 1805, the first building, named Rutledge, was constructed and classes began with nine students and two faculty. Subsequent buildings were completed in 1809 and additional buildings were completed around the horseshoe through 1940 (Tools & Resources, n.d.). However, the Civil War disrupted campus operations, causing College closure in 1861 due to students volunteering for service in the Confederate army (Green, 2013). Negatively impacted by the Civil War, Reconstruction political pressures, the institution was then pressured by Populist politics to become an institution for elites, which starkly contrasted with the newly founded Clemson University (Lesesne, 2002). Renamed and revived in 1866 following the South Carolina's secession and civil war, the institution diversified its administration and student body in 1868 with the first African Americans to serve on the board of trustees and enrolled the first African American students in 1873 (Green, 2013).

At this time, the UofSC was the only Southern state institution admitting and granting degrees to African Americans during the Reconstruction Era and this was viewed as politically controversial. However, funding limitations forced yet another university closure in 1877; this closure was prompted by South Carolina conservative leaders. For forty-years during the 20th century the University was underfunded as a result of rural state legislature that did not develop a Bord of Regents for the state, which could have resulted in more networking between UofSC and Clemson (Lesesne, 2002). The school opened three years later in 1880 as an exclusively White agricultural college. For the next 25 years, the University became enthralled in South Carolina politics and

underwent several reorganizations, including curricular changes and changes from college to university and then back to college (Green, 2013). Then in 1906 the institution went through a final re-charter fully becoming the University of South Carolina. In 1917, as the UofSC evolved into a comprehensive university, it became the first state-supported college or university in South Carolina with regional accreditation (Green, 2013). In the 1920s the University introduced new colleges and degree programs, including doctoral programs. The impact of the Great Depression presented challenges with continued progress, but the University's hosting of naval training programs, during World War II, doubled enrollments during the post war period as veterans used their G.I. benefits (Green, 2013). Not only did the UofSC undergo changes as a result of military benefit expansion, but the 1950s also saw national faculty recruitments and campus expansion to various communities throughout South Carolina (Our History, n.d.).

Campus diversity expansions began in the 1960s with integration and the first African American students were admitted (Our History, n.d.). Diversity of the student body was largely attributed to the landmark 1954 Supreme Court decision in *Brown v. Board of Education*, which determined that school separation for different races was unconstitutional (Green, 2014). The University of South Carolina was one of the last universities in the South to desegregate. On September 11, 1963, Henrie Monteith, Robert Anderson, and James Solomon enrolled at the University of South Carolina (Parham, 2014). In 1965, Monteith was celebrated as the first African American to graduate from the University of South Carolina with a Bachelor of Science degree in Biochemistry (Our History, n.d.). When interviewed about her admission and graduation from the UofSC, Montieth shared how she was specifically aware that her time at the

UofSC was being critically watched and would be used as a benchmark for subsequent minority student admittance (Parham, 2014). Although she adds that she felt no pressure as one of few minority students at the University, she felt that she needed to do well in order to not disappoint others (Parham, 2014).

While the University's 1963 integration took place without violent or disruptive incident, campus life for African Americans was not always peaceful or welcoming. Robert Anderson received the most racial hostile campus experiences as the only newly admitted African American living on campus without a close familial support system. Monteith was from Columbia, SC and thus had close family relations nearby, and Solomon was an older graduate student who was married and lived off campus (Parham, 2014). Hostile events Anderson experienced as a young African American living on campus included being the target of microaggressions as fellow students shouted obscenities at him and disrupted his studying by intentionally bouncing balls against his door at night (Parham, 2014). Although Monteith had family in the Columbia community she describes feeling lonely while at the UofSC but discovered her own strengths through this loneliness. From these experiences she developed leadership skills (Parham, 2014). James described his educational experience through interactions and engagement in noting his lack of concern for being liked or treated poorly. He noted that he was aware that a few of his professors were racist and prejudiced and that he expected this and did not permit this to disturb or negatively influence him (Parkham, 2014). Robert went on to serve in the Vietnam war, serve as a social worker in New York City, and work for the Veterans Administration (Parkham, 2014)

Post higher education experiences for the UofSC's first African American students include Henrie receiving her Ph.D., conducting postgraduate work at the Harvard School of Public Health, and establishing a successful career at the Morehouse School of Medicine. James, on conjunction with a UofSC math professor, developed a fellowship program to train elementary school teachers. He then went on to a successful career in educational administration and state government which included serving as the commissioner of the S.C. Department of Social Services. Following this service with the S.C. Department of Social Services, he became the CEO of a nonprofit organization focused on economic development along the I-95 corridor (Parkham, 2014).

As the State's flagship university, the UofSC is comprised of 12 undergraduate colleges and has an enrollment of over 30,000 students and over 254,000 Columbia campus alumni, of which 25,000 identify as African American. The University of South Carolina has grown tremendously in size and diversity (Office of Alumni, 2019). Some African American students are familiar with the tumultuous history of the University in regard to diversity and describe their more recent experiences in ways that articulate this evolution of the institution. A former African American student body president described never having felt discriminated against because of his race (Parkham, 2014).

A 2018 Hechinger report on African American enrollment at the University of South Carolina found that, based on population figures, few African American high school graduates attended the flagship university (Marcus, 2018). Specifically, it was found that South Carolina, as of 2015, has the second-largest enrollment gap in the nation between African American high school graduates and African American freshman enrolling with African American students comprising just six percent of the freshman

class while making up thirty-seven percent of South Carolina's high school graduates (Marcus, 2018). Overall, as a state system school, the University of South Carolina has the lowest numbers of African Americans when compared to the thirty-four state system institutions in South Carolina (Marcus, 2018). When probed about these alarming figures, University president, Harris Pastides, commented that the options for qualified African American applicants were vast and that the institution would like to do better in competing for qualified African Americans to enroll (Marcus, 2018). But given the large disparity and state rankings amongst peer institutions, the gap in the number of African American freshmen is still alarming. More intentional strategies from the administration to improve these numbers, including diversity programming that brings together racially diverse faculty, staff, and students aims to change this (Marcus, 2018).

A more qualitative look into these figures reveals that even in 2015, African American students felt "singled out" and that "racism is alive and well in the South" and institutions of higher education located therein reflect the larger community issues of racism (Marcus, 2018). A junior sports management major who took part in the 2015 study shared that implicit bias and microaggressions were still present from some interactions. She further shared that although prospective African American students are well aware of top ranked academic programs at the UofSC, they do not feel that the UofSC is "a place for African American students" (Marcus, 2018). The student went on further to share that diversity programming, aimed at addressing racial challenges in institutions of higher education, like the "Welcome Table," must do more to not just focus on like-minded voices, but must focus on the voices, spaces, and practices that promote and uphold racism (Marcus, 2018).

Research into the experiences of University of South Carolina African American alumni will determine how race and race relations have impacted the experiences of former students in an effort to determine similarities and/or differences and improve enrollment as mentioned by former University president Harris Pastides. This qualitative measure endeavored to provide more depth into the experiences of a sample of the UofSC's "six percent." African American alumni participants for this research study are detailed in the next section.

Participant Selection

Research suggests that participants for a qualitative study can be selected through purposeful sampling (Seidman, 2013). Purposeful sampling permitted the researcher to identify participants that are more familiar with the phenomenon being analyzed. To create a criterion-based sample for this research, the specific African American STEM alumni chosen for this study had successfully matriculated and received their bachelor's degree. Specifically, the participant criteria were:

- Participant identified as African American

- Participant had successfully matriculated through an undergraduate program at the University of South Carolina

- Participants majored in a science, technology, engineering, or math

- Participant had received their bachelor's degree within 5 to 10 years from the start of study

For this study, the primary focus centered on the undergraduate experiences of African American STEM alumni who graduated from a predominantly White institution

(i.e., the University of South Carolina) along with their subsequent post-undergraduate experiences. Ten alumni were recruited to participate in the study with the assistance of the Office of Alumni Affairs and African American alumni leadership. The researcher forwarded a letter of intent to the prospective participants.

Positionality

As an African American doctoral student at the University of South Carolina, the researcher understands and has experienced being a graduate African American student at a PWI. However, the researcher does lack any experiences of what it is like to be African American as an undergraduate student at a PWI. The researcher wants to understand more about the undergraduate African American experience and how these experiences shape future endeavors post undergraduate completion.

Considering these limitations in the literature and my positionality as an African American doctoral student at the University of South Carolina, I plan to conduct a qualitative research study using the following research questions: How do African American STEM alumni from the University of South Carolina make sense of their undergraduate experiences at the PWI, and what are the post-undergraduate experiences?

Data Collection

Data collection consisted of individual virtual interviews conducted in three parts. Although the researcher initially planned to conduct interviews in person, the interviews were conducted via Zoom due to COVID-19 restrictions. An open-ended, semi-structured interview process convened with questions regarding classroom experiences, access and participation in study groups, fraternities and sororities, athletic organizations,

study abroad, work-study, field, internship, team-based, social network, and career services programming. Participants were asked to generally describe their college experience, goals prior to college, goal transitions during college and their current status. Additionally, participants were asked what activities they participated in during college, if any, and what decisions led them to participate or not participate in activities. Finally, the participants were asked to discuss what, if any, relations exist between activities they participated in and their current post undergraduate status. The interview focus protocol ensured an engaging space was provided for each graduate to dialogue regarding their college experiences and connections to their current status.

Virtual video interviews with each participant were 80-90-minutes (broken into three parts). Semi-structured interview techniques were employed, which also permitted data gathering and reflections by participants (Patton, 2002). Interviews were conducted and recorded via the virtual conferencing platform Zoom with the permission of each participant.

Procedures

To conduct the study, approvals from the Institutional Review Board (IRB) at the University of South Carolina were obtained. After receiving all necessary permissions, the participants for the study were identified and recruited with assistance from the Office of Alumni Affairs and African American alumni leadership. A letter of intent ensured that participation was voluntary and was provided to all prospective participants. The letter also outlined the privacy of each participant's identity throughout the duration of the study. Pseudonyms were used when necessary to distinguish between participants.

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Additionally, participants were notified of the time required for the interview processes as well as any follow-up commitments to confirm their full ability to participate.

Disclosure was provided to each participant on how their responses, as data, would be used. Additionally, participants were informed where the data were used and why. Participants were also informed that some of the information gathered would be included in published documents they are able to access. Participants were granted permissions to conclude their study participation at any time and would be able to decline to answer any question or questions they did not feel comfortable answering. Upon the participants being identified and consent confirmed, interviews were scheduled with confirmations emailed to each person. Due to participants being located all over the world, the virtual conferencing software Zoom allowed interviews to be conducted during days and times that are convenient for all.

In-depth, semi-formal, and open-ended interviews were conducted for the purpose of gathering data pertaining to the participant's undergraduate and post-graduate experiences. Interviews were conducted individually and broken into three distinct parts. Breaking qualitative interviews into parts has been found to increase validity as it permits the participant and the researcher the opportunity to reflect on context and meaning at each stage.

Part one of the interview process lasted approximately 20 minutes and consisted of an overview of the research study, protocol, and to again confirm the interest of the participant in completing the study. The second portion of the interview consisted of the question and answer session. Approximately 15 questions were asked of each participant with the goal of answering the main research question. The second interview lasted

approximately 60 minutes. Questions were rehearsed for clarity and the interview was video-recorded and transcribed for convenience and accuracy. Non-verbal utterances considered unnecessary were omitted while significant non-verbal utterances were included in the transcription (Smith et al., 2009). The participants were provided the opportunity to share their interpretations regarding their undergraduate experiences. The third part of the interview consisted of member checking and lasted approximately 10 minutes. To member check, the researcher forwarded a copy of the interview transcript to the participant with the interpretive comments on the right side of the page with highlighted quotes and themes that emerged during the initial analysis. Additional information on member checking is provided in the next section, which discusses data analysis.

Data Analysis

Interviews were transcribed using a third-party provider. Community cultural wealth was used for data interpretation. This approach was taken due to persistent deficit focused analyses of racialized experiences in higher education including a preoccupation with the under preparedness of students of color in higher education, disengagement of minorities, and lack of academic effort to explain trends (Harper et al., 2016). Moreover, very few studies explore specific campus dynamics which speak to how ongoing institutional structures that are racist, in addition to policies and practices that are racialized, undermine African American student achievement (Harper, 2012). The goal of this study was to identify and characterize the community cultural wealth of African American alumni STEM majors.

Transcription and coding helped make sense of the data collected and captured the student strengths. Data analysis consisted of several steps. The first step included a review and re-review of the data while listening to the recording using NVIVO coding software. Coding took place through the creation of nodes in NVIVO and the development of a code book to define and describe the codes/nodes. The next step included providing written notes and comments on transcript documents. There was a focus on language and the meaning of this language, while reading. These notes and comments included pertinent information such as similarities, differences, and any contradictions. Comments considered descriptive were highlighted along with key phrases that described the participant's experiences and were documented using nodes and node descriptions. Commentary considered more conceptual in nature allowed for the researcher to move from more of a descriptive analysis to an analysis that was more in-depth and was also captured using nodes and sub node categories.

Step three included the identification of more emergent themes throughout the transcript in the order in which it appeared. The purpose in doing so was to condense the amount of information while keeping more complex concepts within the nodes. Themes then were in the form of phrases that identified the essence of the experience being described. Umbrella nodes organized the categories and subcategories. As commonalities were discovered among themes, they were listed together and given a name to identify the group. Finally, the process was repeated for each interview. The researcher looked for patterns across all interviews, which required the relabeling of some themes when necessary.

Ethical Considerations

Given that the researcher identifies as a minority and alumnus from a higher education institution, she was cautious regarding assumptions and generalizations based on personal experiences which can distort information or impact candor from the participant. Study participants were identified with the help of various university alumni affairs offices, departments, and fellow peers. The researcher strived to maintain an ethical research study by conducting equal and fair interviews. This was done by adhering to similar time frames for each interview and using the question script. Again, the interviews were conducted during a time that was convenient for the participant.

In order to ensure that interview questions were ethical, the researcher confirmed that questions were not leading or judgmental and encouraged each participant to speak openly and honestly about their experience. The researcher refrained from discussing her own background and personal experiences or providing her own opinion on topics, during the interview process. Again, the researcher limited the interview to the script and made comments when necessary to gain clarity and understanding.

To protect the participant's information, data collected from all interviews were stored on a password-protected personal computer and the files were backed up on the recording platform storage that maintains a secure password. Pseudonyms for participants were used for identification.

Trustworthiness

Qualitative research involves the following components: credibility, dependability, and confirmability; these terms are used to determine the trustworthiness of any

qualitative study (Lincoln & Guba, 1985). Credibility means to have confidence in the reality of the findings or believability (Lincoln & Guba, 985). For this research, credibility was implemented to ensure in-depth interviews and engagement with the participants. After the question and answer part of the interviews were conducted, debriefing took place for each participant. This process is called member-checking and provided the participants the opportunity to review the interview transcripts and notes to verify that the information gathered was accurate and representative (Creswell, 2012).

A proper audit trail would allow someone else who is not related to the study to hypothetically follow the logic of the study and understand the full process from the initial concept of the research question to the final report. The authors state that not only is this helpful in checking the validity of the study, it also helps the researcher to develop a coherent line of arguments between the initial data and the final report (Smith et al., 2009).

<div align="center">**Potential Research Bias**</div>

Bracketing occurred before the data analysis stage. It was necessary for the researcher to identify her relationship with the phenomenon and be conscious of any biases that may be present in order to avoid allowing these biases to influence questioning during the interview process. Although bracketing is almost impossible for a researcher to do, it is still a very critical step in the research process (Greonewald, 2004). Although it is almost impossible to avoid bias, it is possible to mitigate its effects on the study.

The first step in bracketing is to be aware of the bias. The researcher's interest in the exploring the effect of undergraduate experience on African American alumni experiences at the University of South Carolina results from her own experience at a PWI as well as her teaching at the University of South Carolina. Hearing other African American student experiences of implicit and explicit racial microaggressions, successes and challenges in matriculating were important in addition to post-undergraduate experiences. Assumptions that experiences during undergraduate education impact post-undergraduate experience are assumptions based on views of racial climate at universities and the research's role as a faculty member at one such institution. This can create bias.

To deter from potential bias, the researcher created an interview protocol that was used for all participants. The protocol included interview questions that were not leading and outlined the process for recording the interviews. The researcher also avoided sharing personal experiences during the interview process, which promoted the participants to share their own specific narrative. The interview protocol included a statement that was read to each participant and included explanations that the interviewer would refrain from discussing her background and personal experiences, identifying with or corroborating any of the experiences that are shared or making any statement that indicates an opinion about the participant's experiences. During the data analysis process, the researcher shared all information even if it was contrary to her assumptions. The researcher avoided taking sides with the participant when analyzing the data (Creswell, 2013).

Limitations

Limitations and barriers include the broad nature of a qualitative study on collegiate experience and post-undergraduate experiences. This includes a lack of generalizability based on the interviews conducted with African American STEM alumni from the University of South Carolina. Difficulty in organizing and coding responses, which ranged from those pertaining to personal growth, skills acquired, to earnings and job preparedness persisted. However, the success of the study laid in the coding of responses to coincide with more long-term post-undergraduate experiences for those who recently entered the workforce and establishing intercoder reliability with a second independent coder to establish study accuracy.

Summary

Chapter Three provided a detailed overview of the research design, methods, and methodology. This qualitative study was designed to solicit responses that best addressed the overarching research question. Chapter Four provides a detailed analysis of the results of this study. Additionally, Chapter Four provides a description of the findings and discussion.

CHAPTER 4

RESULTS

Chapter One provided an introduction to the purpose of this study. In Chapter Two the literature guiding the importance of this study was examined. Chapter Three outlined the methodology for this study, including methodological design, data collection, participant selection, data analysis, and trustworthiness. These chapters have provided the foundation for Chapter Four, which presents the findings of this study. Specifically, this chapter includes a brief overview and profile of the former University of South Carolina (UofSC) students and a full summary of the participants' experiences and perceptions of their experiences during their tenure at the UofSC. The research questions are addressed with supporting evidence ranging from quotes and participant feedback. Finally, the emergence of themes through data analysis and factors contributing to the college students' experience are reviewed.

Participants

The results of this qualitative study were based on interviews of 10 African American STEM alumni from the UofSC who graduated within the past ten years. All participants voluntarily participated in the study after being recruited with the assistance of the Office of Alumni Affairs and African American alumni leadership. Interviews took place via the virtual conferencing software Zoom. Table 4.1 outlines the demographic information for each participant. This information was collected to

determine whether there were any connections between demographic categories and the perceptions of participants. Pseudonyms were used to protect confidentiality and anonymity of participants.

As shown in Table 4.1, all participants were under the age of thirty. A majority were ages twenty-five and under. All study participants graduated between 2017 and 2019 with eight participants graduating within three years of the study. With the majority of the participants graduating within the past three years, this allowed for perspectives and responses from more recent collegiate experiences. Additionally, eight out of ten study participants were born and raised in South Carolina, which would lend to more localized perspectives and reflections of their socialization and lived experiences in the state.

Table 4.1 *Participant Demographics*

Participant	Age	Gender	Place of Birth	Grad Year	Program of Study	Current Employer/ Role
Jeremy	23	M	Rock Hill, SC	2018	Computer Information Systems	Software Engineer at Genesys
Tamara	23	F	Gaffney, SC	2019	Computer Science	Junior Front End Developer at Bank of America
Jennifer	25	F	Beaufort, SC	2017	Integrated Information Technology	Research Scientist Intern at Amazon Web Services

Participant	Age	Gender	Place of Birth	Grad Year	Program of Study	Current Employer/ Role
Stacey	22	F	Spartanburg, SC	2018	Computer Information Systems	Cybersecurity Technical Specialist at IBM
Shannon	25	M	Denmark, SC	2018	Computer Information Systems	Computer Systems Analysts at SAIC
Marvin	28	M	Clio, SC	2018	Computer Information Systems	Senior System Software Engineer at Warner Media
Eric	24	M	Columbia, SC	2017	Computer Information Systems	Data Engineer for Emphasis Limited
Andre	23	M	Charleston, SC	2019	Computer Science	Systems Engineer at VC3
Sam	25	M	Augusta, GA	2018	Computer Information Systems	Senior System Support Technician
Kevin	24	M	Rochester, NY	2019	Computer Science	Alliances and Strategic Partnerships Account Manager - Cloud Platform at IBM

Jeremy

Jeremy is an African American UofSC alumni participant rooted in his racial identity, which serves as a celebration of who he is and what informed his experiences, upbringings and understanding prior to entering the UofSC. Jeremy is a 23-year old male from Rock Hill, South Carolina, who studied computer information systems (CIS) and now works as a software engineer for Genesys. His final major GPA and overall GPA were both 3.7 and he completed studies at the UofSC in 2018. His reason for attending the UofSC was financial. He received in-state tuition and other state scholarships, which provided him the opportunity to pursue higher education with minimal debt.

Jeremy's undergraduate experience included challenging moments where he felt a racialized disconnect between peers and himself due to a lack of African American representation in the program. In the College of Engineering, Jeremy felt like an outsider and alone. Therefore, he sought after African American peer academic groups for academic and social supports. Jeremy was particularly drawn to Minorities in Computing (MIC) as an organization because of the College of Computing's recognition and commitment to the retention of African American students. He described this commitment in saying, "the Computing College wanted to help retain minority students, mostly African American students and instead of looking at the problem with the lack of African American professors, the College turned to the students."

He applauded these efforts because he felt the College was demonstrating an inclination to listen to student input concerning matters that impacted them. While Jeremy was rooted in his racial identity, he did not intentionally segregate himself from

other peer identity groups, rather, he connected with those who had causes similar to his own and he attributes these bonds to his overall success at the UofSC. Overall, Jeremy felt race significantly impacted his undergraduate experience and he did not recall feeling connected the University. He yearned for more diversity in event sponsorships and the creation of safe spaces for racialized expression. As an alumni of the University, Jeremy does not attribute any success to the University, but does to his peers along with his resilience. His self-determination and acumen acquired from African American upperclassmen provided him the knowledge for what he deems as career success.

Jeremy bares slight animosity over the low number of minority enrollees, negligent exclusion of African American thought and inclusive African American learning methodologies in curriculum, and the dismissive nature of UofSC higher education administrators, particularly deans and advisors. For this reason, he shares that he would not attend UofSC if given the chance again. Similar tension was evident amongst other study participants.

Tamara

Tamara is a 23-year old African American female from Gaffney, South Carolina, who studied computer science and now works as a junior front-end developer for Bank of America. Her final major GPA was a 3.7, her overall GPA was a 3.9, and she completed studies at the UofSC in 2019. Her reason for attending the UofSC included the University being one of two engineering schools in South Carolina, her admittance into the UofSC, and the close proximity to home.

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Tamara held quite a resentment towards her undergraduate STEM experience at the UofSC. Although she had some strong and positive relationships with one to two faculty members, the majority of her faculty relationships with faculty were dismissive and somewhat hostile. She attributes the dismissiveness and hostility to racism and this taints her overall perspective of the UofSC.

In her early years at the UofSC, Tamara was accused of cheating by a STEM professor she reached out to for instructional support on an assignment. The instructor refused to provide her any assistance and upon completing the assignment on her own, the instructor accused her of cheating. She laments that White students in her class asked for and received instructional support, but she was denied this same attention; a denial she attributes largely attributes to her being African American. It was not until she advocated for herself and escalated the cheating situation to University officials, that the matter was resolved. However, this experience harrowed her innocent assumption that higher education was for everyone, including African American people.

Tamara's experience with this professor, who she now viewed as racist and what she felt was a lackluster response from the College of Engineering, hardened her view of the institution as a whole. This view was only softened when she encountered two faculty members who doubled as her academic advisor and her minority student organization advisor. These intentional relationships somewhat softened Tamara's perspective regarding the School of Engineering because these two faculty members acknowledged her identity as an African American woman. She described the experience in sharing,

My academic advisor Dr. Won was also my professor she was very influential in my experience and Dr. Francis was a second influential person in my academic career. They both were great, and I helped them understand a lot about the African American community and they seemed genuinely interested in issues we were facing and offered to help.

From this knowledge the faculty members queried her interests and her needs. They listened deeply and responded accordingly, and this was all the difference she largely attributes to her matriculation and current professional success.

Tamara was more focused on academic pursuits during her tenure at the UofSC and was not the type to overly indulge in social activities. She was hyper-focused on her academic and professional aspiration and used these personal goals to guide her time at the UofSC. When asked about the source of her motivation she replied, "when you're from a small town with one high school, you have a lot of motivation to push through anything." She was, however, active in academic oriented organizations such as Minorities in Computing and the international African American Greek organization Alpha Kappa Alpha. Her participation in these organizations came largely at the urging of a fellow African American female STEM upperclassmen who she largely attributes to her success. She softens her rhetoric as she speaks of her African American peers. Without them, she admonishes that things would have been much more difficult, but she still would have persisted to completion because that was engrained in her from her family.

In reflecting on her time at the UofSC, Tamara never felt connected to the UofSC, but felt connected to the non-racist people she encountered. She does not attribute these positive relationships to institutional infrastructure, but to individual initiative. For Tamara, it was the individuals she encountered, the people who celebrated her identity and advocated for African American inclusion that she felt connected to and not the UofSC as a whole. Upon graduating from the UofSC and starting her career alongside fellow STEM graduates she compares her undergraduate training to those of her professional peers and feels at a loss. Tamara spends her free time catching up on skillsets she feels her professional peers acquired during their undergraduate careers but she was lacking from her undergraduate experience. For this reason, she would not attend the UofSC again if given the opportunity.

Jennifer

Jennifer has a cheerful disposition on life. This disposition permeates in her interactions with others but is not without context and racialized obscurity. She is a 25-year old African American female from Beaufort, South Carolina who studied integrated information technology (IIT). Jennifer is working as a research scientist at Amazon through a paid internship while completing her engineering doctorate at Georgia Tech. Her final major GPA was a 4.0 and overall GPA was a 3.9, when she completed studies at the UofSC in 2017. Jennifer was admitted to the UofSC, the University of North Carolina at Chapel Hill, her first choice institution, and Clemson University. She elected to attend UofSC at the urging of her mother after review of the out-of-state cost of attendance for the University of North Carolina at Chapel Hill, which did not offer a comparable financial package to that of the UofSC. The financial package at the UofSC

provided her a sizeable refund check to cover books and other supplemental higher education costs.

Jennifer is competitive, by nature; this comes from her participation in sports and academics during her K-12 education. During her K-12 education she describes herself at being good at most things. She was the valedictorian of her high school. While she had never taken a computer science course until she arrived at the UofSC, she chose a STEM major as a result of her mom's strong encouragement to pursue a career that generated a high income. She quoted her mom's sentiment in sharing, "my mom said, you know we gotta make some money and you need to do something that can make you some money." Although high school did not prepare her for such a major, she persisted with the encouragement and support from an African American female teaching assistant (TA) whose lab she was enrolled in as an undergraduate student. Jennifer describes this lack of preparation in high school saying, "my senior year of high school was important because there weren't any more classes for me to take. My school didn't have AP and I couldn't take a dual credit math class, so I had to improvise my senior year."

Jennifer was on the brink of changing her STEM major when this African American female TA took her under her wing, providing her mentorship, guidance, and a paid position as an undergraduate research assistant during her time in the Department of Computing. This TA reaffirmed her goals and told her she was going to stick with her STEM major and that she was going to learn the necessary content. She did not let Jennifer give up on herself, she provided her with both a professional development opportunity and a comfortable place where she could study. Jennifer had her own computer station and practically lived in the lab. She was known for her bonnet and

sweatpants and always threw herself into her schoolwork and research duties. This interaction boosted Jennifer's confidence and through her lab participation she connected with fellow non-African American peers from the lab and formed study groups. Although a very outgoing person, it took some coaxing, encouragement, and reinforcement to build Jennifer's resolve to persist in her STEM major. Following this tumultuous first semester, Jennifer felt she had caught up with her White peers and she felt connected to her major through her research position. The studies she worked on focused on using robots to create equity in education; a topic she was most passionate about as she too wanted to improve learning outcomes for students in her hometown.

Although Jennifer received support and encouragement from her African American TA, she laments about never having an African American professor in her time at the UofSC. She felt this lack of diversity amongst teaching faculty heavily influenced teaching methodology and curriculum application to benefit White students and not African American and other minoritized students. She critically reflects on such a strong statement in comparison to her graduate educational curriculum, which teaches concepts in a way that invites students from various racialized experiences to craft their own assignments and apply technical science concepts in culturally diverse ways.

Jennifer is a self-described "people person" and with her cheery disposition and new comfortability within her STEM major, she harnesses her expertise to support fellow African American peers in the department. As a leader in high school, she became a leader at UofSC by becoming the founding member of Minorities in Computing (MIC). The founding of this organization was completed with the support of a White faculty member and administrator who were committed to increasing diversity and supporting

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minority students in the computing major. The relationships Jennifer established with her TA, and later went on to establish with her TA's advisor, provided her the guided leadership and confidence to purse her doctorate. She felt indebted to the African American graduate students who helped her successfully matriculate through the UofSC and is committed to paying that support back. For these and other reasons, she would attend the UofSC again.

Stacey

Stacey is straightforward and knows exactly what she wants and what she expected from her undergraduate experience. While she was not the first to attend college in her family, she was the first to attend a four-year university. Stacey is a 22-year old African American female from Spartanburg, South Carolina who studied CIS and is working as a cybersecurity technical specialist at IBM. Her final major GPA was 3.7 and her overall GPA was a 3.5 when she completed her studies in 2018. Her reason for attending the UofSC came as a result of touring the campus and feeling at home. She describes the campus as "welcoming" and felt UofSC had a strong IT program. She noted having completed a summer senior program at the campus while in high school and makes careful observation that she had people who looked like her who attended the UofSC and shared positive things about their experience with the institution.

Racialized identity relationships were very important to Stacey and were also a large part of her decision to attend the UofSC. She toured the University prior to attending and felt at home upon seeing fellow African Americans on the campus. Additionally, the summer senior program she participated in facilitated relationships with

incoming students in smaller groups for more intimate interaction. Although she participated in this summer senior program, she still felt outnumbered as an African American student. Though small in number, she formed close relationships with African American peers who she referred to as her "African American USC family." This African American USC family improved her experience significantly as she bonded with people she felt she could relate to over cookouts, being members of African American Greek organizations, and hosting hip hop Wednesday music and African American social events. She described this feeling by sharing, "I would definitely say I felt outnumbered sometimes, but you know, having the little African American USC family made my experience better because I always felt like I had people I could relate to." From a racial perspective, Stacey described her experience as good since she created lifelong friendships.

Stacey was grateful for the incoming supports she received at the University, so much so that she gave back through organizations like Gamecock Connection and Multicultural Student Outreach, which served to assist with the recruitment of first generation and minority students to enroll at the UofSC. For professional development, Stacey actively participated in Minorities in Computing. This organization was a driving force in her academic support because she felt more comfortable with African American peers who had taken or enrolled in similar courses and experienced similar struggles. Stacey did not completely segregate herself to African American peers. She joined other professional organizations that provided exposure to industry expectations through conferences and special events.

Stacey's academic experience was challenging, having not come from a family of technology experts. She lamented spending excess time in the library self-teaching concepts she was unfamiliar with and struggled with in the classroom. She compares her lack of technology exposure to those of her White counterparts who have been coding since middle and high school and come from families of technology consultants and coding professionals in corporate America. Stacey generalized these sentiments to most African Americans in the College of Engineering.

Although at an academic disadvantage upon entering her STEM major, Stacey bares no ill feelings toward her professors. To deter from such feelings, she went the extra mile and made it a priority to establish relationships with each of her instructors at the start of any course and before experiencing any challenges with course content. She utilized office hours to seek academic support and acknowledges that most faculty she engaged were helpful. She does however clarify that while some faculty were supportive and helpful, others were not, forcing her to rely on peer academic supports from fellow African American students.

Her experiences with administrators was much less than helpful and the height of her disappointment during her undergraduate career. Stacey felt as though the advisement she received on course selection and matriculation did not set her up for success. She felt obliged to build her own schedule and outline her own four-year course plan because she had heard that advisement, at times, placed African American students at risk of not graduating on time. She did not have a good experience with her advisor and neither did her friends; she felt they did not care about her career path. And so, in hindsight, Stacey would not elect to attend the UofSC again.

Shannon

Shannon is an ex-military, country boy, with love and adoration for his single mother. Shannon is a 25-year old African American male from Denmark, South Carolina who studied CIS and is working as a computer systems analyst at SAIC. His final major GPA was a 2.7, his overall GPA 3.0, and he completed his studies in 2018. He chose to attend the UofSC because it was in-state and he was able to utilize the state-based Life Scholarship available for qualifying graduation high school seniors. He reflected on his mom being a single parent and wanting to be close to home in case she needed him. Again, reiterating the cost benefit of attending the UofSC, Shannon mentioned that the UofSC was more affordable than other public institutions, had a good STEM program, and offered a military service member discount for tuition.

Shannon is product of the infamous "Corridor of Shame" and attended resource deficient K-12 schools in rural Bamberg County, South Carolina. Shannon is a Naval Reserve member and a man of discipline, integrity, and loyalty. He was accepted to Clemson University but chose not to attend based on the local community's historical treatment and lower numbers of African Americans. Shannon described this sentiment in saying, "Clemson, at the time, was different towards African-Americans. Students of color were in a lower percentage and I wanted to be in an area where it was diverse along with having a higher percentage of African-Americans. So for me, between the two schools, USC was a better fit." Shannon wanted to attend an in-state institution that had a higher percentage of African Americans and where he could excel.

Shannon was taken aback by the predominately White populated STEM courses and the larger class sizes. Shannon struggled academically at the beginning of his collegiate career. He felt his struggles came from the lack of preparation from his Bamberg school, which did not offer a challenging curriculum with diverse teaching methodologies. Shannon began his UofSC tenure teaching himself content he had not been exposed to while taking classes, which was stressful for him. He used his single mother who made less than $20,000 per year supporting two additional children, as his driving force to persist, achieve, and support his family while in school. Shannon held a part-time job while at the UofSC, providing supplemental support for his mother. He balanced military life, a part-time job, and maintained an average 15-16 credit hours in STEM science while at the UofSC. To cope with such rigorous obligations Shannon noted that he demonstrated good time management, which also helped him build a sense of confidence. He felt that if he could persist through military, work, and collegial responsibilities, he could be success in his careers.

Shannon experienced a lot of growth during his time at the UofSC. He attributed his persistence and success to his religious faith. He reiterated that he overcame any challenges experienced through prayer. Shannon is strong mentally and with his faith he overcame challenges with the mindset that his past educational deficiencies did not define him and that he could either persist through curricular challenges at the UofSC or drop out. For Shannon, not graduating from college was not an option. Therefore, Shannon's strong will allowed him to navigate academic obstacles with determination and connect with other students who were experiencing similar challenges. Connecting with other students provided peer tutoring supports that included accountability. He fought with

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himself to let go of the small-town mentality and engage with other students for his academic and professional benefit. This mindset aided in Shannon's success and for these reasons, he would attend the UofSC again if he had to choose.

Marvin

Marvin is a 28-year old African American male from Clio, South Carolina who studied CIS and is working as a senior system software engineer at Warner Media. His final major GPA was a 2.7, his overall GPA was a 2.7, and he completed his studies in 2018. He elected to attend the UofSC primarily because it was close proximity to family, which was an important factor. Additionally, the curriculum was strong and offered a desired "trifecta" between computer science, engineering, and information systems.

Marvin is a bright young African American male full of zeal and energy. He is family oriented and has always had passion for computer engineering, science, and information systems. Marvin acknowledges the academic under preparation from his small-town high school, having never been exposed to courses like trigonometry. This under preparation impacted UofSC's assumption that he had been exposed to various curricular teachings in high schools. Infrastructural inequities from his hometown exacerbated his lack of K-12 preparation for college, from the usage of outdated technologies such as dial-up internet service.

Marvin deeply reflected on his time at the UofSC, noting that the UofSC did the best they could do given his background and given that his playing field was no equal to his White peers who had more resources poured into their high schools. He felt he

learned everything he needed to learn while at the university and was also able to determine what areas he needed to improve on post-graduation.

Marvin was diagnosed with a chronic condition at an early age. Working with this condition in school presented many issues, mostly in terms of health and wellness. He described his health experience in saying,

> I forgot to mention that I have a chronic illness, and so working with that condition in school kind of presented issues, mostly on the healthcare side. You know if you can't go to the doctor to get help, your condition is probably going to deteriorate. So I had to work with USC a little bit more.

This condition is debilitating at times and impacted his physical and mental stamina inside and outside the classroom.

Marvin's health condition complicated his schooling because his condition would deteriorate if a doctor was unable to assist him. He applauded the UofSC for accommodating him through his disability in terms of leniency on assignment completion from faculty. With only this support he had to slow down the rigor of schooling to maintain his health, so he took time off from the UofSC and returned taking one class at a time at a slower pace while working full-time in IT. This permitted Marvin the opportunity to improve his academics while still managing his health and securing a private tutor to assist with this course curriculum. He reiterated how his care plan made all the difference in improving his curricular experience and he detailed that being able to afford a tutor made a drastic difference. Comparatively he was earning D's and below when he entered the program and earned B's and A's once a tutor was acquired.

Regarding his peers, Marvin described them as predominately White with implicit bias towards African American identity. He elaborated on his perspective saying, that while he did not want to go as far as to call them ignorant, their negative stereotypes regarding African American men were being inadvertently proven wrong by their positive encounters with him. He critically thought about his White peers' prejudicial thoughts of him from an empathetic lens, considering college as a place of discovery and a place where their racist microaggressions would be questioned both directly and indirectly. Marvin felt that his White peers discriminated without even knowing their doing and despite their racialized thoughts and ideas, he was able to get along with and socialize with them.

Marvin valued friendships and peer relationships, so much so that he joined a African American Greek fraternity at the encouragement of a friend, who said doing so would help him get involved in the community and play leadership roles in development. He described his Greek life experience as part of the overall college experience and one that gave him a set of people he could talk to, struggle with, and succeed with because he reasoned that there was no way one could go it alone.

In terms of academic supports, Marvin never felt comfortable going to the math center or the writing center because the setting was more group-oriented and he preferred one-on-one tutoring support. With preferring more intimate support settings, he enjoyed career services and found the individualized resume and mock interviews most helpful. Marvin had similar dismissive sentiments regarding advisement noting that they only signed off on courses he elected without in-depth review or discussion. His faculty interactions were mixed with some really good faculty and really indifferent instructors.

He elaborated in sharing that some faculty took an active role in his academic progression and met with him after class; going beyond what they were required to do. He clarified that these were fewer than most of his engineering instructors who provided such supports. The majority of other engineering faculty gave off an air of indifference regarding whether or not students were able to pick up and understand the material.

Teachers that provided more guidance and support were the classes where Marvin performed well due to instructors' approachability. Marvin critically reflected on the flippant experiences with faculty noting that he did not consider this any form of explicit bias due to race, but rather implicit bias towards minority students who had not been exposed to parents and faculty family connections who provide leverage regarding academic environments and acclimate their children to engaging with adults and superiors at an early age.

In terms of relatability, Marvin naturally gravitated towards the few African American peers in the classroom. He valued being able to be what he referred to as "his authentic self," without the need for code switching between African American reality and White comfortability. The majority of his experience in the College of Engineering was spent with African American people like himself who were trying to understand course materials. He described connecting with any African American student in his classes, which usually averaged out to about three African American students per course. Marvin did not consider his STEM courses diverse and when placed in student group assignments where he was one of the only African American members, he was often left out of group discussions and often had to catch up on his own with teammates. With the overall sentiment that his educational experience was self-designed, self-paced, and self-

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guided with his outreach to approachable faculty and African American peers, Marvin feels he would not attend the UofSC if given the opportunity. Marvin would attend MIT or Georgia Tech to really challenge himself.

Eric

Eric is the son of two parents who graduated from UofSC. He is a 24-year old male from Columbia, South Carolina who studied CIS and is working as a data engineer for Emphasis Limited. His final major GPA was a 3.4, overall GPA was 2.7, and he completed studies his in 2017. He attended UofSC because of his mother's love for the institution and the location (i.e., his hometown) which allowed access to close friends who lived in proximity of the campus.

Eric lived on campus for his first year then moved off campus the subsequent years. He did not have much experience with his STEM major prior to attending college because his high school did not offer computer science classes. However, he participated in a one-week coding program that developed K-12 student interest in coding. The program was offered by his high school multimedia teacher. This one-week exposure encouraged Eric to pursue computer science as a major in college. Eric did not feel as prepared for STEM studies as his White counterparts. Many of his classmates often discussed their prior experiences with the area of study and one shared that he had built a printer when he was twelve. Eric used this disadvantage to build strategic relationships with more experienced peers to provide academic support for himself.

Eric spent much of his time at the UofSC making friends and teaching himself curricular material introduced in class. As an African American student he felt pretty

good about his experience and included in the collegiate life via African American peers he connected with. Eric noted how it was difficult to find African American students in the STEM major and this dynamic is similar in his current field. He described this experience in stating, "We should definitely have more African American faculty in STEM to make the material more relatable. It's easier to learn content when the instructor has similar cultural and environmental context." Overall, he was able to connect with more African American peers outside of the College of Engineering, but within, there were few.

Eric actively participated in Minorities in Computing along with NSBE, which brought him more comfortability with fellow African American peers in STEM majors versus the majority White and Asian students who dominated many of his classes. He frequently was the only African American in his classes and re-connecting with this African American peer groups outside of class brought him social and emotional balance in addition to academic supports.

Eric maintained a job while in school, working 20-30 hours per week off campus. Faculty and administrative experiences were somewhat dismissive for Eric and he attributed these lackluster responses to a lack of interest in the African American experience while at the UofSC. He sought advisement and curricular supports from African American peers and persisted via these peer supports.

Overall, Eric felt his collegiate experience did not adequately prepare him for the workforce but did provide him the necessary building blocks. Eric, in his entrepreneurial spirit, launched a company after graduation and returned to attend the Science

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Engineering and Technology (SET) fair as an alumnus and acquired a position. Since these building blocks provided critical skillsets that he used in pursuing his career, he felt he would attend the UofSC again if provided the opportunity.

Andre

Andre is a 23-year old male from Charleston, South Carolina who studied computer science and is working as a managed service provider for VC3. His final major and overall GPA were both 3.4 and he completed his studies in 2019. His reason for attending the UofSC stemmed from both parents and two older siblings attending. Although being accepted into the College of Charleston, Clemson, and North Carolina Central, Andre chose to attend the UofSC because it "checked off the boxes," including overall costs and location. Additionally, the location was ideal, and the STEM program availability met his interests. In-state tuition was also a critically important deciding factor.

Andre describes his time at the UofSC as "good overall." He found the University had many talented professors and the programs, overall, were good. He felt the institution offered a myriad of programs and services for him to take advantage. He did, however, feel there were some improvements that needed to be made to the curriculum, but he felt overall the University was making a positive effort. Eric felt the UofSC actively sought student input to improve the campus overall. He did see a difference in the racial demographics as a predominately White institution and he often felt his presence as an African American male non-athlete was noticeably lesser on

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campus. Andre took this racial disparity in stride and maintained tunnel vision towards his goals.

Maintaining this tunnel vision assisted Andre as part of his character development from a young age. He attributed his "tunnel vision" mentality to his upbringing where his parents taught him that, at times, to be successful there might not be many people who look like him. He described this in reflecting,

I think it started from a young age. I was taught that wherever I go in life, I might not be around people who look like me. So I took this to heart and it drove me and reminded me that I don't have to have representation around me to be successful.

Andre internalized this ideology and this fueled his persistence during this undergraduate career.

On campus, Andre was active in diverse professional groups that assisted students with gaining real world experience. Additionally, he became the Vice President of an IT professional student group that provided business mentorship. He was also a member of the NSBE, but he noted the organization was less focused on internship acquisition and computing. However, Andre did find his membership with NSBE provided him fellowship and networking amongst African American peers. Andre does not feel his African American racial identity negatively impacted his collegiate experience. Although he was one of few African Americans in his STEM program, this environmental dynamic did not deter his educational and professional pursuits.

Andre did not develop relationships with faculty because he was not keen on doing extra work to establish a connection. He did, however, feel there were faculty standouts who served as advisors to student groups and assisted with him gaining pre-employment experience. Andre did not feel his undergraduate experience required close relationships with faculty, and he leaned more on assignment teammates and peers. Andre attributed his collegiate success to his wherewithal and would not change it for anything. He would attend the UofSC again if given the opportunity.

Sam

Sam is an even-tempered and straightforward African American male STEM professional from a single-parent family who takes life experiences as they come. He is a 25-year old male from Augusta, Georgia who studied CIS and is working as a senior system support technician for BlueCross BlueShield. His final major GPA was a 2.7, overall GPA was 2.8, and he completed his studies in 2018. He attended the UofSC at the urging of his mother.

Sam's mother had him at a very young age and she never attended college. He is a first-generation college student who promised his mother that he would successfully matriculate from the UofSC. It was his mother's love for the University that drove his persistence to achieve and he described his undergraduate experience as "making the best of what was given." Having both positive and negative interactions was something he anticipated during his tenure because of his lack of exposure and mentorship as a first-generation student.

Sam was a transfer student who attended a small university and technical college prior to enrolling at the UofSC. He initially began his collegiate career as a sociology major, but through upperclassmen peer connections he changed his major to engineering during his first spring semester. At the peer encouragement of an African American upperclassman, Sam was encouraged to pursue a major that yielded more money so he decided to pursue a STEM major. He described these initial connections in saying, "I just happened to be playing basketball one day, and I was also a big party guy, so I would always run into this guy and one day he told me I could make some decent money in STEM and I made the switch." Sam connected with these peers through social activities like playing basketball and attending parties. He had only a small group of peers which he felt he could relate to and would keep him on par with curricular expectations and supports for areas where he was lacking. This small group of peers attempted to keep him up to academic speed and served as a close-knit social, emotional, and academic unit for Sam. They had each other's back and Sam valued these relationships.

Sam held two jobs while attending UofSC and worked between 30 and 35 hours per week while balancing studies and received federal assistance for food stamps. He stayed off campus in a shared living space because it was the more affordable option and helped him reduce his college debt. He lived in various places off campus for three and a half years while attending UofSC. One of his roommates was an electrical engineering major who provided professional development supports. He advised him regarding the job benefits, encouraged him to attend the career fairs, helped him with his resume, and connected him with professionals to help Sam develop his network. Sam was actively involved in African American professional organizations including NSBE and Minorities

in Computing. He attended STEM career fairs but was underqualified for any internship position. Upon admission to upper division, Eric secured his first internship with the company he is currently working for. He attributes his ability to acquire this position to MIC. Minorities in Computing provided Eric with recommendations on how to present himself along with business dress items including a suit and tie and professional headshots. They assisted with interview questions and how to sell himself to recruiters and salary negotiations.

In class, Eric did not connect with faculty members or have overly positive experiences with the majority. He felt race played a factor as he observed an easier comfortability between his White peers and himself as they were better able to mingle and connect and have conversations with faculty. Eric reasoned that much of this comfortability comes from his limited background in STEM and extensive experience some of his White peers had been exposed to. He described some of his classmates mentioning that they knew how to code since the age of eleven compared to his year and a half experience. Eric felt he could not speak the language of the discipline in a way that he could further connect to faculty or engage in the same manner as his more advanced peers. Eric felt that faculty reasoned that they would get paid regardless and as a result did not put extra effort towards engaging all students, particularly the few African American students in his classes. He felt they did not make the effort to establish relationships with African American students and that they lacked empathy regarding the challenging experiences African American students had in their courses. This made Eric feel lonely and as if he did not belong in the major. Connecting with his African

American peers provided the support, empathy, and comfortability he needed to complete his studies and move from his internship to a full-time employee.

Eric feels these curricular experiences prepared him for the workforce as he is the only African American member on his team and has to navigate feelings of isolation and exclusion on a daily basis and feels better prepared and better able to cope. Considering the above, Eric would attend the UofSC again as he feels that attending a predominately White institution looks good for African Americans on resumes. However, he feels the historically African American college or university experience would have provided him more personal enrichment.

Kevin

Kevin is a 24-year old male from Rochester, New York who studied computer science and now works as an alliances and strategic partnerships account manager for IBM. His final major GPA was a 3.2, overall GPA 3.5, and he completed his studies in 2019. He attended the UofSC after taking a tour of the campus, having a parent who attended UofSC, and not receiving direct admittance into Clemson University. Although he was recommended for Clemson's Bridge Program, he elected to attend the UofSC. The strength of Kevin's family served as his backbone. As an only child from his mom and having two half siblings, extended family members, relatives and other familial supports kept him grounded and guided his pursuits. They were his source of support during challenging times and his source of mentorship as he navigated professional environments.

Kevin had a positive experience at the UofSC but felt there could have been some improvements in the computer science department curriculum regarding the teaching of practical skillsets. Regarding the campus and community climate, Kevin felt that because the University is situated in the South, social segregation undertones and microaggressions were prevalent regarding the treatment of himself and other African American students. He felt this treatment was largely the result of racial inequities and financial disparities between African American and White families in addition to systemic racism that has taken place in South Carolina. He described these sentiments in saying, "I think as an African American at USC, it's not that you're necessarily seen as different intentionally. I think it has a lot more to do with the financial disparity in the South between African-American and Caucasian families and the social structures in place for each side." During his time at the UofSC, Kevin realized that many of his African American and White peers were socialized to segregate, which creates these racialized subsets around campus. Kevin subscribed to this socialization but often tried to extend his peer relationships to people with similar interests as him, including gaming.

Kevin described how his peer relationships came from a place of comfort. He joined an African American Greek fraternity in addition to participating in the Carolina Gamers EA Sports Club and the video games club and hackathons. He recognized his own comfortability in socializing and engaging with people who looked like him and enjoyed similar activities to himself; this socialization was somewhat more diverse since he also enjoyed gaming. Although he experienced such microaggressions he enjoyed his time at the UofSC and made friends he remembers to date. Kevin attributed his success

after graduating from the UofSC to taking on an internship as a student. For these and other reasons, Kevin would attend the UofSC again if provided the opportunity.

Findings

The purpose of this study was to gain an understanding of the experiences and perceptions of African American STEM alumni regarding their undergraduate and post undergraduate experiences, as well as factors contributing to these experiences. The preceding section detailed the profiles of the 10 participants. A look into the participants' undergraduate experience delves more into what they encountered and how they processed through experiences. Through analysis of the data, insight was provided into the various familial, social, and academic factors which impacted the alumni participants' collegiate experiences.

Subsequently six themes and nineteen subthemes emerged. These themes include: 1) Motivation for attending UofSC defined as specific reasons African American STEM alumni elected to attend UofSC, 2) Transition from high school to college, defined as curricular transition from high school studies to collegiate STEM science curriculum for African American students, 3) Influence of instructors, defined as the influence of faculty, teaching instructors, and/or teaching assistants on African American STEM student experiences, 4) Influence of administrators, defined as the influence of interactions between African American STEM students and administrative personnel, 5) Influence of African American peer relationships defined as bonds formed with like-minded individuals that contributed to positive experiences for African American STEM alumni, and 6) Transition from UofSC to the workforce. Table 4.2 identifies each

emergent theme from the analysis along with the frequency of each theme among the participants.

Table 4.2 *Emergent Themes with Frequencies*

Motivations to Attend UofSC	# of participants
Proximity to family	5 out of 10
Financial burden	6 out of 10
Encouragement and positive references	4 out of 10
Transition from High School to College	
Challenges and Stressors	2 out of 10
Learning curves	6 out of 10
Positive experiences	2 out of 10
Limited STEM exposure	5 out of 10
Influence of Instructors	
Negative faculty/instructor/TA interactions	8 out of 10
Positive faculty/instructor/TA relationships of significance	6 out of 10
Influence of Administrators	
Negative interactions	5 out of 10
Positive interactions	5 out of 10
Influence of Peer Relationships	
African American peer study groups	8 out of 10
African American Greek organizations	4 out of 10
Minority peer professional networks	7 out of 10
Diverse peer professional networks	10 out of 10
Transition from UofSC to Workforce/Graduate School	
Career fair and conference attendance	8 out of 10
Internship experiences	9 out of 10
Job or Scholarship pre graduation	9 out of 10
Unprepared for workforce or graduate education	4 out of 10

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The proceeding sections detail the findings of the study and major themes gleaned from the participants.

Motivations for UofSC Attendance

The first theme that emerged from the study was motivation to attend the UofSC. Participants in the study outlined specific reasons for why they chose to attend the UofSC and many similarities were present. Three subthemes emerged: 1) close proximity to family, 2) lower financial burden, and 3) encouragement and references from current and former students.

Close proximity to family. The first subtheme is close proximity to family. Half of the participants shared family as a reason for selecting the UofSC as their college of choice. Regarding being close to family, Shannon shared:

> There was a notion in the back of my head that my mom is a single parent and with the rest of my siblings being gone, I was able to be far enough away to experience something new, but close enough to be home just in case my mom ever needed that.

African American students often balance competing priorities including caregiver and/or familial support. These familial roles often contribute to them attending higher education institutions within close proximity to immediate family in order to render support as needed. Similarly, Marvin noted "it wasn't too far away from family so that was a big one," while Eric stated, "it's right there in our hometown." Andre and Tamara reiterated, "a lot was just location" and "it's close to home," respectively. African American family culture often includes very strong bonds and very close-knit relationships that serve as a

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source for acknowledgement, shared humanity, and motivation, which can impact educational goals and professional development considerations.

Financial burden. Six out of the 10 participants mentioned finances as their motivation for attending the UofSC so this emerged as another subtheme. Specifically, the decreased financial burden was a prominent reason participants elected to attend the UofSC. In-state tuition and scholarships were available to participants and provided more accessibility. Twenty-two percent of African American students have significant concerns regarding their ability to pay for college compared to 9% of White students (Eagan et al., 2014). Jeremy, Tamara, Stacey, and Marvin shared they chose to attend the University due to in-state tuition benefits. Jennifer elaborated on this topic after gaining admittance into one of the top Universities in the nation, reflecting:

And so, my mom said Chapel Hill was too expensive. I got in, but I didn't get a great financial package from them. They were offering to pay for most of it, but I still would have been taking out like ten to fifteen thousand dollars in loans a year, which isn't too terrible. But my mom, yeah, my mom not was not trying to hear it at all; considering Clemson was giving me a full ride and USC was giving me a full ride, in addition to Furman and State. And just about every other school in South Carolina was giving me a full ride too. And so I was like, well if we're making this decision off of money, Clemson would offer me a pretty decent package, but USC was giving me enough money that I would have a very nice refund check every year to last me the whole semester.

Although Jennifer was admitted into an Ivy League institution, she and her family weighed the impact of debt, which ultimately led her to elect to attend the UofSC. Approximately 40% of students who forego attending their higher education institution of first choice did so as a result of cost related reasons (Seltzer, 2017). Similar to Jennifer, Shannon also made financial considerations to minimize the amount of debt he would acquire in attending a college or university. He too attended the UofSC to take advantage of education awards including the Life Scholarship and in-state tuition. Shannon shared:

> I chose the University of South Carolina, for one, it was in-state. And with it being in-state, that allowed me to utilize the Life Scholarship I received from graduating from high school. And with the cost of USC, I noticed that the University of South Carolina and even other public institutions were a lot cheaper to attend than an HBCU. With me also being a military service member, a naval reserve, USC also offered military, this thing called military verification, whereas they give you a discount, a percentage off your tuition as well. I was able to save a lot of money by attending the University of South Carolina.

In-state tuition and other merit-based educational awards largely influenced why African American STEM students from the UofSC who participated in this study elected to attend the institution. Taking advantage of financial benefits to reduce the cost of higher education was a priority for Shannon and other study participants. His military classification provided an additional financial bonus which he took advantage of.

Moreover, Andre simply stated, "in-state tuition was very important." In 2016, nearly one-fifth of students who gained admission into their top college selection did not

enroll due to cost, while cost was noted on the surveys of nearly 19 percent of students who elected not to attend their initial college preference. Financial aid received from competing institutions was noted as reasons students elected to enroll in an institution. Non-need-based awards were the reasons 6% chose to attend a specific college (Seltzer, 2017). A critical caveat is that 8 out of 10 study participants were South Carolina natives, meaning they would directly benefit from in-state tuition. This evidence further supports the importance of finance in attending college.

Encouragement and positive references. Finally, encouragement from family and other peers was evidenced among participants and emerged as the third subtheme. Four out of 10 participants acknowledged encouragement and positive references as a motivation for attending the UofSC. Jennifer shared, "I already knew that Tricia, the salutatorian, was going there and that [we] could be roommates. We were good friends, so that kind of played a lot into my decision." Stacey provided a more direct and explicit reason stating, "I had people who looked like me, who went to USC and told me all the good things about USC so that made me super comfortable." Kevin attended UofSC based on both his parents attending the institution, while Sam was influenced off his "mother's love for the University."

Strong recommendation and encouragement from friends and family moved African American STEM students from UofSC to initially enroll. Cost-savings supported initial interests to attend the SC flagship university along with family support. Assurance and validation of the decision made to attend a college or university are important to African American students. Beyond other forms of recruitment, personal recommendations and word-of-mouth further encourage African American students to

attend a specific college or university. The stated reasons these African American alumni
provided for attending the UofSC are important from a recruitment perspective because
these reasons drive African American enrollment, which in a highly competitive higher
education environment, encourages institutions to intentionally seek local African
American talent.

Transition from High School to College

The second major theme that emerged from this study was the transition from
high school to college. Overall, participants described their undergraduate experiences as
African American STEM students along a spectrum of emotions. Specifically, Jeremy
and Tamara described their experience as "challenging" and "stressful." Stacey, Jennifer,
Marvin, Eric and Sam described their experiences as "transformative," a "learning
curve," "good," "bad," and "scary." Shannon described it as a "wake-up-call." Andre
and Kevin described their experience as "good" and "really good." There were four
subthemes that encompassed this major theme and are detailed in the proceeding
sections: 1) challenges and stressors, 2) learning curves, 3) positive experiences, and 4)
limited STEM exposure.

Learning curves. In expounding on the aforementioned sentiments, Jeremy felt
his experience was "challenging in the computing college due to lack of representation."
On the other hand, Stacey lamented in her transition from high school to college as hectic
due to her lack of experience with the curriculum as an African American. She stated:

I felt the experience was stressful because I spent a lot of time at the library and

spent a lot of time teaching myself how to do certain things because I really felt

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like I wasn't learning much in class or I had to do after hours and just each myself. So, it was really challenging having that course load. I feel like most African Americans who are in the College of Engineering and Computing, they come from families that have never been in that field.

Jeremy defined his transition from high school to college using racialized comfortability because he was used to a K-12 environment where his classmates were other African Americans. However, Stacey defined her transition on the basis of curricular expectations, which was not what she had been exposed to in her K-12 education.

As a transformative experience, Jennifer reflected on her transition from high school to college as one that changed how she processed new information and how she acted on this new information. She stated:

The word I want to use is definitely in "phases." I feel like I had different phases of how I would be feeling at different times. The first year was definitely a growing experience. I never took computer science until I got to USC. I never took calculus in high school, so that was a huge learning curve for me.

The lack of collegiate preparation in K-12 schools is common for African American students. Many predominately African American K-12 schools do not offer Advanced Placement (AP) courses. This does not acclimate African American students to the collegiate curriculum. Additionally, K-12 public schools also do not market collegiate preparatory courses equally to African American students versus White students. African American students are often overlooked or discouraged from taking college preparatory courses, which can negatively impact their transition when they enroll in college courses.

Additional study participants felt a similar sense tension regarding the lack of preparation they experienced in transitioning from high school curriculum to college. Marvin further described this learning curve experience in sharing:

> I was severely underprepared from my high school. So, I didn't know things like trigonometry, for instance, never seen that, and so I came to college and a lot of things that you know, my major kind of assumed I had. So, I had to learn a lot of stuff from that. Not being on an equal playing field like people who maybe didn't live in a poorer area; stuff like that.

Marvin's description on the severity of his lack of preparation in K-12 underscores both the impact of predominately African American K-12 schools and the students' under preparation for college. Additionally, Marvin's description illuminates the outcome of this under preparation including college departments' generalized expectation of student aptitude, which contributes to African American student stressors.

Eric also shared in the collegiate under preparation experience but highlighted the limited exposure to the STEM discipline he was provided, along with the impact. He noted:

> I mean academically I hadn't had very much experience with my major prior to going to college. So, like my high school didn't offer, like, computer science. The closest thing we had was like, I'm not sure if you're familiar with code.org or not, but code.org is pretty much like getting K through 12 students to develop an interest in coding and learning more about computer science. So, I did that with my multimedia teacher, and I was interested in it and I liked it a lot. So that's the

reason I decided I wanted to do computer science. So that was all I had was like

that one week of code. Right. And then maybe some just looking up stuff on my

own. So then when I got to college, you know, there's other White students that

are like, they've been doing it forever. And there's one White guy and I had a class

with that. He built a printer when he was twelve.

Eric illustrated the impact a small one-week coding camp left on his impression of the

STEM field and how it encouraged him to pursue STEM science. He also compared the

one-week preparation he received from his school to that of his White counterparts whose

exposure to STEM and course preparation outweighed his. Disparities in educational

preparation can lead to feelings of isolation and deficient aptitude among college

students. This can then lead to departures from the STEM major or dropping out of

school altogether.

Next, Sam described an indifferent feeling of acceptance regarding the positive

and negative experiences he endured while at the UofSC. These feelings of indifference

were illuminated by the lack of high school preparation for college, being a first-

generation student, lack of relatability to the majority White peers on campus and

importance of his inner African American circle of friends. He contextualized this

sentiment by stating:

My undergraduate experience as an African American STEM student, I would say

I made the best of what I was given. Some are good, some are bad, you know, the

bad things occurred since I really didn't know what I was getting myself into

being a first-generation student. There wasn't many people I could relate to and

the small group that I did find, you know, made sure that I was kind of up to par on everything or whatever I was lacking or whatever I didn't know. They tried to catch me up to speed. So, it was kind of like a you know, I would say like, a fraternity. It wasn't many of us, but we had each other's back.

Sam's description of the "bad" is reflective in the isolation he experienced in being one of few African American STEM students coupled with feeling inadequate due to his status as a first generation college student. He balanced these feelings of isolation and disadvantage and "made the best" of his situation by seeking out his racialized circle of friends who provided social-emotional and curricular supports.

First generation African American students often experience challenges in their transition from high school to college. They often seek African American peers and African American faculty to compensate for these feelings, which support them in persisting through college. In this study, curricular supports, mentorship, and a circle of peers who represent similar identity groups was critical to African American STEM alumni persistence and these sentiments persisted throughout interviews with additional alumni. Tamara shared the extensive support opportunities she seamlessly transitioned to and how these supports provided for a more positive undergraduate experience. Tamara shared her experiences:

I was presented a lot of opportunities that other people weren't presented; just because, like I talked to everybody and Dr. Andrews presented us with this organization Minorities in Computing, that Sheree started. And then I was under her wing. And so, it helped me get involved with a lot of different things. So, I got

to go on a lot of trips and a lot of board meetings and really talk about diversity in computing. And so, it was pretty good.

Tamara described being introduced to a minority student-support organization, led by an African American upperclassman who took her on as a mentee and connected her with additional opportunities. The initial faculty interest in the minority STEM student experience and their action-oriented support in the founding of MIC benefited Tamara after her arrival to the campus. Her connection with an African American upper classman, Sheree, provided an opportunity to improve upon the African American experience Sheree herself had and addressed prior feelings of isolation and curricular disadvantages typically experienced by African American STEM students at the UofSC. Tamara's experience demonstrates a commitment and similar outcomes were shared with other African American STEM participants. These similarities demonstrate how these positive changes impacted African American student experience.

Andre and Kevin shared in positive experiences similar to Tamara. Andre reflected:

> It was… it was good. Overall, they have some really talented professors. There are really good programs, and a lot of things that you can take advantage of by becoming a part of. You know, they're still working on some of the curriculum and etching out some of things there. But I think they're making a really good effort. In doing so. They take. I think that a lot of the students input on trying to better the curriculum as they go. So, it was really a pretty good program.

Kevin shared in the positive overall experience that UofSC provided and noted:

My…my experience at USC was, it was a really good experience. I think it left some things…with their computer science program…it kind of left some things to be desired in terms of the practical skillset. And socially, I think the South can still be very kind of behind. I can't think the opposite of overt, but the… the social segregation undertones are kind of still there. It's… it's different, but overall, I enjoyed my time at USC and made a lot of friends that I'll remember till the end of time

Overall, the positive experiences described by the participants result from the intentional racialized peer supports and opportunities presented to African American STEM student. This is an effort PWIs should maintain and improve upon.

Limited exposure to STEM science prior to college. Most of the study participants experienced similar learning curves in their transition to STEM from high school with five participants having little or no exposure to the STEM curriculum. Jennifer reflected on seeing her peers complete class activities with calculated speed while she struggled. She revealed more about this experience.

And so being a classroom like that, being around kids who had taken CS [computer science] in high school, who did that first lab in five minutes and ran out the door, and it took me hours; like just going from being valedictorian, never having been in a situation like that before, being thrown into that was a lot for me to kind of unbuckle and work through my first year struggling through math. I had never, never had to do that before and never had to struggle through it.

Jennifer described her academic experience as "playing catch up" and described the classroom demographic from a racialized perspective. She stated:

I went from having all African American teachers in high school to having not one my entire undergraduate curriculum. And I saw that as a problem because I would literally sit in class sometimes and I listen to the examples they would use, and I would try to understand and break them down. But I found myself going on YouTube, looking up people who would use different examples; like there was this one time in class where we had an assignment in lab where we had to make a chess game and other people found that super easy. They just ran through it. But I don't play chess. And so half of the class I spent literally trying to understand the rules that I made for the program. And for me, that was so problematic because I was like, you know, if this was spades, I would be the first one out of here, because that's the type of games I play. The curriculum should be more inclusive

She also elaborated on the educational resource disparities between predominately White and African American schools and districts from her hometown and how this impacted her.

It's hard to separate exposure from race. And so, in some ways I tried to make myself feel better. To say to myself it's not because you're African American, it's because you haven't seen this before. And I feel like in so many parts of South Carolina, the reason you haven't seen it before is because you're African American and because the districts and the disproportion of resources to those school compared to school in Greenville and other magnet academies like that.

In her youth, Jennifer observed and processed racial differences in the resources and educational outcomes for African American versus White students and fought against

internalized oppression and attributed this difference to her own inequity. African American students often feel the curricular challenges they experience at the start of college are a result of their individual inequities and these inequities can be internalized to negatively impact self-identity and aptitude. Jennifer fought against this internalized oppression and reframed this personalized mindset to reflect the actual inequities in resources provision between White and African American K-12 schools. Stacey shared in similar racialized academic transition experiences to those of Jennifer, noting her lack of familial exposure to STEM, prior to enrolling at UofSC, along with the impact. She shared her thoughts on this lack of exposure comparatively among African American students and their families.

> As an African-American engineering student, I come from a family that has never been in the field and most people in my classes had families who are tech consultants and they work in corporate America and they've been coding and doing technical things since they were in high school and middle school. So, for me, I didn't start doing that stuff until I go to college and that was the most challenging.

Stacey comparatively views her curricular transition experience in comparison to other African American families who she reasons are unable to set expectations for their children who are entering into the STEM discipline due to their own lack of exposure. This assertion by Stacey bears some truth as many African American STEM students do not come from STEM familial backgrounds which can impact retention and persistence. This then leads to feelings and experiences of disadvantage among African American STEM students who are the first to pursue the degree in their family. This lack of

exposure can lead to a sense of surprise when African American STEM students encountered predominately White collegiate environments, large classroom sizes, and being introduced to new teaching methodologies.

Shannon described his more shocked high school to college transition experience.

The first thing was being, you know, being in an environment and being in a classroom setting with people that didn't look like me and being in classroom sizes that I wasn't typically use to. I felt behind, because coming from the area where I came from, a lot of methods used for particular subjects wasn't taught to me. Our high school curriculum, I felt, wasn't on par to what I got hit with when I first go to college. Because the area I grew up in was part of the "corridor of shame" in South Carolina. So, it was hard, so I had to work.

Shannon reiterated the sentiments study participants shared regarding being one of few African American STEM students along with feeling ill-prepared for STEM curriculum rigor. He underscored the vast difference between his high school education in referring to the infamous "Corridor of Shame," that brought national attention to gross inequitable school funding between predominately White and African American schools along with poor student achievement among predominately African American schools in the South Carolina. He attributed this lack of infrastructure and lack of collegiate preparation to his challenges within the STEM curriculum at the UofSC. But he described a resolve to persist and excel which many African American students embody during their college degree pursuits. Feelings of under preparation from high school was common among study participants.

Marvin too felt his transition to college STEM was challenging and was direct in his reflection about the experience saying, "I was severely underprepared from my school. So, I didn't know things like trigonometry, for instance; never heard of it. And so, I came to college with a lot of things, you know, especially my major kind of assumed I had." Marvin revealed a disconnect between collegiate course major expectations of incoming students and competencies. He also detailed a similar disconnect in community infrastructure with his hometown of Clio, South Carolina. Clio, South Carolina only had a 56K dialup modem and no broadband internet service capabilities.

Eric shared similar limited STEM exposure in his high school experience but highlighted a coding workshop made available to him in high school, which contributed tremendously to spawning his interest in the field. He provided observation of his experience:

> I hadn't had very much experience with my major prior to going to college. So, like my high school didn't offer, like, computer science. The closest thing was like, code.org, which was pretty much like a program to get K through 12 students to develop an interest in coding and learning more about computer science. So, I did that with my multimedia teacher, and I was interested in it and like it a lot. When I got to college, there's other people that have been doing STEM forever; there's one guy I had in class and he built a printer when he was twelve

While over half of the participants expressed experiencing challenging transitions from high school to college, it was important to note that few were accustomed to the lack of African American representation in certain class settings and adapted very easily. Tamara was more accustomed to the lack of diversity in classroom settings, "It was the

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same because like in high school, I was an AP and honors student. So, it was always either one of the two of us, and I played tennis, I danced, and it was just me, so, it didn't really bother me." Therefore, while an overwhelming majority of study participants experienced curricular transition challenges from high school to college, a few had already experienced being one of few African American students among their White peers. Collegiate disparities also persisted and classroom experiences and their impact on study participants are noted in the next section.

A comparative look at the positive and negative high school to college transitions for these African American STEM alumni are important for higher education institutions as these balanced perspectives provide specific identification of environmental factors that contribute to initial curricular challenges (K-12 education inequity and lack of STEM exposure) and anti-deficit environmental factors (formation of racialized peer groups) that immediately address their lack of STEM preparation. This serves as a charge for higher education administrators for bridge program development and peer support engagement, which can improve retention and attrition rates.

A closer look into the "social segregation undertones," mentioned by the participants reveal a myriad of African American student experiences encountered during their tenure at the UofSC ranging from experiences with faculty, administrative officials, and peers. The third theme summarizes teaching experience responses and impacts.

Influence of Instructors

The third theme examines the influence of instructors on the participants' experiences at the UofSC. Jeremy described his relationship with faculty as "love/hate because me and other students would hold faculty accountable which would at times

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cause conflict." Tamara affirmed Jeremy's critique and added the critical necessity of having at least one strong faculty relationship to persist in collegiate studies. She shared, "It takes the professors as a big part of your undergrad experience; so, without Dr. James saying that I need to be in and organization for minorities and computing, I probably would have had a different experience." Tamara reflected on a second influential faculty member. "Dr. Jeng was a good factor; that's when I really learned how to code well. He was my instructor and he stayed after hour a lot to help us when we needed his help; so, he was a really huge factor." Tamara underscored the critical necessity for African American students to have faculty mentorship during their college experience. This creates positive relationships and improves academic experiences.

When asked about the "hate" relationship with teaching faculty, Tamara blatantly shared, "they were racist." When probed to share a specific experience that made her feel her professor was discriminatory toward her because she was African American, she elaborated. "I could present my code and need help, while a White person could request for and immediately receive help. I would get told they were too busy." During this instance, Tamara recounted how she again asked for help and was accused of cheating and had to escalate the incident to administrators. Such racialized experiences are not uncommon for African American STEM students and often taint their perspective of the collegiate experience. Such experiences create tensions between students and faculty and move African American students to seek out fellow African American students and African American faculty for supports.

A second participant, Jennifer, shared in the importance of quality teachers/teaching staff in institutions of higher education. She detailed mentoring and opportunities for exposure to practical experiences for African American students.

My T.A. was super important and influential in my whole journey. She was a African American female grad student at the time and she's now a professor at an HBCU. She told me I was gonna stick it out and I was going to learn how to code and I was like OK, I'm willing to give it a shot. She invited me to work in her lab and that was the change factor for me. She was working on projects with robots and rural education and that was right up my alley. I fell in love with research through her lab and through her advisement and through her advisor who was also a faculty in the College of Engineering. Those two women, having them influenced my trajectory and put me on a path for research.

A study by Indiana University-Purdue University examined how to help African American women students stay in STEM (Indiana University-Purdue University Indianapolis School of Science, 2019). The study found that having allies and role models who share racial identity is key to belonging. African American college students often need motivations and motivators to encourage them when they experience challenges. These supports encourage them to persist and provide them academic and professional resources to build their portfolios in comfortable environments where they can be themselves. Additionally, it helps students to acquire the specific help they need.

Stacey shared in similar positive experiences with some faculty and what made these experiences so positive. She emphasized the faculty made themselves accessible for individualized support. However, Stacey's challenging experiences with other faculty

did not come as a result of racism or dismissiveness, but rather the nature of the challenging STEM curriculum and her learning curve. She detailed both of her varying experiences.

> I think I had pretty good relationships with my professors. I make sure I establish that early on because I would be struggling in some of those class. So, I think the professors, some of them as USC, they were super helpful with always having open office hours. I remember I would spend like hours in my professors' office hours just trying to get help. So, it was some of them, well most of them didn't have a problem with helping out. I will say some were tougher than others, but for the most part they wanted to help you out. Those that were tough, I think maybe it was just the toughness of the course and not maybe necessarily due to race or anything like that.

A major key to Stacey's positive relationships with faculty was her intentional relationship-building skills, which were largely facilitated by her. Interestingly, it would appear that unless African American students seek out relationships with faculty, these interactions are not fostered, which can impact learning. Other participants shared in the idea that not fostering relationships with faculty can contribute to curricular challenges.

Shannon lamented that he never developed any relationships with professors, but reiterated similar participant experiences about exceptional faculty.

Relationships, if at all, were very, very rare with faculty. Most faculty members… you know.. you just go through and you take those professors and once you take them you never see the again. But there were two that stood out that really stood out to me, who actually let me know they cared about my

education, cared about my success and wanted me to succeed. Once when I was turning in a couple of assignments late, my professor pulled me to the side and said this is not like you. It was good for him to actually know me, for him to notice that I wasn't myself that particular time, and for him to check on me and to formulate a plan for me to still succeed in his class. That let me know he really cared. And Dr. Fran, she knew I had a special interest in cyber security, and I would always come around and pick her brain. She would always give me different things to research and would talk to me about the life of someone in cyber security. She would always check on me and make sure I was ok.

Taking a concerted interest in student outcomes, for those who appear to be struggling, was important to African American STEM alumni from the UofSC. Faculty showing concern for the well-being of African American students who appear to be struggling built student interest and further encouraged them to complete assignments and stay engaged. Moreover, professional and career advisement from faculty was also appreciated by African American STEM students at the UofSC. These juxtaposed experiences with faculty were common throughout interviews with African American STEM alumni.

Marvin also shared in mixed relationships with faculty; both positive and negative ones he describes as "indifferent." He articulated these experiences:

You know, I had really good teachers and I had really indifferent teachers. I had some teachers who took like an active role in my progression academically, they met with me after class, maybe beyond the, you know, beyond the call of duty for what they were required to do; I will say those teachers were fewer than the

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average in engineering. Most were like, you pick up the material on your own or you figure it out by some other means, but not by talking to me. The teachers that were there for me, those were the classes I tended to do best in, because they were a lot more approachable towards giving help.

A common theme throughout African American STEM alumni faculty experiences includes a sentiment that teachers were genuinely interested in their success and were intentional in their contributions towards that success. This intentionality was reflected in providing individualized time for African American students to query assignment challenges and seek help. The result of such supports, as underscored by Marvin, is that African American STEM students perform better in courses where faculty provide individualized academic supports as needed. Therefore, the importance of engaged faculty could not be underscored enough during the interviews with the participants. While a limited number of engaged faculty provided individualized supports for these African American STEM students, the vast majority of faculty acted in ways that came off as dismissive to the students.

Eric described an overall absent relationship with faculty in which he did not have a relationship with any faculty. He clarified this sentiment in sharing that some professors were approachable and could be inquired for questions but that was the extent of engagement. He detailed his thoughts:

I don't think I had much of a relationship with any of the faculty. It just depended on the professor, really. So, there were some professors that I could go, and I could talk to them and they would explain things really well. I would just pick it up and be like, OK, that makes sense. And then there were other professors

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where either they make it more confusing or they just don't both with you at all. I had a professor that just didn't bother with us at all. Like we would ask him questions and he would just be like, don't bother me with these questions. Just go read and figure it out. So, it just depended on the professor.

Approachability towards African American STEM students was absent among faculty at the UofSC. These students felt compelled to learn the information on their own, thus justification for forming African American study groups to learn material taught in class.

Similar to Eric and other participants, Andre had similar dismissive faculty experiences but questioned his own contributions to the relationship dynamic. He reflected:

To be honest, I didn't develop too many relationships with faculty. I'm not sure if that's just out of my own habit or just be not doing the extra when it comes to a relationship with my professors. But there were standout professors, you know, who were really involved and helpful in groups such as ITP or with assisting in getting internships, and they made sure they made themselves available. I just didn't always use my professors, for instance, unless it was like a project related or internship related thing.

Faculty behaviors toward African American STEM students at the UofSC, as internalized by the participants, leaves to question who is responsible for initiating relationships between faculty and African American students who are 1) few in class numbers, 2) those who might be struggling with the curriculum, and/or 3) students who typically feel marginalized from classroom settings. While the majority of participants would have

preferred more outreach on the part of faculty, some question their lack of contributions to relationship-building with faculty.

The common theme among African American STEM alumni participants echoes faculty interactions that lacked interaction, engagement, and intentional relationship building. Sam reiterated not having a significant relationship but noted this was due to their inability in knowing how to communicate with diverse populations. He detailed these thoughts:

> Honestly, I didn't really have relationships with faculty members at the University of South Carolina. You know, there was maybe like two or three professors I encountered, but the majority, there was no type of connection. I wouldn't say they were bad; I would say they just didn't know how to communicate. You can't communicate with everyone the same way you know; I mean everyone is different.

The inability to communicate with diverse student populations was reflected in Sam's experience and an important detail regarding why faculty and African American student relationships were not as frequent as African American STEM students from the UofSC would have liked.

Finally, Kevin shared similar thoughts to Marvin and a few other participants but focused more on his own lack of engagement with faculty while noting their off-putting demeanor. Kevin stated:

> I didn't have a relation with faculty. I didn't utilize office hours and those type of resources as much as I probably should have. And it wasn't something I was really comfortable with because I think a lot of professors in the computer science

and engineering hard science communities can kind of have an air about them, that "you should know this, this isn't hard." So, I just never felt comfortable going.

Kevin highlighted the reasons behind his own faculty disengagement noting that he did not take advantage of office hours. He underscores previously stated reasoning regarding his lack of faculty relationship-building noting that faculty's lack of approachability and elitist demeanor regarding the learning process. Being made to feel that curriculum questions demonstrate lack of educational acumen deterred Kevin from forming relationships with faculty and lack of comfortability with faculty did not encourage engagement on his part as well.

Overall, the vast majority of study participants did not have relationships with most of their faculty members, and those who did have engaging relationships described these relationships as ones that involved individualized academic support, career mentorship, and opportunities to gain practical experience prior to graduation. Participants would have been more likely to outreach, engage, and seek assistance, and mentorship from faculty if they were more approachable and extended opportunities for engagement. This critical reflection on the part of African American STEM alumni is an indictment of colleges and universities and a call to actualize the curricular supports they often use as recruitment promotion. As participants mulled over experiences with engineering faculty and teaching assistants, many reflected on their interactions with peers. The formulation of peer networks is detailed in the next section.

Influence of Peer Relationships

Peer relationship influences emerged as another theme among participants. When asked about experiences with peers at the UofSC and the impact, Jeremy shared, "I developed some strong bonds with other students with similar causes to myself. Those bonds aided in my success." Jeremey attributed his successful matriculation and overall post undergraduate success to close relationships with his fellow African American STEM peers. Tamara broadened her explanation of positive experiences with peers during her undergraduate tenure and noted:

> Everybody is pretty nice. My closest friend at the University was Palestinian; we were the only females in all our classes so, we were really close and are still close to date. Many of my friends were also non minorities, but they mostly came from my classes. Through class, it was always a lot easier to establish relationships with people.

Tamara's close relationships with non-African American peers who identified as racialized minorities at the UofSC represented the ability to establish relationships with others based on other minority identities including gender. Being minority in identity can often serve as a relationship connector, particularly in education settings. Additionally, settings in which peer relationship building can more easily take place include the classroom setting which can foster shared curricular support mechanisms. Jennifer described her accustomed inclination to gravitate to fellow African American students.

> It was just nature for me to find my community because that's what I was used to. Now I'm much better at it; like sitting next to anybody, but it definitely took some

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growth over time. But that semester I was like, oh there's a African American kid, let me talk to them. Hey, do you know what you're doing? You don't either. Ok, we'll get through this together. We form study groups with African American people in different section and rely on each other's strengths. So, having those resources were super important and critical to me. If I didn't have any other African American kids in my classes, I don't know what I would have done. After that second year, I had pretty much caught up with everybody else.

Here Stacey describes having more comfortability around her African American peers and how she intentionally sought them out while at UofSC. These actions were second-nature to her, and one has to wonder why this is the case. She seemingly answered this query in detailing the shared curricular struggles she and fellow African American peers connected regarding. Stacey and Shannon similarly described connecting with peers to address curriculum challenges. Shannon shared his experience:

I was able to get together with other students. We all kind of came together and we made the best out of it. We held each other accountable you know as far as our education and we looked out for each other. For instance, if it feels like one person is stronger in a specific area, they have a session for everyone and then we would peer tutor and peer educate each other. I did my best to try to group myself with people who were willing to assist me, with me putting myself in a position where I could offer them some type of assistance. So, the ones I did encounter in school, we kind of just all noticed each other and we kind of were like ok you're African American, let's get together and get this done

Shannon detailed how connecting with fellow African American peers was strategically constructed and managed with African American students building off each other's strengths and sharing best practices.

Marvin reflected on peer experiences with grace; being more understanding and empathetic of the limited diverse experiences of most of his White peers. He articulated their interactions:

> You deal with some folk, I don't want to call them ignorant, but maybe a little bit. They had their prejudices and college is a place of discovery so, they are trying to discover themselves as well. But, you know, I had experiences that were something like little aggressions against me, that they were not.

Andre described a more openly adaptive approach when it came to discussing non-African American peers saying, "I would say I developed relationship mostly with the people in my major, mainly because it was a smaller school. So, you ended up seeing a lot of the same people and you just build rapport with them. You know it's almost like a camaraderie and they become teammates."

Sam also described peer relationships that served as academic supports and explained why he established relationships with certain racial groups including how he approached relationships with other races.

> There wasn't many people I could relate to. The small group I did find, made sure I was up to par on everything. They tried to catch me up to speed. So, it was kind of like I was in a fraternity. It wasn't many of us African Americans, but we had each other's back. It was easier for me to be around African American

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people. I knew how to get along with anyone and do whatever I needed to do to communicate. I take pride in doing that.

Sam reiterated the ease and comfortability African American students expressed in connecting with peers in their racialized groups. He described their support mechanism in providing curricular support to each other where needed and serving as critical motivating factors. Most importantly, Sam expressed an ability to communicate and engage with diverse populations including non-African American peers which he took satisfaction in this adaptability.

Finally, Kevin, similar to Marvin, reflected on peer interactions intricately, using intersectionality to process through how class and race played out in the relationships developed between students. He shared:

I think as an African American at UofSC, it's not that you're seen as different intentionally. I think it has a lot more to do with the financial disparity in the South between African Americans and Caucasian families and the social structures that they have in place for each side. Then when you go to college, everyone's so used to hanging out with people who look, or act like them. And it just happens to be kind of these different racial subsets. I don't think people would consider themselves to be bigoted or intolerant. And I don't even think it comes from a place from intolerance. But it is cultural, a place of comfort, and someone who's gotten hung up with the same kind of people for 20 years. You're just gonna keep doing this thing. I fell into communities that I was comfortable with and that I knew were always open-minded. The first thing they weren't focused on was how does someone look or present themselves, but they were

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focused on, I'm here to have a good time. I think computer science is a very social major because UofSC take a very theoretical approach to assignments. With other students who have a better understanding of how to program or code, that's where groups kick in; that is when you build that network and get the assistance you need.

Kevin elaborated on the contributing factors towards the historic and systemic socialization of African American and White towards their homogenous racial groups and how these socializations are reinforced at the institutional levels through intersectional race and class disparities that are prevalent between African American and White communities in the South.

As participants shared experiences regarding interactions and engagements with classmates, they too reflected on peer engagement through membership in student organizations. Their utilization of student organizations throughout their time at the UofSC is highlighted in the next section.

Organizations and events participated in. Jeremy participated in Minorities in Computing (MIC), the South Carolina Alliance for Minority Participation (SCAMP), and intramural sports. Similarly, Tamara noted her participation in MIC. Additionally, she was a member of the campus chapter of the National Society of African American Engineers (NSBE), Society of Women Engineers, Women in Computing, and SAVVY, a women's empowerment group for multicultural students. Jennifer was the founder of MIC and also participated in the African American student organization (AAA), and the African American Greek sorority Alpha Kappa Alpha (AKA). She did not participate in NSBE because she felt it aligned more with building computers while her interests and

expertise were more aligned with fixing computers, building robots, and coding. Stacey was also a member of AAA, the African American sorority AKA, MIC, and was also a member of the Association for Information Technology Professionals, Gamecock Connection, and Most Multicultural Outreach Student.

Shannon participated in more social networking groups with a focus on race including The Brothers of Nubian Descent, the Greek fraternity Iota Phi Theta. He was also a member of MIC, and NSBE. Marvin also pledged an African American Greek fraternity, and was a member of MIC and NSBE. Eric was also a member of MIC and NSBE. He also participated in a few AAA activities. Andre was a member of an IT professional group that focused on getting students real world experience. Additionally, he was a member of NSBE. Sam was a member of MIC and NSBE. Finally, Kevin was a member of the African American Greek fraternity Phi Beta Sigma, served as a resident mentor, and was part of the gamer EA sports club. The next section details why participants joined organizations and why they elected to be part of specific communities during their tenure at the UofSC.

Reasons interviewees participated in events and joined organizations. Jeremy elected to participate in events and organizations because, "The Computing College wanted to help retain minority students, mostly African American students. The college turned to the students to address issues of retention. Stacey described joining organizations with a focus on race for personal reasons. "USC is a predominately White institution and there was not a lot of people my color, especially in the College of Engineering and Computing. So, I just wanted to make friends with people who looked like me." She went on to note that she joined other non-racially focused organizations,

"because they introduced me to different conferences and were really good career wise." Moreover, she noted that she received her first internship through her membership in AIT. She then went on to explain that she joined other racial support organizations such as MOST and Gamecock Connection because of the focus around "getting minorities into USC." She went on to explain that she wanted to "pay it forward" because, through the same means, "people helped me come to USC." Finally, she noted that she joined an African American Greek sorority because of the organization's values and she, "love[d] what they were doing around campus."

Shannon mentioned that he joined, "for comfortability and being amongst individuals who are the same demographic as me, people who looked like me." Marvin first explained his reason for joining a fraternity.

> One of the biggest reasons was I talked to my then friend who would soon be my fraternity brother. We hung out and he kind of said it would be a good way to get involved in the community, maybe play a bigger role in things and get to know some people. I just kind of went with the experience.

Andre confirmed why he joined.

> Someone approached me and said they had a group for people like us and I was like why not. Everybody was cool and smart, because you know we don't get the best rep for being very educated, so, everybody talked on a technical level and I felt that was where I needed to be.

Sam, similar to others, discussed why he joined minority focused organizations.

They held workshops and study groups and because many were going through similar challenges as me. I didn't really know much about computer science or engineering or information system or anything about it, but I joined organizations like MIC because I learned more from my peers.

Finally Kevin described his primary reason for joining organizations in sharing, "I kind of went towards activities where I knew there wouldn't be a lot of friction and I didn't want to have to do a lot of "personal code switching" to try and fit into a group that wasn't my default behavior." As participants reflected on why they participated in certain University activities, they shared the outcomes of their decision. A summary of these are listed in the next section.

Impact of organization and event participation. Jeremy simply stated the impact of his participation in organizations at the UofSC, "those bonds aided in my success." He added, "The most satisfying was getting Minorities in Computing started and immediately seeing the impact." Tamara shared how undergraduate organization participation provided her with various opportunities. She said:

It helped me get involved with a lot of different things. I got to go on a lot of trips and participate in board meetings to talk about diversity in computing. Without MIC I would have had a different experience. I got to attend women in tech conferences and bring STEM resources to local communities like Boys and Girls Club because passing college, you can't do it by yourself.

Jennifer lamented that while most student organization groups met social but not academic interests, founding MIC allowed her to streamline African American

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computing student support efforts, as many African American underclassmen sought her out for help. She mentioned the feel of pride in helping others, "And so by being there, helping one African American student and him helping other African American students in other sections, it was like super dope for us." The outcome and impact of these peer supports led to a professor providing grant funding to formally establishing the organization, Minorities in Computing (MIC), due to curriculum differences within and across majors and specializations in engineering.

Stacey shared how her experiences with student organizations provided a safety net to leaving the major.

> They helped me out and helped me to understand my struggle, because to be honest, being in the engineering and computing school and having no family that's done any technical work before or who hasn't been in the field is kind of hard. Like my first coding class, I really wanted to change my major because I didn't know what I was doing, but until it wasn't until I got into those organization where I felt ok around people like me who are having the same struggles and they were able to help me out.

Stacey mentioned that she enjoyed participating in other non-racial student organizations because they provided career preparation opportunities through conference participation. One of the more direct outcomes of student organization participation for Stacey came when she noted, "I think my first internship I got through AIT. So, that was super helpful."

Shannon shared how organization participation helped him formulate friends and how Greek life introduced him to a new world of people. He shared, "it gave me a sense of familiarity, and made me feel like I'm not alone and there are other people just like me." Additionally, he noted that his organization participation provided him one of his three paid internships while at the UofSC.

Marvin shared that organization participation, "gave me a set of people I could talk to, struggle and stride with, which helped the experience because I couldn't do it by myself." In having peers to provide supports, Marvin specified that the outcome of his Greek organization participation was having a set up people to, "pick me up and give me a ride when I needed to get to different places." He elaborated in reflecting, "you know, friends, family, everyone who pitched into my life in some way, that's probably 80% of my story."

Andre also shared that participation in student organizations provided professional and real-life experiences considered valuable. He also articulated that participation provided leadership exposure and the opportunity to give back to younger class members. He also shared that the more social organizations, although less focused on academics, provided fellowship for multicultural students.

Sam summarized that organization participation provided him a social safety net that supported him academically and Kevin shared the same sentiment in considering the outcomes of his African American Greek fraternity participation. He noted that his broader student organization participation, "would be useful in the long run and look good on a resume."

Overall, peer supports played a vital role in the African American STEM alumni experience and served to provide the necessary curricular, social and professional supports needed to matriculate. This is important because higher education institutions should endeavor to facilitate the development of peer-to-peer student relationships early on in students' enrollment to address high drop-out rates and major changes. Additionally, such peer support development again takes on an anti-deficit approach to higher education supports that focuses on solutions to African American dropout rates and poor collegiate performance and instead focuses on those aspects of the collegiate experience that promote persistence.

Influence of Administrators

Another theme that emerged from the participants was the influence of administrators. Participant administrative experiences' spanned from interactions with academic advisors to experiences with financial aid, residence life and housing, and other academic and co-curricular support offices. Participants recounted their engagement with staff and administrators to shed light on what transpired outside the classroom.

Jeremy described his relationship with leadership staff, "I would say most Deans I encountered were annoyed with me due to posing questions and holding them accountable. Other staff were accepting and helpful, in general I felt race impacted my support services experience." Tamara noted her academic advisor was also her professor and was "really good," according to her experience. She elaborated that she, "helped her [advisor] understand a lot about the African American community." A second administrator who was also a faculty member provided grant funding for the development of STEM initiative at the local Girl and Boys Club. Jeremy explained:

I presented Dr. Andrews a proposal on early STEM program development that also went to student council, while I was a volunteer at the Boys and Girls Club. And so, I ended up bringing STEM into one particular Boys and Girls Club. The Dean of engineering told me that we would write a check if I could do outreach. My proposal won and I brought STEM coding to the Boys and Girls Club of the Midlands.

Jennifer described similar administrative experiences receiving grant funding from a faculty researcher to launch Minorities in Computing. Additional experiences with the writing center and career center were instrumental in receiving the coveted Jim Fellowship and a competitive Graduate Research Fellowship, which had not been received by anyone in computing for an extended period of time. Jennifer noted that a review of writing samples from the writing center was instrumental in clarifying and articulating her research and professional interests.

Stacey lamented a more negative experience and focused more on her interaction with academic advisors. She explained:

I wasn't a fan, to be honest, especially with my advisors, because honestly, most of the advisors at UofSC did not a person up for success. Like I feel like you have to really build your own schedule and outline your own four year plan because some of the advisory really don't know what they're doing and they could really mess up your graduation and everything. I didn't have a good experience with them and neither did my friends.

Regarding any academic support experiences, Stacey noted:

I never got any tutoring services because they didn't offer any tutoring services for information technology, which was kind of frustrating because some of those classes were kind of hard and it's like wow, they don't have a tutoring service for this. So, I had to find other resources. Career services, I never went there honestly. I think I went to career services for resume help and that's about it; but they did a good job.

Shannon described similar absent relationships with academic advisors.

As far as advisors, I wasn't really advised. I kind of just wrote down my classes, if they saw that I was able to take them they approved them and that was that. I was more my own advisor; they just kind of gave approval. I went to career services for my resume, a critique, and staff like that, and they were very thorough with that. But they did encourage me to attend one of the best career fairs ever so that was good, and d if they know a career fair is coming in a week, they will put on these workshops on how to dress and talk to employers. So, Career Services was great.

Marvin described an attempt to access academic support services, but this effort yielded little success. He stated:

Writing centers and math centers and such, I participated in all those, but it never quite worked for me because, you know, it's about a group of things. And I found that I really needed that kind of one-on-one experience to ask dumb questions that I probably wouldn't want to ask in front of anyone else or to be rude and take attention from someone else. So those never worked for me well.

Marvin agreed that the career center was helpful.

> The career center was great to people in school of engineering; I interacted with them a lot. They helped me get my resume groomed. We also did fake interviews, and this was really good. In terms of advisor, they only cleared me to enroll in my classes and that was about it. There was a staff member however, who because of my medical condition, would assist me in getting notices to my professors for accommodations.

Andre also described academic advisement experiences that were not helpful. He reflected:

> I feel like I didn't have great advisor to start. In the beginning, I feel like the purpose of that position was either not necessarily focused or that it just didn't pertain to me. When I got to the IT Program my advisor was very hand on with me, kind of laying out my options, kind of thinking about my personal track and makings sure I knew what things I should be focused on and also the internship program as well.

Finally, Sam described his experiences with administrative services including career services as being helpful, practical, and providing opportunities to mock interview and pitch oneself. He applauded how helpful the engineering department was in providing funding for minority students to attend conferences, pay for meals lodging and flight. As participants reflected on their interactions and engagements with administration, their internship experience was explored. Their commentary is detailed in the next section.

Internship Experience

All 10 participants completed an internship during their undergraduate tenure at the UofSC as part of the College of Engineering recommendation. Tamara completed a four-month internship with a technology agency as a front-end developer making web/mobile portals. Tamara explained how she received an internship through attendance at a conference. She stated, "USC is a BRAID sponsor and we received a grant for women in technology to attend a conference. From that conference I received an internship and interned with Bank of America."

Jennifer completed paid research internships in an African American doctoral student's lab during her junior and senior year. Stacey completed multiple internships, beginning her sophomore year. She first secured an internship through her membership in the organization called the Association for Information Technology (AIT). Her second internship came from faculty support in which she shared:

> I think a professor in the engineering and computing school had a lot of connections to different companies. And they brought them into class. I will say if it wasn't for that professor, I probably wouldn't even have gotten my internship because they don't, you know, really push internships like that, which is crazy because it's so important. And being in tech, like you need an internship to get a good job, like they want people with experience. And the only reason I got my second internships was because my professor brought to company to an event and I got lucky enough to interview and get the position.

Shannon shared how he acquired three internships. Two of the three were acquired through attending fairs hosted by the School of Engineering and one through an organization which he was a member. His sophomore internship was with a local Columbia, SC technology agency and all three internships were paid opportunities.

Marvin described actively attending all Science, Engineering, and Technology (SET) fairs organized by the College of Engineering. He detailed this experience in saying, "it was just a kind of job fair explicitly hosted by USC. I think it's part of the Handshake program. I got my first internship at BlueCross BlueShield through that fair. That was one of the biggest fairs I participated in."

Eric described attending various career fairs, but not having as much luck securing an internship. He shared his experience:

Guess the times when I participated in career fairs, they weren't looking for people, but I did end up securing an internship my senior year. I interned with this guy, he had a small start-up downtown, Columbia. Basically, what I did there was more software development. We created textbooks for this K-5 school district in Virginia. So we created these textbooks and we put all the text, pictures, and sound and connect links to create these digital textbooks. It was actually pretty bool because the position was really flexible. My twenty hour a week work schedule could be completed at any time and if I wanted more work, I could complete more tasks.

Andre shared how he completed a course that focused on the internship requirement. He detailed his experience:

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It was basically another setting where you do those resume building and professional skill development. And they actually and they actually had a program where local businesses would actually come to speak to the class as well. And that's actually part of how I landed my first internship, was through that class were local business and people looking for IT interns would come and give presentations and they were open to discussion and take your resume. The course was call Tech 301; it was call Internship Seminar.

Sam shared that he participated in multiple career fairs. He described his experience, "So the career fair, I did take advantage of those, every single year. I landed my first internship my senior year." Finally, Kevin shared that he completed his internship requirement on his own. He reflected on the experience, "I did attend College of Engineering career fairs, but I got my internship on my own through IBM recruitment that was going on, on campus. It was senior year and I only completed one internship." As each participant recalled completed the required internship requirement, most spoke to how they secured gainful employment with the companies they interned with prior to graduating from the UofSC. These employment offers are highlighted in the next section.

Job offers or post undergraduate funded educational programs prior to graduation. Many of the research participants received job offers, most from their internships, or fully funded post undergraduate offers, prior to completing their undergraduate degree. Jeremy received a job offer prior to graduation but struggled to negotiate comparable wages to the market and peers with his same credentials. In his interview he attributed the difference to racism in the industry.

Tamara received a job offer prior to graduation through her internship. She summarized her employment acquisition, "I interned with Bank of America during the summer of my junior year and from there I got offered a full-time position, so I accepted." Jennifer detailed gaining two coveted fellowships and full admission into Georgia Tech's computer science in intelligent systems program where she has worked full-time as a graduate researcher in human automation systems. Stacey detailed her active pursuit and success in gaining an employment offer prior to graduation sharing, "I interned at the same company 2017 and 2018 because I knew that was where I wanted to work and so I secured a position at IBM prior to graduation."

Shannon detailed how he received multiple job offers prior to graduation even in the face of peers who had higher grade point averages.

> From what I experienced, I saw so many people that graduated with 3.8 and 3.9 cumulative averages with no internship experience and they chose me who only had a 3.0 but three years of internship experience. I've seen it happen time-and-again. Unfortunately, it happened to me and one of my very good friends. He never completed an internship during school, and he had a 4.0 and here I am with a 3.0 and I had multiple job offers; it was because I have experience.

Marvin was working while attending school and also completed two internships. His job transitioned into a full-time job where he was getting paid as a full-time software developer. He attributed his ability to secure a full-time job prior to graduation, "This field has a need for the talent and so, they're willing to be flexible and accommodate people with that talent."

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Eric described how he struggled to gain employment after graduation since he did not secure an internship until his senior year. Andre described gaining multiple job offers following internship completion after also completing an internship seminar and project management elective. Sam and Kevin also secured multiple job offers following internship completion and attribute much of their success to internship completion. As each participant completed their internship, successfully completed their undergraduate studies and transitioned to the workforce and continuing education, they were asked to reflect on post undergraduate experiences. The next section details responses and perspectives.

Post-Undergraduate Transition Experiences. Jeremy described his post-undergraduate transition experience as, "easy due to know what I was looking for after undergrad." He did not however, attribute the ease in which he transitioned from higher education to the workforce, to his time at the UofSC. He elaborated, "I didn't interact with any UofSC career preparation services when transitioning outside of graduation." He went on to share that he did not feel prepared for transition from the UofSC, which was a topic he brought up to the Dean of the Engineering College.

Tamara described her transition as "pretty fast" as she began full-time work two months after completing studies. She reflected on her expectations at the time:

I wanted a full-time position, working in the field I graduate from and that's exactly where I am right now. I don't really have anything to compare it to because both my internship and early career are with the same company; so, I can't determine if it's great or terrible, right now it's just my career.

She lamented on the differences in curriculum and practice.

Industry is a lot different than what we learn in the classroom. So in the classroom it's like UofSC is s research school, so you learn a lot of theory-based research and definitions on the background of why certain things work the way they do, but you don't learn how to get things to work. So, you have your projects, but they don't go in much depth as their test goes into. Like some classes do go in depth, but the mass majority don't. So, you get into industry and you're stuck because you haven't done many real-life projects, because you've done a lot of theory-based projects based on someone else's research.

Jennifer felt elated during her transition from undergraduate studies to a doctoral program. She reflected:

It's a great time to be in tech as a African American woman. Just because there are so many problems and issues in tech that surround race, and the people that are working on them don't have all the context that is needed to really understand these issues and the technology that they're developing is lacking.

Stacey shared that she, "had a good experience. She elaborated by saying:

I think I transitioned from college to full-time work really well, but I will say this, I feel like UofSC can do a lot of fixing up on their program curriculum because I don't feel I was prepared for my full-time position immediately following graduation. So, I will say the transition was easy, but I feel like UofSC didn't each me everything I needed to know.

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Stacey further explained:

> A lot of stuff you have to learn on your own, but I'm very happy with my role
> right now. I'm really glad that I'm able to work with this company, and I'm just
> glad they're teaching me what I need to know, but I had to do a lot of self-
> learning after I graduated.

Shannon described his level of preparedness:

> UofSC prepared me to be able to have conversations with a diverse group people,
> how to approach people in different ways based off characteristics, and how to
> handle situations. He adds that, I can definitely say in my mind that I was
> fortunate to have an easier transition than most of my peers. Because for me
> having graduated with the internship experience, I was able to transition right into
> the workforce with the knowledge that I needed and the references to completing
> my job assignments. And I didn't feel out of place at my first job after undergrad.
> Once again, I was the only African American person in my whole group, but I
> was comfortable with being that way because of my college experience; UofSC
> prepared me for that. Overall, I'm right where I knew I would be.

Marvin described his transition experience positively as well. He shared:

> When I graduated, things went up. I got my degree and came from the job I as
> working while I was a student to having a job, in my field and in a company that I
> love where I can climb in the ranks. Its' kind of awesome. I'm also usually the
> first African American developer on the team and I'm about to bring a different
> thought process to development. I actually enjoy coding and even though my

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final GPA might not be much to talk about, I'm very happy with my salary. Everything is great and I'm happy, exceedingly so.

Eric described a more challenging, yet rewarding, post undergraduate transition. He reflected:

> After completion of the USC, I did a little freelance with one of my fellow graduates and that netted us like a little income, but it wasn't enough to keep it going. So, I ended up applying and trying to find full time work. And that took me about five months to get a job and, pretty cool story, I went back to a UofSC career fair as an alumnus and I handed out my resume and got some offers. Should out to UofSC career fair for that. So it's been pretty positive. I actually really like my job. I feel like it's not paying the market value it should, but I'm ok because it's secure and pretty relaxed.

Andre described a more positive transition:

> So, I was lucky enough to find my final internship with a local business and, after completing that, they offered me a full-time position and that's where I've been working since. I want to say that I have only been there a short while, but I've been promoted twice to full-time project engineer. There were a number of classes, during my time at UofSC that work on preparing you for the real world. I believe I took a couple of project management classes. But these were elective classes. I found these really helpful. They were taught by adjunct professor who own or work in local businesses so, they know what they're looking for. They

want to be able to basically raise the talent themselves and make you a project employee in the future.

Sam also spoke to his transition being positive in saying:

My transition was really good; mainly because I took that entire fall semester to make sure my transition into the workforce was as seamless as possible. I started working in my corporate job three weeks after I graduated. I understood that you know, it took me longer than the average undergraduate to graduate from school, so I had to make sure I had everything together. So, as far as post-graduation, what helped me was the internship. Being given the opportunity to work in a corporate office and work for a company and seeing how things operate, that's what really prepared me because it was an eye-opener.

Finally, participant Kevin also shared how he had a positive post-undergraduate transition:

The experience has been great. If I didn't have the internship, I don't know if I would have a job right now. I think I have the skill set, but the job market, everyone knows, can be kind of a challenge. And going through the computer science program, I learned that I absolutely do not want to program at all, I do not want to write another code ever in life. So, I think I would be unsatisfied if I found that out on my own. But since I had the internship, I was able to do this sales pick and I gained sales experience. So, I landed a technology sales job and I'm as happy as I can be. I love the fact that I was able to move across the country to California.

Factors that contributed to successful undergraduate completion and current career status. Almost half of the interview participants worked at least part-time while taking full course loads. Although the participants mentioned having competing priorities, they summarized factors that contributed to their persistence both during their undergraduate experience and into their careers.

Jeremy attributed his successful matriculation to the peer relationships he developed. He also shared aspects of his undergraduate experience that contributed to his current career status include his helping to run Minorities in Computing as well as balancing his course-load, which helped him learn time management. While Tamara attributed her success to opportunities provided, mentorship, as well as peer relationships, Jennifer similarly attributed her success and connections to her current status around the mentorship and guidance of her African American female doctoral mentor and faculty members providing guidance and supports. Additionally, she attributed her success to what she called "being super driven." She detailed this personal characteristic:

> I feel I was super driven because I was raised in a household that was very academic focused. If I brought home a B, it was a problem and my dad was a huge influence. If I brought home a B, I was gonna be sitting down in my room for hours getting a lecture about why education is so important and everything else.

Stacey attributed her success to peer networks and student engagement while Shannon attributed his undergraduate success to mentorship as well as time management and other skills he learned from the military. Marvin shared that while a chronic illness provided challenges, he persisted by attending part-time, taking longer to graduate, while

hiring a tutor to assist with learning. He attributed his success to his own persistence, motivation to succeed, and his fraternity brothers and network of African American engineering friends. He additionally made mention of one or two administrative staff at the College of Engineering and financial aid who were particularly supportive.

Eric attributed his success to peer relationships, while Andre attributes successfully graduating to his "wherewithal." Both Sam and Kevin attributed their successful matriculation to peer and family supports. The next section explores overall suggestions alumni participants provided to improve the education experience of undergraduate African American students. These recommendations are listed in the next section.

Recommendations to Improve African American Undergraduate Experience at UofSC. Jeremy recommended that the UofSC diversify the experience. Specifically, he stated:

> Creating more diverse events that incorporate al students; particularly minority students is a primary recommendation. Additionally, creating more safe spaces and pushing the Colleges to hire more African American professors and faculty members is critical. Finally, holding advisory more accountable for dictating student pathways is most urgently needed.

Tamara recommended diversifying curriculum to better engage diverse student knowledge and experience. She stated, "Having a teacher or somebody who's making the curriculum for people of color to relate is important." Additionally, she

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recommended the engineering curriculum should be broader to encourage creativity and initiative due to the expectations of industry professionals.

Stacey also suggested an improvement to her engineering program. She urged the University to bring the curriculum up to industry standards to minimize what alumni have to learn on their own. Marvin recommended laptops be provided to all incoming engineering students to improve learning and creativity would be helpful. Additionally, he recommended that the College and University address the gaps in learning between those who have not been exposed to STEM and those who have. Andre also recommended curriculum improvements but commended the UofSC for their efforts thus far. Kevin concurred with most of the participants in the need to improve the curriculum. He stated, "I think it left some things to be desired when it comes to the computer science program, especially when it comes to practical skillsets when it comes to the curriculum."

All of the aforementioned themes inform us about the experiences of African American students and post undergraduate events. The majority of the experiences noted are evidenced by the literature. Additional noteworthy findings and an interpretation are shared in the next section.

Interpretation

Although the study methodology recruited participants who graduated within ten years from the UofSC, the vast majority of participants graduated within three years of the study. This makes the findings more reflective of recent African American STEM alumni experiences at the UofSC, which is important for current and future diversity recruitment and retention strategies. This study demonstrates that 1) African American

STEM students value familial connections as they transition from the protective comforts of living with African American parents or guardians and in African American communities, to living in predominantly White higher education settings where they anticipate racialized living and learning experiences, 2) African American STEM students experience learning curves due to K-12 educational inequities between predominantly African American and White school systems in the South, 3) African American STEM students rely on culturally competent curricular supports including faculty and staff who form intentional connections and supports between African American students and the curriculum, 4) racially homogenous academic and social groups provide African American students with African American peer connections that do not require code-switching or adapting to racial majority preferences, and 5) African American STEM students from the UofSC largely attribute undergraduate internship and research opportunities to their ease of transition from higher education to professional career settings.

Overall, this study teaches higher education administrators the importance of culturally responsive structures that support African American STEM student learning, persistence, and professional development for job placement and satisfaction. Moreover, African American alumni experiences and feedback from participants provided insight into the various research questions posed by the study. Through listening and analyzing the experiences of these African American alumni, critical information was obtained regarding their motivations to attend the UofSC, classroom, peer, and administrative experiences, and post completion experiences.

The findings include a series of environmental, infrastructural, and social/emotional characteristics that are critical to the academic support, social development, and professional development preparation of African American STEM students at the UofSC. Specifically, this study found that African American students at the UofSC have specific motivations for attending the University that are both racial and financial. They attend the UofSC to be close to family, which initially serves as a critical social-emotional support for African American students attending PWIs.

Next, encouragement from friends, family, and former students to attend the UofSC represents the critical role reference, recommendation, and referral play in recruitment of African American students at PWIs. African American college students want to be educated in spaces that demonstrate the most racially inclusive practices to insure their professional development, and much of this "demonstration," comes from the approval and recommendations of those who previously attended the University, currently attend the University, or from word-of-mouth regarding the University. A significant motivational finding for why African American STEM alumni attended the UofSC was also the cost factor. African American students want to attend college without taking on too much debt. In-state tuition and other residency-based scholarships offer African American students financially viable tuition supports that make higher education more accessible and ensures their future goals are not laden with the burden of debt.

The next major finding is that African American STEM alumni from the UofSC experienced transformative academic transitions between high school and college attendance. African American UofSC STEM students experienced academically

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challenging transitions between their high school curriculum and undergraduate engineering curriculum. Most study participants grew up in rural, racially segregated South Carolina communities where innovative STEM programming was not readily available. These same African American alumni also attended severely underfunded K-12 schools, including schools within the "Corridor of Shame," and they encountered significant academic barriers upon entering UofSC STEM classrooms.

Because these curricular transitions from high school to college presented a learning curve, due to curriculum gaps between predominantly White and predominantly African American schools in South Carolina, African American STEM students had to compensate for curriculum they had not been exposed to and sought instruction from fellow African American peers. This curriculum compensation involved more targeted support needed from faculty, but instead, participants received this support from fellow African American peers in their academic program.

Additionally, this study found that African American STEM students prefer strong relationships and intentional engagements with faculty as part of their academic and curricular experience. While a significant number of participants described negative interactions with most STEM faculty, a little over half of the participants described positive and significant relationships with a small number of faculty who provided mentorship, professional advisement, and curricular support. The same applied to administrative personnel as study findings noted half the participants experienced negative interactions with administrative personnel, but also experienced positive relationships with fewer administrators, which they found most impactful. What this demonstrated is that African American STEM students from the UofSC desire more

active relationships with administrative personnel, particularly academic advisors, to provide direction and personalized navigation through the collegiate experience. Moreover, what African American STEM students from the UofSC were not able to get from most faculty and their K-12 education, they acquired from deep bonds formed with fellow African American students.

The next significant finding was that African American STEM students relied heavily on fellow African American peer study groups, African American social organizations, and African American peer professional groups to succeed in college. These racialized affinity groups filled critical curricular gaps as well as social-emotional gaps for African American STEM students. This study also unearthed that African American STEM students also recognize the importance of participation in more broad, non-racial, peer professional groups for a more well-rounded experience and to acclimate them to professional settings where there will be few African American professionals present.

Finally, African American STEM alumni attribute undergraduate and completion success to their participation in internships during their undergraduate tenure. Most of the study participants received job offers from their internship organizations for which they attribute their ability to establish rapport directly as a major benefit to their job search and acquisition.

Summary

The research question for this study was: how do African American alumni from the University of South Carolina make sense of their undergraduate and post-

undergraduate experiences at the PWI? Based on the data collected, it appears that African American alumni interpret their undergraduate experiences based on: 1) the strengths of the relationships developed with peers and professors along with teaching instructors and 2) the organizations, events, and programming, particularly their career fair attendance and internship participation, that were available, which encouraged academic and career success.

Based on the feedback provided by the African American STEM alumni, their undergraduate experiences included challenging curricular transitions between high school and college. Other factors that influenced their undergraduate experience included interactions and engagement with administrative offices and personnel.

Coping mechanisms included connecting with fellow African American STEM majors, fellow African Americans across the University and like-minded individuals from similar backgrounds who had common curricular support needs and interests. Additionally, building relationships with supportive faculty and mentors who understood their interests and needs as African American students in addition to joining racial affinity professional development organizations, national organizations, and African American Greek organizations were critical to identified success.

African American STEM alumni from the University of South Carolina who participated in this study mostly describe their post-undergraduate transition as positive. Their positive sentiment appeared to be connected to their employment acquisition/continuing education admission and transition directly into the work force and Ivy League institutions shortly after graduating from the UofSC. Employment acquisition was primarily limited to participating in internship activities, which had

an impact on the perception of transition experience between undergraduate and post-undergraduate encounters of the African American STEM alumni. This seems to suggest that positive undergraduate experiences are significantly impacted by the extent of engagement that African American STEM alumni have with each other. As a result, African American STEM students who are connected with fellow African American STEM students and fellow African American peers, receive mentorship and academic supports from faculty and administrators, along with practice career experience, have a more positive post undergraduate transition and overall experience of their undergraduate education.

These findings are based on in-depth interviews conducted with African American alumni who graduated within the last ten years. The researcher made sure to follow rigorous interview protocol and refrained leading commentary by sharing personal experiences. Each participant was provided the opportunity to review transcript information and provide their approval. They were also provided the opportunity to review the results and analysis, based on their contributions, for feedback and accuracy. Direct quotations from participants, with detailed descriptions, were used to provide validation for all emergent themes listed. Chapter Five will provide a detailed explanation of the findings and discuss implications for practice along with recommendations.

CHAPTER 5

DISCUSSION, RECOMMENDATIONS, AND IMPLICATIONS

The preceding chapters provided the context for this study. Chapter One provided an introduction to the study. The literature serving as the foundation for this study was detailed in Chapter Two. A detailed account of the research design and methodology was described in Chapter Three. Chapter Four provided a detailed account of the findings that emerged from the participants of this study. Chapter Five will provide a discussion of the study's findings, recommendations, and implications for future research and practice. The chapter concludes with final thoughts and reflections from the researcher.

Discussion of Results

To answer to the research questions, African American STEM alumni from the UofSC experience mostly challenging experiences in transitioning from high school to college due to limited STEM exposure. The influence of peer relationships played a critically positive role in student retention and attrition. The influence of instructors and administrators cannot be underscored with positive interactions yielding positive personal and professional outcomes and negative interactions presenting collegiate barriers and feelings of resentfulness and dismissiveness towards collegiate experience. Transitions to the workforce and graduate school were overwhelmingly positive based on attendance and participation in career fairs, conferences, and internships in addition to receiving job and scholarship offers prior to graduation.

The objective of this qualitative study was to investigate how STEM African American alumni from the University of South Carolina make sense of their undergraduate studies, explain their undergraduate experiences, and perceive their post-undergraduate careers and career development. The theoretical frameworks used for this particular study are Critical Race Theory (CRT) and community cultural wealth (CCW). Ladson-Billings' (1998) noted that the assertion behind CRT argues that race exists as a social construct that significantly impacts multiple areas of development and is rooted in various areas within society. Critical Race Theory focuses on racialized experiences and critiques supports around colorblindness as an ideal. Additionally, CCW as defined by Yosso (2005), extends CRT concepts and expands the view of cultural capital theory to include the experiences of racialized individuals and reveals assets and resources people of color utilize for success. As all participants for this study are African American STEM alumni, CRT and CCW provided evidence-based theoretical connections to answer the research question.

The methodology used for this research was interpretive phenomenological analysis, which included an anti-deficit framework supported by CRT and CCW. This analysis provided the researcher with the opportunity to utilize semi-structured interviews to collect data from participants that would then allow an emphasis on specific phenomenon and the chance to make sense of the phenomenon presented. Each in-depth interview provided participants the opportunity to reflect on their undergraduate experience and make connections between their experience and its relation to their subsequent careers, personal lives, and ongoing development.

Through detailed analysis, six themes emerged including:

1. Close proximity, lower financial burden, and encouragement from friends and family as motivation to attend the University of South Carolina

2. Curricular transition from High School curriculum to collegiate STEM science curriculum

3. Influence of faculty/teaching instructors on student experience

4. Influence of administrative personnel on student experiences

5. Bonds formed with like-minded individuals which contributed to positive experiences

6. Transition from undergraduate experience to continuing education or the workforce

Findings from these themes will be explored in depth in this final chapter in addition to how each theme is situated in the literature. Chapter topics will include an in-depth analysis of additional findings that were shared during interviews but did not meet full criteria for the study. Next, there will be a discussion regarding implications of the findings, along with additional examples of how the results can be integrated in institutional settings. Finally, this chapter reviews recommendations of areas of future investigation around this body of research work.

Motivations for Attending the University of South Carolina

African American students want close relationships as part of their holistic college experience. Students attend college for various reasons deemed critical to them and these

reasons begin their quest in higher education pursuits. As this study was situated in the South, specifically South Carolina, eight out of ten research participants were South Carolina residents. Their residency was notable because most of the participants elected to attend the University for geographic purposes in being close to family. In addition to being within close distance to family, study participants shared that they were encouraged to attend the institution from family and friends. Electing to attend the institution provided in-state tuition benefits, which research participants stated was also a critical deciding factor in their attendance.

Explored collectively, being close to family and the encouragement of friends and family, along with the fiscal benefits, played a key role in the participants' decision to pursue studies at the UofSC. The proximity to family demonstrates and initial desire for African American STEM students from the UofSC to maintain a sense of connection to loved ones while pursuing their studies.

As community cultural wealth studies outline, there are six forms of capital persons of color utilize to navigate society (Yosso, 2005). One of those forms of capital is "familial capital," which includes cultural knowledge that is nurtured among families and extended families which then bring about a sense of community (Yosso, 2005). Carrying a sense of community and familial bonds with them as they attend college is important to students of color and this importance was evident in the African American STEM student responses to this study. This sense of community works bilaterally between minority students and their relatives as many maintain close communications with immediate family members in the event support is needed and vice versa (Espino, 2014). Responses from participants with single parents articulated the desire to be close

to home to help if needed while other participant responses articulated the desire for continued nurturement and comfortability not yet discovered on campus. But African American students also actively seek out social and communal supports among fellow African American peers. The transition from high school to college also lends itself towards a transition from immediate family to extended family found in the establishing of surrogate relationships with African American peers. In higher education settings, familial capital includes bonds and relationships between similarly racialized students who seek each other out for morale supports (Yosso, 2005). Close ties sought-after and developed between African American students have been explored throughout the literature and the connections between these occurrences, as described in the literature, and those of this study's participants are examined in the next section.

Bonds Formed with Like-Minded Individuals Contribute to Positive Experiences

African American students want culturally relevant meaningful and supportive experiences in higher education. Specifically, they want these experiences both inside and outside the classroom. The participants in this study repeatedly mentioned meaningful and supportive experiences as a critical factor. The importance of understanding the significance of bonds amongst racialized college students is described accordingly.

Previously, very limited information is known of how African American college students experience higher education, how they overcome challenges in and outside the classroom, or the sociopolitical strategies used by those who overcome the odds and defy racial stereotypes in higher education (Harper, 2009). Previous higher education

empirical research studies focus primarily on minoritized student challenges and failures,

however, a growing number of researchers are focusing on their resilience (Quaye &

Harper, 2014; Quaye, Harper, & Pendakur, 2019). Moreover, researchers have written

much less on students who persist and successfully matriculate. Attempts to address

these racial higher education literature limitations include leading academicians such as

Shaun Harper, Gloria Ladson-Billings, William Tate, Daniel Solorzano, Tara Yosso, and

a host of others. These critical race and community cultural wealth theorists examine

phenomena in higher education that draw attention to ongoing racial inequities, racialized

experiences of minoritized students, and other topics related to African American student

success.

To better relay the nuanced experiences, encounters, and expectations African

American students endure, Critical Race Theory's (CRT) counter-storytelling tenet

provides faculty, staff and students the opportunity to voice their narratives and discuss

their racialized experiences at higher education institutions. In analysis of the field of

higher education, CRT is cross-examined as evident through institutional racist practices

and pathways of education for students of color (Savas, 2014). Critical Race Theory best

incorporates the intersectionality between educational experience and race. In comparison

to transition theory (Schlossberg, 1981), which frames individual life events that impact

interactions, routines, assumptions, and roles that are integrated into daily lives, CRT

focuses on racialized experiences as a constant transition that intersects with a life event.

Most student development theories minimally discuss race and the challenges of racism

in higher education (Savas, 2014). Critical Race Theory then, is used as a perspective to

challenge the more common deficiency-focused analyses of racialized experiences in

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higher education and corrective interventions that generate deficit approaches (Freire, 1973; Garcia & Guerra, 2004). Additionally, CRT argues that the cultural practices of racialized students can nurture and empower (Bernal, 2002; Delgado, 2001). Community cultural wealth (CCW) then moves the analysis of storytelling then, to the exploration of contributing factors related to a more anti-deficit approach to examining relationships between African American students.

Forming African American Peer Study Groups for Tutoring Assistance and Social Support

From this study most participants formed study groups with their fellow African American peers for both social support and tutoring assistance. They described an instantaneous connection between classmates who "look like them," and they almost immediately build rapport with one another through a shared desire to succeed in what they described as challenging curricular settings. They specifically described building intentional connections with African American STEM peers in the same major to better process through shared curriculum; a curriculum they viewed as "not being culturally diverse" or "relatable," or "inadequately taught." They detailed the time, care, and attention they took in both being vulnerable with each other in their lack of specific course knowledge and the shared camaraderie they had for one another in providing more in-depth and accessible course concepts and supports for fellow African American peers. They described a sense of relief and calm in meeting fellow African American STEM peers and they attributed their undergraduate success to these study group formations.

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The above sentiments of the research participants are in line with the literature which states that racialized students who receive supports from fellow peers, in their racialized ethnic groups at their respective college, are more likely to contribute to their persistence in STEM by their sophomore term to their participation in these groups (Grady, 1998). Community cultural wealth's social capital reaffirms that social capital, as represented through networks of community supports and people, speaks to the persistence African American students exhibit beyond racially hostile and/or unwelcoming classroom and campus environments (Yosso, 2005). Moreover, Clotfelter (2003) noted that alumni post-undergraduate experiences were linked to specific types of experiences from campus life like peer support groups, which were found to provide hands-on practical exposure for curriculum retention. The development of the African American study groups as "counter spaces" is attributed to improving the academic performance of the research participants, just as noted by the literature, in addition to the benefits such groups provide including genuine community support, and establishing intentional relationships, and sharing cultural experiences to improve academic outcomes (Solorzano & Villalpando, 1998). Joining racial identity peer professional groups was also common for study participants as they actively focused on their initial collegiate attendance goals of improving their career outcomes upon completion of their undergraduate studies and is also connected with the literature in the next section.

Joining Racial Identity Peer Professional Networks for Social Support and Career Development

Research into student typologies, provided that there are six goals which motivate students to attend college (Phinney et al., 2006). These include 1) the goal of obtaining a

good job, 2) achieving success and reaping financial rewards, 3) professional development and intellectual growth, 4) improving the world, 5) meeting the expectations of parents and family members, and/or 6) the goal of avoiding less desirable options including remaining idle or menial labor (Phinney et al., 2006). Studies in 2014, to determine if these motivations expanded, added the following goals: 7) better supporting and assisting family, 8) proving to others that one could succeed academically and 9) the goal of responding to mentorship received that encourages the pursuit in higher education (Phinney et al., 2006). Participants in this study described a keen focus, motivation, and commitment to overall collegiate achievement and success, which they sought through various means while attending college.

Over half of the participants described becoming members of minority peer professional groups. These groups included the National Society of African American Engineers (NSBE) and Minorities in Computing (MIC). The NSBE, with over 400 chapters and an African American membership base of over 15,000, is one of the largest and most prominent student-governed, peer professional organizations in the United States (National Society of Black Engineers, 2016). As a non-profit of over 44 years, NSBE's mission is to "support and promote the aspirations of collegiate and pre-collegiate students and technical professions in engineering and technology while increasing the number of culturally responsible African American Engineers who excel academically, success professional and positively impact the community" (National Society of Black Engineers, 2016). The organization provides professional development opportunities ranging from leadership training, mentorship, career placement services, and community service opportunities, among others (National Society of Black

Engineers, 2016). Minorities in Computing (MIC) is a UofSC founded student-organization, developed with the goal of "helping students take full advantage of the opportunities presented to them." The group aims to create a network among students to foster mutual support, bring awareness to student opportunities, promote professional development, develop mentoring relationships and provide supplemental instruction where needed" (Garnet Gate, 2020).

Given the background and focus of each organization, participants had similar reasons for joining. Many mentioned joining because of their attendance at a PWI, and an interest in connecting with members of their racial group within their areas of study. They joined for additional racialized supports and comfortability in being among individuals who resembled them. Other research participants noted that learning more from the African American peers within their majors and by joining minority professional organizations, they learned more about career preparation and development. The benefits noted by participants were similar to that of the research.

African American STEM students often engage in a myriad of activities including participation in their campus chapter of the National Society of African American Engineers (NSBE), Minority Education Programs (MEPs), and African American Greek Organizations (BGOs) (Simmons et al., 2014). These activities have been found to provide students with extended familial bonding, sense of community, and peer academic supports that contribute to retention (Frehill, 2011; Maine, 2001; May & Chubin, 2003). Findings including NSBE influencing the development of professionalism, business and management, leadership and communication skills, while BGOs influenced the development of ethical standards, and MEPs developed analytical skillsets (National

Academy of Engineering, 2004). Study participant responses mirror this research in their participation various minority activities.

Although motivation encourages college attendance, experiences of African American STEM majors highlight numerous barriers including cultural and social segregation as well as stereotype threat (Seymour & Hewitt, 2000; Steele, 1997; Wilson, 2000). A continuation of the formation of counter-spaces, beyond the classroom and into professional development, addresses racial microaggression in collegiate spaces as noted by the literature (Solorzano, Ceja, & Yosso, 2000). Through the interviews research participants shared how these peer professional groups provided mentorship and guidance on how to achieve post-undergraduate career goals through undergraduate preparation and development. The shared how they learned industry standards, employment outlooks, and interview skills development, from the African American STEM experience. It cannot be understated then, that through their position of marginality at the UofSC, these African American STEM research students were resilient and created academic and social counter-spaces to improve their collegiate experience as noted in the existing research (Solorzano & Villalpando, 1998).

This idea of "comfortability" was articulated by some research participants as including not having to "code switch." Code switching can be described as a changing of language and/or mannerisms to fit within a more dominant environment. Most research participants for this study joined retention and retention-support-focused groups, African American peer study groups, and pre-professional networks to support academic and career endeavors. Additionally, a significant number of research participants became members of African American Greek organizations and race-related student

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organizations, such as the Association of African American Students (AAAS), as a way of supporting their social and emotional interests. The research describes such participation as African American Greek spaces serve as a haven where African American students can challenge racial biases and notions of collegiate deficit while creating a positive racial climate that celebrates diversity (Solorzano, Ceja, & Yosso, 2000; Solorzano & Villalpando, 1998).

Although most of the research participants joined African American peer study groups, African American pre-professional organizations, and African American Greek organizations, they each joined non-racial peer professional networks for broad career development exposure. Some of these organizations included Women in Tech, Society of Women Engineers, Women in Computing, the Association for Information Technology Professionals, Gamecock Connection, Boss Technologies. Participation in non-racial student organizations was significant because the intersectionality of identity was revealed for female study participants who also realized they experienced discriminations based on gender; and so their participation in gender-based organizations helped to address some STEM challenges based on gender identity, while the race-based organizational addressed racial discriminatory challenges. Overall, strengths-based research on this topic reveal that creating on-campus communities of intellectual shared interests, assists student with social and academic integration (Triesman, 1992). Beyond intersectional identity, broad peer student organizations provided participants with practical industry connections and the opportunity to enhance networking skills development and post-undergraduate career transition.

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As participants shared the necessity peer study group provided in their academic transition from high school to college, a closer look at their transitions from high school to college was explored to make connections between the experiences of African American STEM alumni at UofSC and minority students discussed in the literature. The sense of ease and reliance on African American study groups also comes as a result of feelings of unpreparedness from high school and lack of exposure to STEM prior to attending college. This lack of preparation and the experiences pertaining to are explored in the next section.

Transition from High School to College

African American students want to smoothly transition from high school to college curriculum being equally exposed to collegiate materials at the high school level; similar to their White peers. As study participants described varying feelings during their transition from high school to college, most experienced similarities in curricular transition to those in the literature. A majority of the participants described their transition as "challenging," "stressful," and a "learning curve." The context of these descriptions includes a common lack of exposure to STEM science in K-12 schools attended by a majority of the African American STEM alumni. High school achievement gaps significantly impact collegiate transition experiences in STEM studies as these majors typically require that entering student have already mastered certain skillsets and prerequisites (National Academies of Science, Engineering, and Medicine, 2016). As participants described limited to no exposure to STEM science, ranging from a one week coding camp to no advanced science class or honors science course offerings, a study

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participant offered a scathing explanation on why this lack of exposure has taken place in saying:

> So, I definitely I will say, because I feel like racism played a part in the lack of STEM exposure for African American students, especially in South Carolina, where a large portion of UofSC's population means most are coming from South Carolina high schools. It's hard to separate the exposure from the race. I try to tell myself, to make myself feel better, that my lack of STEM knowledge not because you're African American, it's because you haven't seen this before. But I feel like in so many parts of South Carolina, the reason you haven't seen it before is because you're African American is because the district that you're in is so heavily dominated with these certain subsets of the population that are so situated in certain parts of South Carolina that like pretty much you can count the schools that are predominantly African American; and the resources are disproportionate to those African American schools compared to schools that are in Greenville and these magnet academies and things like that. Not all the African American kids have access to those AP classes. So those computer science classes where teachers are willing to come to the districts and even teach. or any of those other courses that are more difficult, are seen as more prestigious. And I feel like that ties so much into people don't care about these communities in South Carolina because they're predominantly African American.

The above indictment of K-12 education speaks to the racism that is evident in divestment from K-12 education through property tax structures that privilege predominately White communities while exacerbating the obstacles experienced by

underfunded poor districts; which are predominately African American communities. This racially systemic educational disparity collects tax monies on the basis of property values and property values in areas where people of color reside in larger numbers typically have lower values. A second participant made this same observation based on his own high school experience and transition to the UofSC, referencing his attendance at a school he describes as being located in the "corridor of shame." The "corridor," is made up of 36 school districts in rural South Carolina along Interstate 95, that received inequitable funding, which resulted in poor student achievement.

The inequities in K-12 preparation between the African American research participants and their White counterparts was evident in their classroom experience as study participants describe their White peers completing class exercises with speed and precision while they struggled and how their White peers describe building advanced technology are part of their K-12 experience, while they only received a one week coding introduction. Not having practical innovative opportunities made for a challenging academic transition for participants, which was exacerbated by what they describe as flippant experiences with some teaching faculty, which is described in the next section.

Influence of Faculty/Teaching Instructors on Student Experiences

African American students want to build rapport faculty and teaching instructors to improve learning outcomes and develop mentorship opportunities. Eight out of ten study participants described experiences with professors who gave off negative energy, lacked approachability, came off as indifferent, which resulted in off-putting curricular experiences. From being accused of cheating to outrightly informing students to not disturb them, study participants described problematic instructional encounters that do

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not lend towards a positive learning environment. The literature supports such described experiences by African American students.

Alumni perceptions of their higher education experience has primarily hinged on experiences within the classroom (Ness, 2003). Volkwein and Cabrera (1998) found that academic activities contributed tremendously to post-undergraduate experiences. Prior to this, Tinto (1997) found that college classrooms were a focal point where social and academic experiences intersect; these social and academic experiences influenced alumni post-undergraduate experiences. Participants reported that racial microaggressions in student-faculty interactions included instructors, at times, displaying low expectations of minorities and accusations of cheating and/or plagiarism, in some cases, where minorities excelled on assignments; this often caused students to feel a sense of self-doubt in their performance (Solorzano, Ceja, & Yosso, 2000).

To counter this, the African American students stated the importance of having other African American students in classes to contribute supports against microaggressions and other stereotype threats (Solorzano, Ceja, & Yosso, 2000). This continued question of African American student intellect permeated in student group work as well. Students interviewed in the study shared instances in which non-African American classmates isolated African American peers due to perceptions of intellectual inferiority (Solorzano, Ceja, & Yosso, 2000). And while these negative interactions with teaching instructors contributed to unhealthy learning environments for these African American STEM alumni, study participants also described how positive relationships and mentorship with faculty positively influenced their overall experience.

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Although participants described having more negative experiences with teaching faculty, the positive experiences encountered served tremendously to provide resources for individualized academic support, peer organizational development assistance in construction and advisement, provide funding for conference participation and professional development activities, as well as mentorship and advisement. These supports were critical in what the research participants describe as their successful completion and perceived success. Research participants described their navigations around microaggressions experiences from dismissive instructors while lauding those who go above and beyond to meet after class, during office hours, and to mentor.

Mentorship and resource-funding opportunities from faculty with a keen interest in building the capacities of minority students led to seed-funding being provided in the establishment of MIC. These and other advisement supports on career trajectories addressed many exposure disparities encountered during high school and, according to participants, brought them to a space comparable to their White peers. Minority women make up a small portion of bachelor degree STEM recipients with African American women comprising only 3.6% of STEM degree holders (Johnson et al., 2019). With African American women being the most underrepresented groups in STEM, the field stand to shrink their talent pool for those who can offer innovative and new perspectives (Johnson et al., 2019). In studies pertaining to a sense of belongingness, African American students who viewed institutional profiles and saw African American STEM faculty relayed a sense of comfortability and institutional trust as opposed to institutional profiles where they mainly saw White faculty (Johnson et al., 2019). Nonetheless, while study participants acknowledged and were greatly

appreciated of these supports they felt the mass majority of teaching faculty interactions were inadequate. This inadequacy was also evident in administrative personnel experiences analyzed in the next section.

Influence of Administrative Personnel on Student Experiences

African American students want to build rapport with well-versed administrative officials who have their best interest at heart. While at least half the study participants described negative interactions with advisors, deans, and other student services support personnel, they also described positive relationships and positive relationships with certain officials including career services, the writing center, and few others.

Again, although motivation encourages college attendance, experiences of African American STEM majors highlight numerous barriers. These challenges include inadequate career information and strenuous course loads among others (Seymour & Hewitt, 2000; Steele, 1997; Wilson, 2000). To address challenges African American students encounter during their undergraduate tenure, several activities have been deemed critical to racialized student achievement in the STEMs; these areas include monitoring and advising, and advising among others (Maton & Hrabowski, 2000). Although participants for this study described having more positive experiences with UofSC careers services, experiences with course advisement was challenging they describe flippant advisors who merely signed off on semester schedules without querying course load management or engaging in in-depth advisement that supported learning outcomes and career trajectories. Advisement and monitoring have been found to assist STEM majors with course selection and progression, graduate study planning, life skills including personal life management, and the development and maintenance of healthy

and productive relationships. This community cultural wealth model extends beyond universities' typical provision of orientation and academic advisement (Treisman, 1983).

These varied administrative experiences were not reported by study participants to have a significant impact on their overall experience as their peer study groups, student organizational and support faculty fulfilled any gaps experienced. Transitions between their undergraduate tenure and careers are analyzed in the final section.

Transition from Undergraduate Experience to Continuing Education/Workforce

African American undergraduate STEM students want to be prepared for the industry upon graduation and transition smoothly into the workforce. They attribute several factors, during their undergraduate experience, they attribute to their increased ability and inability to have a positive experience after graduating from the University of South Carolina; all are analyzed in the next section.

Most study participants described having a positive transition after graduation because of their participation in career fairs hosted by the STEM department and career services. They referred to this fair as the "Science, Engineering, and Technology (SET) Fair," and attributed their positive transition to fair attendance in that they were exposed to industry professionals in addition to being able to network with industry leaders and establish professional relationships in advance of undergraduate completion.

The literature supports the above efforts and initiatives as community cultural wealth purports the critical importance of developing social capital through various means. Social capital is one of six forms of capital that is represented by networks of community supports and people (Yosso, 2005). Career services and other co-curricular

initiatives represent these elements of social capital and are a common part of the undergraduate experience that provide hands-on-practical engagement and pre-employment experience. Clotfelter (2003) noted that alumni post-undergraduate experiences were linked to particular types of experiences alumni engage in while on campus as students. Creating such opportunities through career services fairs is something research participants and the research alike benefit alumni. An important caveat to how the UofSC constructs this opportunity is that alumni mention that the fair is offered every year which provided alumni with three or more years access to industry professional to develop a strategy to apply for internship positions, acquire a full-time position, and market themselves as the most ideal candidates for companies of interests. The vast majority of African American STEM alumni participants described the career fair experience as most helpful in acquiring an internship and an analysis of their internship experience is highlighted in the next section.

Nine out of ten research participants acquired an internship after attending a University-sponsored career fair that was specific for STEM majors. Many completed multiple internships from as early as their sophomore year. Gaining extensive real-world experience and establishing relationships with industry professionals is largely attributed to study participants receiving job offers prior to graduation.

While not a new area of focus, workplace readiness and the identification of skills key to employment has been the focus of several major studies (ACT, 2015; Bentley University PreparedU Project, 2014; Casner-Lotto & Barrington, 2006; NACE, 2014, 2015b). Workplace readiness is defined as an individual's possession of skills which are key to meet minimal qualifications for specific employment (ACT, 2015; Winograd &

Hais, 2014; United States Department of Education, 2015). Additionally, in the National Academy of Science's research, a panel of representatives from the education, public sector, private sector, and government were convened to identify employability skills needed to be successful in one's career (National Academy of Science 1984). The key competences identified by the team included the following: 1) Strong oral communication, 2) computation, 3) science and technology, 4) reading and writing, 5) reasoning and problem-solving, 6) interpersonal skills, and 7) personal work habits and attitudes. Study participants largely attributed the ease in which they transition from their bachelor's programs to the workforce and/or continuing education, to the internship and/or research lab opportunities afforded to them while in college.

Participating in one or multiple internships led to most study participants receiving job offers prior to graduation. As previously stated, today's student cites the acquisition of a satisfactory job as their primary reason for attending college (Hartman & Schmidt, 1995). This sentiment is consistent across research. One of the reasons individuals choose to invest in higher education has been associated with improved occupational and career post-undergraduate experiences (Roska & Levey, 2010). In a review of a decade's worth of exit interviews, it was found that more recent graduates placed higher values on employments prospects when compared to earlier graduates (Belcheier, 2002).

It must be noted that the majority of the job offers for the study participants were from the agencies they interned with during their undergraduate career. Additionally, internships are strongly encouraged by the UofSC's College of Engineering and elective course offerings provide additional resources for improving the internship experience. In

support of these activities, employers have agreed that recent graduates who have participated in activities such as community volunteering, interning, senior thesis, or group problem solving tasks are more prepared for post-undergraduate tasks, roles and responsibilities (Hart Research Associates, 2013).

Feeling Unprepared for Workforce/Graduate Curricular Expectations

Although internship participation provided networking and practical experience opportunities for African American STEM alumni, a significant number shared their challenges with workplace expectations and attribute this to feeling unprepared for workforce or graduate curricular expectations. Study participants described this feeling of unpreparedness through comparisons with their workplace/research lab colleagues and the observation that fellow colleagues demonstrated extensive skillsets they were unaccustomed to. This sentiment is supported by the literature, which details how the concerns of African American STEM students include their knowledge and skill development including aptitude and critical thinking which are critical for successful matriculation and overall achievement (Astin & Astin, 1992; Barlow & Villarejo, 2004; Bonsangue & Drew, 1995; Springer, Stanne & Donovan, 1999; Treisman, 1992). Therefore, the learning curve experienced between high school and college was still experienced after completing their undergraduate degree. Student expectations for attending college include being provided the necessary basic skills for competitive career preparation (Crebert et al., 2004). As study participants revealed their feeling of lack of skills for competitive skill preparation, this becomes an area of focus for higher education improvement among others.

Recommendations for Practice

The findings from this study present several areas for improvement in practice for higher education faculty, staff, and administrators. There are six specific recommendations outlined based on the experiences of this study's participants at the UofSC.

Provide Inclusive Orientations

Transitioning from high school to college presents students with an opportunity to diversify their peer, instructional, and campus community relationships. Universities should be intentional in using orientations to facilitate new-student introductions using culturally competent and diverse ice-breaker activities to build a campus and peer camaraderie that celebrates difference. Orientation provides an opportunity to set the tone and this should be done within the larger campus community as well as in academic units. Once a student declares a major, academic units should provide inclusive orientations that further supports the inclusion of students from different racialized backgrounds so that they feel a part not only of the college community, but their academic community as well.

Develop and Promote Academic Bridge Programs

To address learning curve transitions, bridge programs should be developed and made accessible to diverse student populations. Any barriers pertaining to cost or scheduling should be removed to promote and encourage African American students, who have the potential to excel in STEM, to seek out academic supports early on and during their academic experience. Bridge program participation should be incentivized to

participate so as to tackle any curricular challenges early on and institutionalize an academic support process that meets students where they are and moves them where they would like to be.

Facilitate Peer Study Group Development

Academic units should support and encourage students from all backgrounds to provide tutoring supports to peers in need. This can be developed using federal work-study funding for those who qualify. Academic units can provide space for study sessions to take place within departments or utilizing campus resources such as library study rooms. The peer study group development process can be established for any course, therefore the support is institutionalized. Academic units should then encourage students to provide curriculum feedback and or use student evaluations to improve the learning process.

Train Instructors on Curriculum Diversification and Inclusion and Hire More Minority Faculty

Instructors should critique, evaluate, and update teaching curriculum materials to insure cultural competency for diverse student populations. Academic units should commit to hiring faculty from diverse backgrounds and through faculty meetings, committees, and subcommittees review teaching curriculum for broad inclusion and innovation. The experiences of students can be improved with an increase in the number of African American adjunct, clinical, research and tenured faculty.

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Create more Engaged Advisement Protocols and Procedures

Academic units should survey students on their advisement experience and use recommendations to improve the advisement process. Senior administrators should facilitate programming to encourage students to meet and become acquainted with advisors and vice versa to encourage ongoing mentorship and guidance relationships to enhance scheduling experiences.

Provide Additional Funding and Supports for Minority-Focused Peer Groups

The voices and experiences of African American STEM students should be amplified. Academic units should provide additional funding, leadership, and mentorship supports for minority organizations as a way of retaining African American STEM majors. University personnel should survey these minority-based organizations and use feedback to improve the educational process for African American STEM students.

Seek and Utilize Ongoing Feedback from STEM Alumni

University administrators and/or alumni offices should actively seek feedback from African American STEM alumni annually and share feedback with respective academic units as well as develop strategic plans to incorporate their feedback into institutional planning.

Recommendations for Future Research

This study explored only a small sample size from within the last ten years. A larger sample size from an extended period could compare experiences and how experiences are processed across a more extended period of time. This study could also

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explore the experiences of African American STEM students at other PWIs to determine similarities and differences across experiences. Additionally, this research question could be explored with different majors to learn more about how non-science majors experience undergraduate and post undergraduate events. In all, data from such studies can inform university officials of ways to improve the educational process for an array of individuals. Moreover, ongoing assessment is important to the success of higher education institutions. Replication of this study can broadly serve to improve the experiences of specific African American students, with specific strategies for success. The importance of such work cannot be understated and efforts to expand these studies will be critical to the improvement of higher education.

Conclusion

The research question that this study answered was: how do African American STEM alumni from the University of South Carolina, make sense of their undergraduate experiences and post-undergraduate experiences at the PWI? Based on the data collected for this study, it appears that African American STEM alumni interpret their experiences based on 1) their motivations for attending, 2) curricular transitions from high school to collegiate academics, 3) relationships developed with peers, 4) relationships developed with instructors, 5) administrative support services, and 6) transitions into the continuing education and/or workforce opportunities. These study findings are similar with research conducted by Harper (2010), Solorzano, Ceja, and Yosso (2000), and Clotfelter (2003). Harper (2010) stated that it is important to focus on enablers of African American STEM alumni achievement using methodologies that are anti-deficit in nature, and analyze

African American STEM alumni from the UofSC at different stages including undergraduate attainments into science research and industry careers.

According to the literature, in order to enhance the undergraduate experience of African American STEM students there are multiple factors that must be taken into account. It will be important to improve the high school to college transition experience, create more inclusive environments for diverse students, institutionalize culturally competent mentorship, advisement, and tutoring support efforts, and diversify the curriculum. It is not enough to simply recruit diverse students or create diversity administrative positions or host diversity-related talks. These activities should be implemented in addition to intentional practices within and outside of each academic unit lead by students and alumni within a respective major. As Ladson-Billings (1998) and Parker and Villialpando (2007) urged, diversity initiatives must be intentional in addressing issues pertaining to campus climate and competency as expressed through faculty, staff, and administrators. The goal then is to unearth ingrained racially discriminatory ideologies to create more diverse and inclusive campuses, whereby African American students can fully prosper. This includes the promotion of effective activities that contribute to student learning and success including a diverse curriculum, capstone experiences, and internships (Kuh, 2008). Having a curriculum that is specific and unambiguous provides more African American students the opportunity to focus on the learning and encourages the further development of skilled abilities that are important to academic success (Bennett et al., 2004; Gordon & Bridglall, 2006).

Solorzaro and Yosso (2000) also urged the implementation of four criteria used to categorize a higher education climate that is racially positive including: 1) the inclusion

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of students, faculty, and staff of color, 2) a curriculum that reflect the previous and current experiences of people of color, 3) programs and services that encourage the recruitment, retention and matriculation of students of color, and 4) a higher education mission that that illustrates the college or university's commitment to diversity. Although the focus of this study was African American STEM alumni and their undergraduate and post-undergraduate experiences at the University of South Carolina, other predominately white institutions (PWIs) can gain from the suggestions of this study.

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APPENDIX A

INTERVIEW PROTOCOL

Research question: How do African American alumni from the University of South Carolina make sense of their undergraduate and post-undergraduate experiences?

Alumni Interview Protocol

Interviewee (Pseudonym): _____

Gender: _____

Age: _____

Place of Birth: _____

Graduating Year: _____

Program of study: _____

Final Overall GPA:_____

Final Major/Program of Study GPA: _____

Part I: Introductory Interview (20-30 minutes):
Objective: To establish a relationship with the interviewee, provide an overview of the research study, summarize items included in the informed consent document, and clarify any questions or concerns.

Primary Interview Protocol
Thank you for making yourself available to speak with me today. You have been selected to participate in this research study because you have been identified as someone who might have something to contribute regarding your experience as an African American alumnus who successfully completed studies at the University of South Carolina. If willing, you will participate in a three-part interview. There are no additional requirements for this research study. The goal of the first portion of the

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interview is to provide an overview of the study being conducted and to share, in detail, the precautions and safety measures that will be used to ensure confidentiality and the protection of your rights as a participant, which has been included in the letter of intent. Time has been allocated to also review the letter of intent together. If in agreement with the terms and conditions of the study, you will be asked to sign the document. This interview will take about 20-30 minutes to complete.

The second portion of the interview will last about 60-90 minutes and will include questions that will assist in learning more about how you interpret your undergraduate and post undergraduate experiences. The final portion of the interview will be follow-up and will last 20-30 where you will be provided a copy of your interview transcript to review for accuracy.

Again, my research study focuses on how African American alumni interpret their undergraduate experiences at a predominantly White institution (PWI) with a particular interest in how these interpretations may inform your post-undergraduate experiences. Through this study, I hope to be provided more insight into how you interpret your own undergraduate experiences in your own words.

If you any questions or concerns regarding this process or about the forms you have completed, please let me know. If you choose not to sign the consent form, this will in no way affect your rights and privileges as an alumnus/a. Thank you for your time and consideration.

APPENDIX B

SECONDARY INTERVIEW PROTOCOL

Part II: Open-ended, semi-structured interview questions *(60 minutes)*

Objective 1: To learn more about the interviewee by gathering the story of the

participants' undergraduate experience.

Objective 2: To provide the participant the opportunity to share their story and gather

their interpretations of these experiences in addition to gathering information

regarding post-undergraduate experiences.

Secondary Interview Protocol

This interview has been planned to last around 60-90 minutes. During this time, a series

of questions will be asked. In the interest of time, it may become necessary to

interrupt at times so as to be sure all questions are adequately covered. Moreover,

to ensure that your thoughts are full captured, I would like to record the interview.

Do you give me permission to record this interview?

[if yes, the interviewee will be thanked and the recording will begin/ if the answer is no,

the participant will be thanked and the interview will be concluded].

Written notes will also be taken throughout the interview process. Each response will

remain confidential and pseudonyms will be used in quoting from the transcripts.

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Only the researcher will have access to interview recording and this will be destroyed following completion of the study. Pseudonyms only will be used to label all transcripts. Do you have any questions at this time?

To make sure that the experiences divulged during this interview are in no way influenced by the personal experiences of the researcher, I will take caution against sharing my own background and personal experiences as an undergraduate, agreeing or disagreeing with any of the experiences shared by you or refrain from making any statements which might suggest an opinion about your experiences. This will all be done in an attempt to focus on you. Do you understand?

Participant Background Questions *(questions asked in order to establish rapport)*

1. What city are you originally from?
2. Were you the first in your family to attend college?
3. What was your major while at University of South Carolina?
4. Tell me what you are currently doing (occupation/field of work/etc.).
5. Tell me about the reasons you choose to attend the University of South Carolina?

Interview Questions

Take a moment and describe your experience as an undergraduate?

Can you describe the extracurricular activities you were you engaged in while at attending the University of South Carolina?

What, if any, services, events, programs, or organizations did you that you participate in while at the University of South Carolina?

What made you want to join those specific services or organizations or participate in those events or programs? or What led to your decision not to participate in these types of things?

a) How would describe the relationships that you developed with other students at University of South Carolina?

b) How would describe the relationships that you developed with faculty at University of South Carolina?

c) How would describe the relationships that you developed with administrators and staff at University of South Carolina?

Describe what experiences made you feel connected to University of South Carolina.

What was your housing experience while attending the University of South Carolina? In what way did your housing preferences at University of South Carolina affect your undergraduate experience?

What has been your experience after completing studies at the University of South Carolina?

a) In what ways are you involved with the university as an alumna/alumnus?

b) How has your decision to attend the University of South Carolina affected your post undergraduate experience? Possible Probe: Having experienced what you did at the University of South Carolina would you still attend? Why or why not?

Is there anything else you would like to share about your undergraduate experience at the

University of South Carolina?

If you could tell future gamecocks anything, what would it be?

Thank you for participating in this interview. I will email a copy of your transcript to you

within the next week so that you can review it within seven days. Afterward, I

would like to schedule a follow-up interview to review the information.

Part III: Member Checking Interview (20-30 minutes)

Objective: To review transcripts and notes with participant and check for accuracy

Tertiary interview protocol

The purpose of this interview is to conduct a debriefing session. This will provide you the

opportunity to review the copy of the interview transcript that I previously

emailed you and all handwritten notes to check for accuracy. It will also allow

you an opportunity to clarify anything that was previous stated during your

second interview. This should take no more that 20-30 minutes.

After review

Thank you very much for assistance in this process and the time you took to participate in

this study. I look forward to sharing the final product with you once it is

completed.

APPENDIX C

INTERVIEW QUESTIONS

1.   How would you describe your undergraduate experience?

2.   Can you describe the extracurricular activities you were you engaged in while at University of South Carolina?

3.   Tell me about any events that you participated in while at University of South Carolina.

    a.   What led you to join those particular organizations or participate in those events?

4.   How would describe the relationships that you developed with other students at University of South Carolina?

5.   How would describe the relationships that you developed with faculty at University of South Carolina?

6.   How would describe the relationships that you developed with administrators and staff at the University of South Carolina?

7.   Describe what experiences made you feel connected to University of South Carolina.

8.   In what way did your housing preferences at University of South Carolina affect your undergraduate experience?

9.   Describe your post-undergraduate transition and experience.

10. What aspects of your undergraduate experience were the most and least satisfying and why?

11. What aspects of your undergraduate experience do you feel contributed to your current career status?

12. Is there anything else you would like to share about your undergraduate experience at the University of South Carolina?

13. How would you improve your undergraduate experience?