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Successful African American Women Leaders on Ascending the Corporate Ladder in STEM: A Single Case Study

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Walden University
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Abstract

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MA, Fairleigh Dickinson University, 2011

BS, Fairleigh Dickinson University, 2009

Proposal Submitted in Partial Fulfillment

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Doctor of Philosophy

Management

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Abstract

A literature gap exists on the experiences of African American women in the United States who successfully ascended the corporate ladder in science, technology, engineering, and mathematics (STEM) fields. The purpose of this qualitative, single case study with embedded units was to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields. Qualitative data from six semi-structured interviews, reflective journaling, and archival data on career trajectories and labor statistics of African American women in the STEM industry were collected and triangulated to answer the central research question. This study was grounded in theories which included two key concepts: (a) Bourdieu's (1977b) concept of social capital and (b) Collins' (2015) concept of intersectionality. Three identified themes were revealed from the thematic analysis of data: (a) the importance of mentorship, (b) the sense of self or belonging, and (c) success strategies: overcoming the barriers. This study's results indicate that African American women in STEM fields successfully overcame obstacles to break the discriminatory barriers they faced while progressing toward diversity and inclusion goals that afforded them leadership opportunities. This study may drive positive social change by highlighting the benefits of diversity and inclusion and equal opportunities that promote and support the value of processes to advance African American women to executive level positions.

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Dedication

I dedicate this research study to God, who is the head of my life, and my children, who are my biggest fans, anchors, sources of inspiration, and the instigators of this work. The kind words, the support, and the persistent reminders from my village regarding the need to complete this journey are immeasurable. During my life endeavors, my ability to pursue my academic quest avidly and successfully brought about abundant encouragement and motivation, which guided me to complete this accomplishment. For that, I say thank you!

To my siblings, my beautiful cousins, Sorors of Sigma Gamma Rho Sorority, Incorporated, and friends, thank you for your patience and understanding and for encouraging me throughout this journey. I appreciate each of you immensely!

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First and foremost, I want to give all the glory and honor to Almighty God, who made it possible for me to complete this research. Thank You, Lord! To my children, Rae'Quan, Sha'Quan, Alicia, and Makayla, thank you for your unwavering support, love, care, and persistent reminders and pushes to stay focused on this journey. To my family, a special thank you for your understanding and for always ensuring that I remained focused and took time for self-care. You have celebrated many milestones as my family and have always been supportive throughout this experience. Thank you for your understanding.

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Chapter 1: Introduction to the Study

Due to the underrepresentation of African American women in science, technology, engineering, and mathematics (STEM) professions (Fatourou et al., 2019), the need for a diverse and inclusive workforce is crucial, yet the fields remain male-dominated (Prescod-Weinstein, 2020). According to Gupta (2017), sustainable human resource management and leadership training are essential for a sustainable business model. Nazarian et al. (2017) stated that leadership has a significant impact on organizational performance, yet as a leader, one must focus on the expectations and perception of all stakeholders who can impact organizational performance and growth. Inequalities of African American women in STEM fields is a dilemma that organizations can assess by recruiting and influencing such leadership and how such issues influence not only organizational performance but can play a critical role in understanding that men and women are equal and should have an opportunity to increase their career advancement.

According to Srivastava (2016), one approach through which organizations can remain socially conscious of the diversity and inclusion benefits versus the pursuit of profit is to improve innovative ideas and organizational performance by promoting and supporting the career advancement of African American women in STEM, which may lead to enhancing economic and organizational growth and development. A literature gap related to the experiences of African American women who successfully ascended the corporate ladder in STEM exists. This study aimed to increase awareness of the potential for integrating and promoting African American women in STEM fields and captured the

attention of such barriers to career development and advancement (Vuong et al., 2021), which may create a dynamic of positive social change (Smith et al., 2019).

This chapter presents a background of the literature that led to the formation of the problem statement, the purpose of the study, research question, conceptual framework, and nature of the study, and lists definitions of critical terms used in this specific research. Furthermore, the chapter also explains the assumptions, scope and delimitations, and research limitations. Lastly, the study's significance to theory, practice, and social change is presented to conclude the chapter.

Background of the Study

The National Science Board (2018) cited women account for only 28% of STEM employees; nevertheless, such women holding STEM leadership positions or having STEM degrees have increased over the years, still only representing less than a quarter of the STEM jobs. Women struggle to ascend the corporate ladder. Based on the research gap, there was still a need to explore the experiences of African American women who successfully ascended the corporate ladder in STEM. This study aimed to increase awareness of the potential for integrating and promoting African American women in STEM fields and captured the attention of such barriers to career development and advancement (Vuong et al., 2021), which may create a dynamic of positive social change (Smith et al., 2019).

Despite the thought-provoking perceptions, the three identified articles published by (Aydin & Rahman, 2017; Dinesen et al., 2020; Holmegaard, 2015) addressed the essentials of understanding diversity and inclusion problems and opportunities. The

researchers also focused on the importance of diversity and inclusion and how advocating for the progression of African American women in STEM early in life can encourage positive influences and promotion in STEM fields. Haddon et al. (2015) noted that to gain a better understanding of what employees want from organizations, continuous communication between all parties – leadership and its employees – must take place to understand the importance of advocating for opportunities for leadership for African American women in STEM and effective decision-making, which can influence resources to build the organization's brand (Urbancová et al., 2016).

Advances for African American women in STEM leadership may provide various workforce benefits with means of improving organizational competitiveness through new ideas and innovations, which also may lead to a balanced workforce in STEM fields (DeAro et al., 2019) and result in positive social change (Alfred et al., 2019). According to Amunga and Musasia (2021), African American women in STEM fields play a vital role in sustainable development and advancement. There is a need to promote gender and racial equality by opening career opportunities to African American women as change agents in STEM organizations. Effective change management is needed, as African American women in STEM fields may provide opportunities that unlock the potential of economies for growth and can improve integration between stakeholders within STEM organizations (Kansake et al., 2021).

Problem Statement

African American women's opportunities in STEM are limited by the barriers such as the glass ceiling, sticky floor, labyrinth, or social capital metaphors they face

ascending to the corporate leader in STEM fields (Alfred et al., 2019). Although African American women account for 11.4% of all college graduates, they make up only 2.5% of the STEM workforce, and that number sharply declines when referring to the more mathematically based fields, such as physics, chemistry, engineering, and math (National Science Foundation, 2019). The workplace environment and structures in STEM continue to restrict professional opportunities for women and students of color, resulting in diminished achievement, low satisfaction, and high attrition rates for African American women in the STEM fields (Seymour et al., 2019). The social problem was that African American women experienced multiple forms of oppression in STEM environments compared to White women or men of color (McGee, 2018; Wilkins-Yel et al., 2022).

There was a substantial body of research detailing the influence of gender and race and their intersections on the experiences of STEM students (Allen et al., 2022). Overall, women were still underrepresented and faced bias and discrimination compared to men in STEM (Adams-Harmon & Greer-Williams, 2020). It is essential for African American girls to have role models and for young African American women to be mentored into professions by those that have successfully preceded them and to leverage counter-narratives of resilience as a resilience strategy in the STEM fields (Ibourk et al., 2022; McGee et al., 2022). While very few African American women obtained executive level positions in STEM fields due to the lack of diversity and inclusion in the workplace (Wilson et al., 2019), a literature gap exists on the experiences of those African American women who successfully ascended the corporate ladder in STEM (Vuong et al., 2021). The specific management problem was that little is known about the opportunities and

challenges of African American women who have successfully ascended the corporate ladder in STEM fields (Allen et al., 2022; Coston, 2020; Ferguson & Martin-Dunlop, 2021).

Purpose of the Study

The purpose of this qualitative, single case study with embedded units was to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields. My study used a single case study with an embedded unit design (see Yin, 2018). I conducted six semi structured, online interviews with African American women in the United States with successful STEM careers to gather data to meet the study's purpose. I used thematic analysis guided by Yin's (2018) pattern-matching logic sequence as my data analysis tool. Data were triangulated with reflective journal notes and archival data on career trajectories and labor statistics of African American women in the STEM industry to support the trustworthiness of the study results and make recommendations for future practice and research (Farquhar et al., 2020; Halkias et al., 2022).

Research Question

What are the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields?

Conceptual Framework

The theories and concepts that grounded this study included two key concepts that focus on aligning with the purpose of the study to explore the opportunities and challenges African American women faced while having successfully ascended the

corporate ladder in STEM fields: (a) Bourdieu's (1977b) concept of social capital and (b) Collins' (2015) concept of intersectionality. This empirical investigation aimed to advance research and address a literature gap on the experiences of those African American women who successfully ascended the corporate ladder in STEM and shed light on the potential for integrating and promoting African American women in STEM fields and captured the attention of such barriers to career development and advancement (Vuong et al., 2021).

According to Bourdieu (1977a, 1986), social capital is connected to structural relations and subjective beliefs associated with inequalities of resources and power accumulated through strong interpersonal skills, conflict resolution skills, and a diversified alliance pool (Lomsky-Feder & Sasson-Levy, 2015). Social capital is defined as an "investment, and use of embedded resources in social relations for expected returns" (Lin, 2000, p. 786) and has been commonly viewed as a factor of an individual's economic growth and a contributor to the well-being of societies, and has, thus, captured the attention of organizations, policymakers, researchers (Woolcock & Narayan, 2000). African American women have been systematically directed to seemingly high-profile positions that are, in fact, of low organizational value and do not afford entry into the firms' power structure. Drawing on Bourdieu's concept of social capital, resources can also become an intervention to advance diversity and inclusion in the workplace for disadvantaged groups that remain within and across generations (Simmons & Parks-Yancy, 2018).

Over the years, various concepts and theories have explained why African American women have not ascended the corporate ladder in STEM. Such theories range from the glass ceiling metaphors (Cornelius & Skinner, 2005), sticky floor (Berheide, 2013), and labyrinth (Haber, 2009), all falling under the umbrella concept of intersectionality. Collins (2015) grounded the concept of intersectionality in Crenshaw's (1991) theoretical works about aspects of people's identity (e.g., race, gender, class, sexual orientation) interacting with the condition of people's lived experiences (Crenshaw, 1991). In my study, I focused exclusively on the experiences of African American women. By centering African American women in my research as knowledge producers, my results addressed the intersecting forms of oppression and unique experience of African American women ascending the corporate ladder in STEM fields (Haynes et al., 2020; Ireland et al., 2018).

Additional detailed explanations of these conceptual propositions are presented in Chapter 2.

Nature of the Study

The purpose of this qualitative, single case study with embedded units (see Yin, 2018) was to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields. A single case study is the established research design used extensively in various disciplines, particularly the social sciences (Yin, 2018). Given the study's purpose, a deeper exploration of the lack of diversity and inclusion and how equal opportunities in the workplace for African American women also addressed the advancement of

organizational outcomes such as enhancing profitability and retaining employees. Using a qualitative case study approach allows researchers to analyze in-depth, multifaceted explorations of cases from various embedded units (Yin, 2018) while relying on accessible data from a group of individuals in their real-life settings. The embedded units of analysis (Noor, 2008) in the identified case study were African American women in STEM fields.

A quantitative method was not appropriate for this study, as I did not want to test hypotheses by obtaining statistical data to quantify the identified problem (see Creswell & Creswell, 2018), yet I analyzed a comprehensive depiction of the phenomenon by utilizing embedded data units (see Creswell & Creswell, 2018). To achieve this research's purpose, an extended analysis of the data were unnecessary, making the ethnographic research approach that required immersion in the subject's culture (see Creswell & Poth, 2018) inappropriate for this study. Furthermore, the mixed methods approach was not appropriate, as I attempted to make sense of the opportunities and barriers influencing African American women's career advancement in STEM fields and the phenomenon of inequality.

Participants for this case study were recruited using criterion and snowball sampling strategies and assessed with the following inclusion criteria: (a) African American women over the age of 18 who held executive level positions in STEM, (b) each woman would be open and willing to share their perspectives regarding the identified research topic, and (c) each woman would be willing to participate in the in-depth interview openly and honestly. The method for recruitment of participants was a

critical component of this research study, as it ensured the correct number of participants needed to validate the research data (see Moser & Korstjens, 2017). I conducted six semi structured, online interviews with African American women in the United States with successful STEM careers to gather data to meet the study's purpose and continued the interviews until data saturation occurred.

Given that the approach seeks valuable data from each participant, the choice of five to 10 participants was appropriate for this case study, as saturation could be reached with six or fewer participants (see Moustakas, 1994). Participants presented no new information saturation, indicating that I was able to move forward with the information received (see Moustakas, 1994). Lastly, to ensure triangulation, a compilation of the data from interviews, reflective notes, and the researcher's journal assisted with creating themes related to African American women leaders in STEM to support the trustworthiness of findings, attain reliability, and make recommendations for further research (Hennink et al., 2016).

Definitions

This section includes definitions of terms within the study that may give a common understanding. The definitions followed the use of the word in context. The terms below were used throughout this research study to describe various understandings based on the context of the term.

African American women: Women of Sub-Saharan African descent; usually preferred to be known as the term Black women over women of color. Such women are

classified across different cultures and are scarred by social biases due to their skin color (Logan & Dudley, 2021).

Diversity: An approach in which one avoids the risk of exclusion by being different, diverse, or varied and generating a sense of solidarity. Such an approach embraces people from different races and cultures and combines the focus of the community or individual principles (Frémeaux, 2020).

Executive: Leaders of a business entity or organization who hold an authoritative senior-level managerial position (Glass & Cook, 2020).

Glass ceiling: An invisible or informal barrier or norms that hinder women or minorities from reaching senior level positions in the workplace despite qualifications and skills (Kaur, 2021).

Inclusion: A process that ensures people with or without disabilities are provided with equal rights, opportunities, and shared practices that help the individual function concerning his or her duties and goals (Magnanini & Morelli, 2021).

Labyrinth: A confusing or complex maze of paths bordered by entanglements and dead-end corridors which hinder the ability to obtain one's goals (Mohigul, 2020).

Mentoring: A one-on-one relationship between two people in which a senior employee offers guidance or support to a junior employee (Mohtady et al., 2019).

Science, technology, engineering, and mathematics (STEM): Education related to academic achievements and career frameworks which influence and support individuals who have a tenure-track position in a research environment (Rattan et al., 2018).

Sticky floor: Barriers or obstacles that women face while ascending organizations that retain them in lower and middle hierarchical positions (Berheide, 2013; Rincón & Martínez, 2020).

Assumptions

According to Sliwa (2017), a researcher must learn to plan the research process to acquire the information needed to support its identified phenomenon and distinguish personal views or biases, referred to as assumptions, to evaluate and shape the study to ensure the trustworthiness of the findings (Tracy, 2020) by eliminating previous notions from the researcher's perspective (Shufutinsky, 2020). I explored African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. Understanding such opportunities and challenges allowed one to better understand the business case for diversity. I assumed the research participants were all African American women in STEM.

Other assumptions were as follows: (a) participants would answer each question honestly and accurately, (b) the participants understood the preservation of anonymity and confidentiality of the study and amenably shared their lived experiences to contribute to the data of this research study, (c) the data collected would be solely the opinion of the participant and measured the same knowledge, skills and experiences of the African American women and no biased opinions would surface during the in-depth interview, and (d) the interpretation of the data accurately reflected the experiences of the participants. Anonymity and confidentiality were preserved as each participant was

afforded the option to complete the in-depth interview and had the opportunity to discontinue the interview at any time without consequence.

Scope and Delimitations

The results of this doctoral study assisted in exploring and understanding the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields and how such leadership could increase an organization's sustainability and contribution to social change. This study would increase awareness and the capability for restructuring STEM organizations' leadership for African American women in such fields. The research would allow STEM fields to promote and support having African American women in executive leadership positions, enhancing benefits such as profitability and creating a dynamic of positive social change (Smith et al., 2019). I excluded men and focused on African American women in the United States who have successfully ascended the corporate ladder in STEM fields and now hold executive leadership positions.

The delimitations I used are determined to interpret better and explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields and how those experiences, past, and present, affect their professional choices and the success of such choices. The criteria for participants in this study were the following: (a) African American women over the age of 18 who held executive level positions in STEM, (b) each woman would be open and willing to share their perspectives regarding the identified research topic, and (c) each woman would be willing to participate in the in-depth interview openly and honestly.

The participants in this research study would be employed in STEM fields in the United States.

I believed that interviewing the women online via Zoom established a sense of trust. Open communication and transparency allowed the participants to feel comfortable and fostered a power distribution level while expressing themselves without feeling threatened (see Adamu & Mohamad, 2019). The sample was intended to include various STEM positions throughout the United States, and the intent was to have a broad range of African American women in executive level positions by age and geographic location.

Limitations

According to Theofanidis and Fountouki (2019), the limitations of a research study are factors that a researcher has no control over; however, one must consider them when interpreting such research implications. This study explored African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. Limitations of the study may occur as real-world constraints and may arise during the interview process. The first limitation included the accessibility of participants, as recruitment was limited to specific criteria and diverse social and professional resource groups due to the sensitivity of the identified topic. The second limitation included the sample size, as the snowballing method was implemented and consequently resulted in other women in STEM participating instead of African American women, the identified population. Lastly, since interviews were conducted via Zoom, building a rapport, and monitoring the participant's nonverbal cues was visible,

hence leading to participants possibly withholding information or providing biased perceptions, which restricted the study's findings.

Significance of the Study

Significance to Practice

The importance of diversity and inclusion in the workplace cannot be overstressed in addressing the lack of African American women in executive leadership positions in STEM fields in the United States. This research helped encourage the need to create an inclusive approach to diversity that maintains and supports an open line of communication and transparency challenges African American women face that affect equal opportunities, organizational growth, and stakeholders. This study's findings may also lead to positive social change by creating responsiveness to how organizations in STEM fields make sense of diversity and inclusion and how African American women believe that career advancement is being considered fair-balanced, which creates equal opportunities for advanced promotion.

To that effect, the results of this research study filled the gap in the literature on significant characteristics of effective diversified inclusion, which led to being strategic, being transparent with stakeholders, and being prepared to expand the multicultural workforce that may improve the workplace setting (see Gilstrap et al., 2015) and create financial competitiveness for African American women in STEM. The second result presented a competitive advantage for organizations as all stakeholders' perceptions would remain optimistic and, in turn, remove the stigma of deficit credibility and the lack

of diversity and inclusion, which may also improve the organization's culture (Coldwell et al., 2011).

Significance to Theory

This single case study with embedded also significantly contributed to the body of knowledge in human resource and organizational leadership disciplines. Such an effort to address the underrepresentation of African American women in STEM leadership positions (Adams-Harmon & Greer-Williams, 2020; Amon, 2017) resulted in findings that shed light on positive influences, which have the potential for integrating and promoting African American women in such fields and captured the attention of such opportunities and barriers to career development and advancement.

By exploring the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields, I aimed to address the lack of literature on career advancement for executive level African American women in STEM leadership (see Davis & Maldonado, 2015) and add new knowledge to the study's conceptual framework. Several qualitative studies have been published on why African American women have not ascended the corporate ladder in STEM. Such theories range from the glass ceiling (Cornelius & Skinner, 2005), sticky floor (Berheide, 2013), and labyrinth (Haber, 2009) metaphors, all of which focus on gender and inequalities affecting all women in STEM without narrowing down the perspectives of African American women.

Throughout this study, I presented a deep and rich understanding of the lived experiences of African American women and explored the opportunities and challenges

African American women faced while having successfully ascended the corporate ladder in STEM fields. Moreover, this study supports the importance of diversity and inclusion in the workplace and the representation of African American women in executive leadership positions in STEM fields. Lastly, researchers and scholars may expand the scope of this research to explore other specific races, cultures, and industries to improve the representation of all women throughout the United States and possibly globally.

Significance to Social Change

Based on my understanding of positive social change, the exploration of this qualitative research study was vital, as it included the potential to enhance equal opportunities for African American women who are trying to ascend the corporate ladder in STEM fields and provide a better understanding of the critical need to continuous foster diversity and inclusion within such fields. Nevertheless, previous researchers showed a gap in the opportunities and challenges of African American women who have successfully ascended the corporate ladder in STEM fields (Allen et al., 2022; Coston, 2020; Ferguson & Martin-Dunlop, 2021). Advocating and understanding diverse leadership opportunities for African American women and how open communication and effective decision-making can influence resources to build an organization's good brand (Urbancová et al., 2016) may assist with supportive organizational structures and reinforcing change that contributes to a society based on disclosing information openly to all stakeholders and how such communication can help restructure the organization's credibility when fostering diversity and inclusion the workplace. Conducting this study drove positive social change by creating awareness of gender theory and the importance

of diversity and inclusion in the STEM fields for African American women (Coldwell et al., 2011; Haddon et al., 2015).

Summary and Transition

The purpose of Chapter 1 was to provide a thorough background on the identified problem of interest in this study and describe the gap in the literature that justified such research. The problem statement, the purpose of the study, and the research question were used to guide this study, as many African American women face barriers and challenges during their careers, and each method addressed in this study assisted with the resolution of such issues. The nature, definitions, scope, assumptions, delimitations, limitations, conceptual framework, and significances illustrated various strategies used by African American women who have ascended the corporate ladders in STEM fields and provided foundations of professional methods in response to the importance of implementing and supporting diversity and inclusion in the workplace for this study.

In Chapter 2, I provide an in-depth analysis of the lived experiences of African American women who ascended the corporate ladder in STEM. I describe the literature relevant to the notion that businesses and organizations may not fully understand the perceptions of executive level African American women on career development and the barriers and challenges that they faced ascending the ladder in STEM fields (see Davis & Maldonado, 2015) in the United States.

Chapter 2 includes a more comprehensive review of the literature search strategy related to key concepts, a synthesis of related concepts, the study's conceptual framework, and a summary and conclusions.

Chapter 2: Literature Review

The purpose of this qualitative, single case study with embedded units was to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields. This chapter presents a justification for conducting such research related to African American women who have ascended into executive level positions in STEM fields. Increasing the diverse work pool by implementing diversity and inclusion best practices within organizations and businesses could influence the recruitment and retention of this underrepresented group of women, which was a problem as discrimination still exists (Hayes et al., 2020). Such an effort to address the underrepresentation of African American women in STEM increased the positive experiences that African American women faced and encouraged other young African American women to pursue careers in such STEM fields.

There was limited literature on African American women who have ascended the corporate ladder in STEM and their lived experiences of such opportunities and barriers that they faced (Allen et al., 2022; Coston, 2020; Ferguson & Martin-Dunlop, 2021). Owing to the problem, there were limited studies on how the social capital theory intersects with the impact of career achievements of African American women leaders in STEM. This study aimed to explore the experiences of five to 10 African American women who have ascended the corporate ladder in STEM and the barriers and opportunities they faced to obtain such executive level positions. The literature review highlights how researchers use social capital theory to understand the disadvantages African American women in STEM may face based on the intersection of multiple social

barriers such as the glass ceiling, sticky floor, and labyrinth metaphors they face ascending the corporate leader in STEM fields. Society perceives norms, behaviors, roles, dress, and actions of both men and women, which affect workplace performance. I explored the specific problem that women are still underrepresented, and face bias and discrimination compared to white men in the STEM fields (see Adams-Harmon & Greer-Williams, 2020; Amon, 2017).

The literature review (see Table 1) shows that most researchers focused on the experiences of women of all races (including women of color, not just African American women). However, the experiences of African American women vary from the experience of White women or other women of color in that they faced discrimination due to their ethnicity (Ireland et al., 2018). Very few African American women obtained executive level positions in STEM fields; as such, women did not receive equal opportunities as other women or White men in such fields due to the lack of diversity and inclusion in the workplace (O'Neil & Hopkins, 2015; Remedios et al., 2016).

Table 1

An Integrative Literature Framework of the Factors Exploring Women's Underrepresentation in STEM

Factors	Definitions	Factors	References
Individual	Individual factors are the external variables in the subject based on their agency, i.e., the ability to interpret, assimilate, redefine, and/orreproduce	Biological aspects	Hyde (1996), Blickenstaff (2005), Irwing and Lynn (2005), Ceci et al. (2009)
		Personality and self-efficacy	Holland (1985), Scott and Mallinckrodt (2005), Sax et al. (2016)
		Attitude towards science	Weinburgh (1995), Muñoz and Weaver (1997), VanLeuvan (2004) Rayman and Brett (1995), Frome and Eccles (1998), Astin and Sax (1996), Aschbacher et al. (2010), Scott and Mallinckrodt (2005), Hanson (2007), Sax et al. (2016), Christine et al. (2017)
		Stimulation and family support	
Family	Family factors are the transfer of knowledge, norms, and values previously constructed in society, which occur within a social relation—usually with blood relatives	Family background	Rayman and Brett (1995), Bevins et al. (2005)
		Parents' educational level	Ware et al. (1985), Astin and Sax (1996)
		Stereotypes about science in the family	Sonnert et al. (2007), Watt and Eccles (2008)
		Household demands: work and family conflict	Sonnert (1999), Maffia (2008), Barnard et al., Maffia (2008), Barnard et al. (2009), Goulden et al. (2011), Kurup and Mithreyi (2011), Fox et al. (2011), Howe-Walsh andTurnbull (2016)
Social	Social factors are characterized by socio-cultural constructions of global and local groups that are transmitted	Cultural beliefs about gender and science	Deboer (1986), Reskin et al. (1996), Astin and Sax (1996), Steele (1997), Furnham et al. (2002), Ellemers et al. (2004), Lagesen (2008), Ceci et al. (2009), VanLeuvan (2004), Stout et al. (2011), Young et al. (2013), Deemer et al.

	through social relations	Lack of role congruity	(2014), Smeding (2012), Reuben et al. (2014), Sheltzer and Smith (2014), Hopkins (2015), Delisle et al. (2009)
		"Chilly environment" (segregation in scientific communities, lack of networking activities)	Diekman et al. (2010), Stout et al. (2016), Sax et al. (2016), Carli et al. (2016)
		Racial barriers	Reskin et al. (1996), Knights and Richards (2003), Settles et al. (2006), Morganson et al. (2010), Fox (2010), Stamm (2010), Ramsey et al. (2013), Howe-Walsh and Turnbull (2016), LaCosse et al. (2016)
		The absence of role models	Ong et al. (2011), Beasley and Fischer (2012), Alexander and Hermann (2016), Carlone and Johnson (2007), Sax et al. (2016)
			Smith and Erb (1986), Glenn (1996), Sonnert (1999), Dryburgh (2000), Blickenstaff (2005), Sonnert et al. (2007), Buck et al. (2008), Morganson et al. (2010), Smith (2011), Stout et al. (2011), Cheryan et al. (2013), Young et al. (2013), Early (2017)
Educational	Educational factors are institutional and educational pedagogical issues. Since these transmit knowledge between individuals, these factors are social too	Pedagogy in science	Seymour (1995), Astin and Sax (1996), Warrington and Younger (2000), Whitelegg (2001), Blickenstaff (2005), McGinnis and Pearsall (1998)
		Academic performance	
		Belief about ability in science	Baillargeon et al. (1995), Baron-Cohen (2002), Spelke (2005)
		Vocational expectations and stereotypes	Deboer (1986), Eccles (1994), Farmer et al. (1999), Archer et al. (2013)
		Lack of information about careers in science	Schreiner and Sjøberg (2004), Lagesen (2008), Vázquez and Manassero, (2008), Polino (2012), Archer et al. (2013)
		Vertical and horizontal segregation	The Peruvian State (2015)

			Anker (1997), Piscova (2003), United Nations Educational, Scientific and Cultural Organization (UNESCO, 2007), Maffia (2008), Ceci and Williams (2011), Holland (1985), Anker (1997), Kuwahara (2001)
Labor-economic	The elements that include the subject's involvement in an activity is considered labor factors. The objective may be to satisfy a need (biological, financial, personal, etc.)	Wage gap	Gunderson (1994), UNESCO (2007), Ceci and Williams (2011), Hunt (2016)

Note. This table demonstrates the factors that contribute to the underrepresentation of African American women in STEM. Adapted from Casad and Bryant (2016).

Focusing on African American women was vital. It outlined the essential issues they have faced as they ascended the corporate ladder and focused on balancing personal and professional achievements related to gender equity, pay equality, recruitment, and retention rates in STEM fields. The following section in this chapter includes findings from different scholarly studies on how African American women have circumnavigated their gender, race, and ethnicity to achieve success in their STEM careers since STEM was a White-male-dominated field and was stereotypically considered discriminatory due to the disadvantages resulting from their race, gender, and ethnicity (Prescod-Weinstein, 2020). For African American women in STEM, the processes associated with racial identity and the intersectional experience of gender discrimination presented a case to critically examine why and how African American women have not satisfactorily addressed their simultaneous racialized and gendered experiences in STEM fields.

According to Jefferson (2019), only 5% of executive level careers are held by both African women and men, with only 4% of STEM executive level roles are held by women of color (which includes African, Asian, and Latina women) and 22% by White women (Metcalf et al., 2019). The study highlighted the barriers that African American women face ascending the corporate ladder and the opportunities to increase diversity and inclusion in the workplace, specifically the increase of African American women in executive level positions in STEM fields.

Literature Search Strategy

The iterative search process used for this study resulted from current, peer-reviewed articles retrieved from various databases from Google Scholar and the Walden University Library, including the Thoreau multi-database search, EBSCO Host, ProQuest, SAGE, and Academic Dissertations and Theses. The combination of research terms was explored between the years 2015–2021 to meet the required guidelines of Walden University. Keywords and search phrases used included were *African American women in STEM, African American women*, *corporate social responsibility*, *decision-making*, *diversity*, *ethical leadership*, *ethics*, *executive*, *gender and race in STEM*, *glass ceiling*, *inclusion*, *labyrinth*, *lived experience*, *mentoring*, *organizational culture*, *social capital theory*, *science*, *technology*, *engineering*, and *mathematics*, *sticky floor*, and *underrepresentation of women in STEM,* as well as several combinations of the aforementioned phrases.

The literature review was conducted using peer-reviewed articles from qualitative, quantitative, and mixed methods research. Such studies used to complete this review

were selected and analyzed for relevance and timeliness, while most of the results from the search of the literature identified for this study focused on women of color, which includes Blacks, African Americans, Asians, and Latina women. As a result, the literature review was limited to the lived experiences of studies conducted solely to evaluate African American women in STEM.

Conceptual Framework

The theories and concepts that grounded this study included two key concepts that focus on aligning with the purpose of the study to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields: (a) Bourdieu's (1977b) concept of social capital and (b) Collins' (2015) concept of intersectionality. This empirical investigation aimed to advance research and address a literature gap on the experiences of those African American women who successfully ascended the corporate ladder in STEM and shed light on the potential for integrating and promoting African American women in STEM fields and captured the attention of such barriers to career development and advancement (Vuong et al., 2021).

According to Bourdieu (1977a, 1986), social capital is connected to structural relations and subjective beliefs associated with inequalities of resources and power accumulated through strong interpersonal skills, conflict resolution skills, and a diversified alliance pool (Lomsky-Feder & Sasson-Levy, 2015). Social capital was defined as an "investment, and use of embedded resources in social relations for expected returns" (Lin, 2000, p. 786) and has been commonly viewed as a factor of an individual's

economic growth and a contributor to the well-being of societies, and has, thus, captured the attention of organizations, policymakers, researchers (Woolcock & Narayan, 2000). African American women have been systematically directed to seemingly high-profile positions that are, in fact, of low organizational value and do not afford entry into the firm's power structure. Drawing on Bourdieu's concept of social capital, resources could also become an intervention to advance diversity and inclusion in the workplace for disadvantaged groups that remain within and across generations (Simmons & Parks-Yancy, 2018).

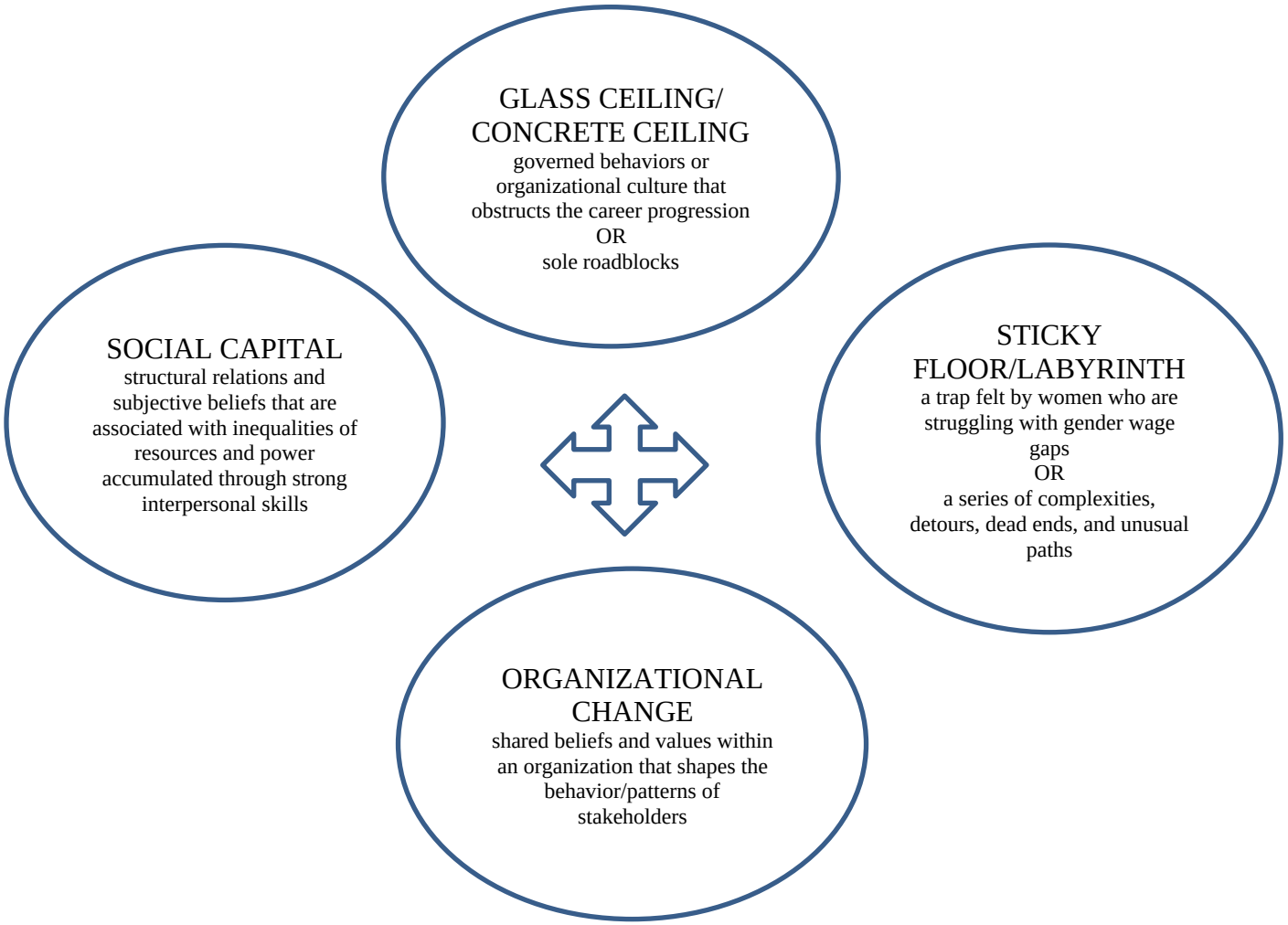
Over the years, various concepts and theories have explained why African American women have not ascended the corporate ladder in STEM. Such theories ranged from the glass ceiling (Cornelius & Skinner, 2005), sticky floor (Berheide, 2013), and labyrinth (Haber, 2009) metaphors, all falling under the umbrella concept of intersectionality. Collins (2015) grounded the concept of intersectionality in Crenshaw's (1991) theoretical works about aspects of people's identity (e.g., race, gender, class, sexual orientation) interacting with the condition of people's lived experiences (Crenshaw, 1991). In my study, I focused exclusively on the lived experiences of African American women. By centering African American women in my research as knowledge producers, my results addressed the intersecting forms of oppression and unique experience of African American women ascending the corporate ladder in STEM fields (Haynes et al., 2020; Ireland et al., 2018).

Theoretical Grounding of the Conceptual Framework

Four theories framed this research study, which included: (a) glass ceiling (Cornelius & Skinner, 2005), (b) sticky floor (Berheide, 2013), (c) labyrinth (Haber, 2009) and (d) metaphors and social capital (Bourdieu, 1977b, 1986). This section of Chapter 2 explains the conceptual framework (see Figure 1), the assumptions, and the purposes of each theory and provided an overview of literature-based explanations from previous use of the theories relevant to the identified study. The theoretical framework justification is explained with an outline related to each theory's relationship to the research problem.

Figure 1

Theoretical Framework



Literature Review

Glass Ceiling Theory

Since the preface of the "Black Lives Matter" and "social justice reform" paradigms, demarcation against African American women and other minority groups within the workplace has shed further light on the inequalities in STEM fields. Women have faced intersectionality and stereotypical barriers and a lack of support for decades, yet African American women still struggle to find support via sponsorships, advocacies, or mentorships to overcome such inequalities (Beckwith et al., 2016). According to Rincon and Yates (2018), African American women are faced with such barriers due to the STEM industry being White male-dominated, which impedes African American women's ability to ascend the corporate ladder despite their education or work accomplishments.

As of 2020, African American women were comprised of 18% of the workforce, with only 3.9% of African American women in executive level positions (Catalyst, 2022), which contributed to women unconsciously being faced with a glass ceiling upon entering executive roles (Babic & Hansez, 2021). More than simply a barrier, the glass ceiling metaphor was described by researchers as governed behaviors or organizational culture that obstructed the career progression of qualified African American women (Beckwith et al., 2016). Beckwith et al. (2016) explored different barriers, perceived or

actual, that prevented African American women from ascending to the C-suite within organizations. Berman (2015) found that there were only four African American chief executive officers (CEOs) in Fortune 500 companies. Results found six factors are generally used to enrich careers, which include: (a) holding an advanced degree, (b) participation in national organizations, (c) communication skills, (d) people support, (e) administrative experience, and (f) being mobile. The researchers further implied that the glass ceiling phenomenon impacted all industries and represented a barrier that significantly limited the advancement of African American women.

Blanche (2021) cited that such a barrier has contributed to the significant underrepresentation of African American women in various fields. Concerning STEM, African American women specifically still seek to address race and gender barriers, although women in leadership have been acknowledged, whether socially or politically, since the 1970s (Cook & Glass, 2014a; Seymour et al., 2019). Historically, the culture of many organizations was that White men represent leadership roles, and such executive positions are emphasized by masculinity (Gorman & Mosseri, 2019; McGee, 2018; Wilkins-Yel et al., 2022). Gorman and Mosseri (2019) discussed how aspects of organizations affect gender difference and inequality in three broad areas: workplace experiences, work-family conflict, and career outcomes. The research found that women were typically underrepresented in each work area (Adams-Harmon & Greer-Williams, 2020). Upon finding such disparities, the authors mapped out broad themes and processes that affected gender difference and inequality for most women and men and highlighted

some of these variations. Results found that workplace cultures shape how workers interpret and respond to experiences of discrimination or harassment.

Organizational glass ceilings remained dense, but African American women were optimistic that a pool of diverse leaders might increase the benefits of positive social change (Chanland & Murphy, 2017). Chanland and Murphy (2017) discussed the importance of creating optimal developmental networks where individuals work together to uplift and assist African American women and underrepresented groups on senior management teams and boards with advancing their careers and personal growth. Such assistance could uplift and excel African American women to propel into the upper echelons of their organizations and board positions (DeAro et al., 2019).

Researchers also identified developmental networks that would help diverse leaders overcome barriers to breaking the glass ceiling in more significant numbers and discriminatory practices in the workplace for African American women (Chanland & Murphy, 2017). The glass ceiling effect and the barriers that African American women encountered seeking ascension to executive level positions were analyzed by Jackson et al. (2014). Three key themes were highlighted concerning discriminatory practices in the workplace including: (a) a lack of skills and qualities required for a leadership position, (b) overt discrimination by the majority culture, and (c) systemic discrimination on behalf of the organization against African American women. These research findings opined that misleading studies damaged African American women's representation in the workforce (Amunga & Musasia, 2021).

According to Hamrick (2019), African American women earned 2.9% of bachelor's degrees and attained fewer advanced degrees across all STEM fields (Catalyst, 2022; National Science Foundation 2019). Despite accounting for over half the college-educated workforce, African American women in the United States made up only 2.5% of these employed in science and engineering occupations in 2017 (Catalyst, 2022; National Science Foundation, 2019). Women entering the STEM workforce was becoming more common than ever, as many aimed to further their education, yet many changes are still needed to fix this inequality and misconceptions that exclude African American women in these fields.

Concrete Ceiling Theory

Experts suggested that African American women could not seem to break the glass ceiling because of societal behaviors, cultural biases, and gender structures (Beckwith et al., 2016; Matchett, 2013; McGregor, 2016; Seymour et al., 2019). The perspectives on whether African American women lead differently from White men have created a glass ceiling and rendered a more complex barrier known as a concrete wall or concrete ceiling for African American women regardless of the industry in which they work (Tan, 2016). According to Tan (2016), the concrete ceiling metaphor reflected the sole roadblocks, which African American women experienced at higher levels of corporate hierarchy as White men seemed to be considered better leaders based on their ability to contribute to mechanistic or task-oriented responsibilities (Devillard et al., 2018).

Researchers have highlighted that African American women are not offered the same opportunities as their White counterparts (McGee, 2018; Wilkins-Yel et al., 2022). White men are three times more likely to hold leadership positions than women (McGee, 2018; Mekongo et al., 2019; Wilkins-Yel et al., 2022), and African American women would have to wait until 2119 to obtain equal pay for work-related roles (Institute For Women's Policy Research, 2018; Vuong et al., 2021). Scholars have contended that women's inclusiveness may lead to new innovative ideas for equity and build a gender gap in the workplace (Mitchneck et al., 2016; Smith et al., 2019).

African American women still struggled to fit in at different workforce levels, whether socially or financially (Bailey-Jackson, 2021; Settles et al., 2019). Organizational leaders could encourage authenticity of career advancement for African American women in STEM and support more opportunities to meet the needs of their stakeholders by promoting diversity and inclusion in leadership (Babalola et al., 2021; Ismail et al., 2017; Xu, 2017). Sharma and Tarp (2018) suggested that organizational culture could either hinder or support leadership styles of African American women in STEM as leaders could influence such growth based upon their perceived individual dispositions.

From the glass ceiling theory, several metaphors were formed, such as the sticky floor and labyrinth, to explain why minority groups were being excluded from leadership positions. The sticky floor effect was described as a trap felt by women struggling with gender wage gaps, usually in the low to middle level positions for extended periods (Shabsough et al., 2021). Due to the lack of advancement and frustration with the

workplace, many African American women may seek other opportunities such as becoming entrepreneurs. This theory highlights the vertical and horizontal segregation between African American women and their White counterparts in wage gaps.

Sticky Floor Theory

The sticky floor theory (Berheide, 2013) was derived from the glass ceiling theory. However, the sticky floor criticized the labor economic factors identified between genders in the workplace. The premise is similar to that of the glass ceiling except focusing on women who are paid less than men even though both genders are equally qualified to perform the job responsibilities (Avolio et al., 2020; National Science Board, 2018). Sticky floor theory argues that despite changes in social norms and policies, there remained a gap of around 15% in hourly earnings between similarly qualified men and women (Ciminelli et al., 2021).

One idea stemmed from the sticky floor theory. Inequality and limited growth prevent African American women from reaching their full career advancement potential. Researchers quantified the main drivers of gender wage gaps using individual level data, intending to devise effective policies to reduce them. The research findings suggested that, on average, “sticky floors” account for 40% of gender wage gaps based upon preconceptions of social norms, gender stereotyping, and discrimination (Ciminelli et al., 2021). In contrast to the ethnicity, race, and gender intersection related to wage gaps amongst African American women, the researchers also highlighted other factors contributing to the barriers faced by such women ascending the corporate ladder.

The influence of access, mentorship and participation, and educational choices were also highlighted as factors that impact the underrepresentation of African American women in STEM. The significant underrepresentation of African American women in executive level positions in STEM was a tenacious challenge (Orrell & Cox, 2020), yet there seems to be a pipeline of educated and skilled women who are being overlooked.

Labyrinth Theory

Upon further exploration, researchers also found a consensus that as African American women entered the workplace, they were stigmatized as having double challenges: (a) being African American and (b) being women. African American women have been silenced and stereotyped for many years, and as literature has indicated, hard work and persistence do not pay off when trying to ascend the corporate ladder (Hyppolite, 2019; Prescod-Weinstein, 2020). The labyrinth plays a critical role, as it was a more accurate metaphor for the obstacles women encounter, such as a series of complexities, detours, dead ends, and unusual paths. Labyrinth theory includes sex discrimination, women's domestic responsibilities, and sometimes women's own failure to believe in themselves (Crites et al., 2015).

Each women's journey through the labyrinth is complex, yet they are also different, but the results were the same: not reaching the executive level positions, which they desired (Carli & Eagly, 2016; Prescod-Weinstein, 2020). Researchers suggested that as African American women work to prove their ability to hold executive level positions, they are also impacted by their failure to believe in themselves, which leads to a lack of self-esteem, self-worth, and self-efficacy (Crites et al., 2015; Ibourk et al., 2022; McGee

et al., 2022). Many African American women have found coping strategies to protect themselves in the workplace (Dickens & Chavez, 2018; Ibourk et al., 2022; McGee et al., 2022). These coping strategies assist African American women with shifting the impact of stress from discrimination and altering the workplace's cultural behaviors to form positive well-being and work outcomes (O'Brien et al., 2016). Research indicated the importance of inclusive work environments benefited the celebration of group differences and individual identities and created positive social change for organizations and their stakeholders (Dickens & Chavez, 2018; Vuong et al., 2021).

As each of these metaphors evolved, the successes and challenges of African American women will continue to create dilemmas between their White counterparts in the workplace. If equality was to be achieved, there must be changes to organizational cultures and their structural foundation (Onyeador et al., 2021). Researchers have conducted countless studies on the disparities women face in the workplace, so gender bias was not a new issue but has been highlighted now more than ever due to the leadership structures and diversity and inclusion initiatives in organizations (Gipson et al., 2017; Smith et al., 2019; Superville, 2016; Vuong et al., 2021). The paradigm of new grassroots initiatives and followership leaders is critical in overcoming the labyrinth metaphor. Nevertheless, organizations must adapt to change from the top down to overturn the pressures of African American women's obstacles within the workplace (Basow, 2016; Smith et al., 2019).

Bastedo et al. (2016) cited diversity represents one of the most dramatic societal changes in the 21st century. Avolio et al. (2020) implied that STEM was a powerful

resource for global development as it was an essential element of social and economic progress. So why was STEM not more diverse and inclusive as expected? The cycle of discrimination must be eradicated, and the promotion of diversity and inclusion fostered to ensure cross cultural representation in STEM is being protected appropriately. Consistent with Broom's (2020) research, it was crucial to acknowledge countries like Denmark, France, Belgium, Iceland, Sweden, and Canada that have made significant progress in the ability to have equal standing opportunities for women in the workplace. Due to deeply embedded cultural beliefs in the United States, as a researcher, one must showcase the importance of inclusion of African American women in executive level positions in STEM and, among other things, continue to assist with changing the discriminatory historical practices to create positive social change.

Social Capital

Building relationships, sharing resources, and affording opportunities are vital to success in STEM (Vuong et al., 2021). Such tactics promote and support access to resources necessary to ascend the corporate ladder, especially for African American women. According to Carli and Eagly (2016), social capital contributes to how women developed relationships and engaged in an organizational setting. The need for resilience to obtain personal objectives by overcoming obstacles such as gender and racial biases and social capital create an opportunity to enhance the probability of African American women attaining executive level positions in STEM.

Developing relationships and engaging with others is essential for establishing diverse alliances (Vuong et al., 2021). Formed alliances tend to emerge as an essential

aspect of ensuring the effective development of responsibilities within the workplace and shared activities that contributed to an inclusive atmosphere. Alliances should be strategic and support personal and professional objectives that render successful and influential contributions to the development of one's achievement in addition to an organization's mission (Kansake et al., 2021). Glass and Cook (2020) cited the fundamental importance of having a direct link between one's contributions as a woman in leadership, as pathways result in innovation, profitability, and community brand.

Creating a system of resources where African American women are empowered by unique influences such as mentoring was more than a summation approach for expressing social climates but also imposed an understanding of self within those climates. A platform to share and express one's thoughts and perceptions regarding their identities revealed the importance of promoting and supporting the voices of African American women in STEM as they were determined to demonstrate their power, strength, and successes just as their White counterparts (Kansake et al., 2021). As race and gender are examined as social constructions for African American women in STEM, researchers have found that the presence of African American women in STEM has an impact on various factors like resources, representation, pedagogy, and culture (Amunga & Musasia, 2021; Ong et al., 2018).

The efforts of diversity and inclusion of African American women leaders in STEM also rendered a competitive edge in the United States (Amunga & Musasia, 2021). Additional human capital in STEM results in new concepts and illuminates the mainstream of new cultures that contribute to the commitment to diversity and inclusion

in the workplace (Alfred et al., 2019; Kansake et al., 2021). Taking a deeper look into identity, mentorship, and STEM was necessary to understand better how and to what extent African American women used developmental interventions to transition through different phases of their professional careers (Ibourk et al., 2022; McGee et al., 2022; Mondisa, 2018).

The differential representation must start early and continue through higher education and the workplace to retain global competitiveness (Ibourk et al., 2022; McGee et al., 2022). Alfred et al. (2019) cited advancement of African American women in STEM must lead the discussion of organizations' human resources to obtain and maintain global competitiveness. Diversity has become a crisis of a significant portion, especially for African American women in STEM (Alfred et al., 2019). The marginalization of African American women in STEM has increased on different levels and across most industries, resulting in negative access to networks and resources within the workplace (Nazarian et al. (, 2017).

Alfred et al. (2019) examined factors that served as barriers and supported opportunities for career choices, development, and retention among African American and Hispanic women in STEM education and the professions. The authors found that human resource development played a critical role in retaining and advancing African American women in STEM throughout the research. Providing support such as mentoring provided developmental experiences that lead to a talent pool inclusive of racial minorities (Prescod-Weinstein, 2020). The researchers drew data from empirical studies, conceptual analyses, governmental reports and databases, and other related literature to

explore underlying forces contributing to the representation crisis among African American and Hispanic women in STEM. Upon the researchers' review, several factors were identified and highlighted to understand the underrepresentation of African American women in STEM education and professions.

Alfred et al. (2019) suggested the concept of social capital as a determinant of African American women's economic growth and contributors to the well-being of their communities. To support interventions promoting diversity, equity, and inclusion, the researchers established a common ground that a mentor-protégé relationship might assist with introducing resources and power, which may lead to new ideas, systems of rewards, a diverse culture, and ethical culture codes of conduct and traditions in the workplace (Ibourk et al., 2022; McGee et al., 2022). Results found that social capital served as bonding and bridging functions and could link networks to acquaintances that provide equal access and interactions of various kinds of capital such as symbolic, cultural, and social (Smith et al., 2019; Vuong et al., 2021).

Having access to mentors and role models positively impacted the professional development of African American women in STEM and contributed to equitable outcomes (Buzzanell et al., 2015). Mentoring was perceived as an organized process, thought to be comprehensive, developmental, nurturing, and collegial, that supported different needs, individual experiences, and vulnerabilities (Buzzanell et al., 2015; Ibourk et al., 2022; McGee et al., 2022). Still, mentoring efforts received minimal visibility and recognition in many organizations.

Creating mentoring networks supported the development of career progression and skillsets that were needed to promote one's career (Corneille et al., 2019; Ibourk et al., 2022; McGee et al., 2022). There are several mentoring models including: (a) one-on-one, (b) group, or (c) network through employee resource groups (ERGs) and peer mentoring. The potential to display empathy towards employees, whether women or men, and support mentorship strategies could benefit organizations as it was perceived that organizational support was in place and a sense of belonging was projected amongst all employees. A commitment to social capital within the workplace led to understanding how individuals were advancing in the organization and the career development of its employees. ERGs in organizations were essential as these resource sharing groups contributed to employee development and career advancement (Brown, 2016; Seymour et al., 2019) and are necessary to dismantle inequities and promote factors such as open communication amongst employees and its leadership, accountability, training, and policy change within the organization (Corneille et al., 2019).

Social capital theory suggested that organizations increased network accessibility and supported how leaders access social and material resources (Munn, 2018). Munn (2018) cited that racial inequalities influenced access to social capital and gaining network accessibility led to diversity management strategies that stimulated access to resources linked to White networks. Members of such White social networks tend to have an executive level position that provided power and control at top organizations over individuals who were not a part of the group (Munn, 2018). Data showed that such effects were the mental and emotional shackles of historical racism, genderism, and

structural barriers amongst African American women (Washington Lockett et al., 2018), as African American women are the most oppressed minority group in the United States.

Understanding the social capital factors contributing to the under representation of African American women in STEM was contingent on participation and early assessment of meaningful academic and career choices. As researchers have found, gaps in perception of positive STEM choices and experiences begin as early as middle school, and the environment could influence the barriers and opportunities, whether internally or externally (Collins, 2018; Haynes et al., 2020; Ireland et al., 2018). Skvoretz et al. (2020) cited the critical role in students' preparation and persistence by providing access to resources. Social capital gained from knowledgeable resources help support students with barriers and challenges and influences academic and career outcomes.

Skvoretz et al. (2020) examined the influence of social capital on differential persistence and retention among women and underrepresented minorities in undergraduate engineering majors. Researchers found that social capital differed for first-year students by gender and ethnic-racial groups but was beneficial to the students' persistence and retention rate. To understand the diverse limiting perspectives, the researchers attempted to define social capital based upon two broad categories: (a) networking and (b) participatory. The researchers also proposed that once a gained understanding of social capital was comprehended by organizational leaders, individuals could achieve goals they could not achieve on their own without access to resources. Access to social resources led to positive employee engagement. Researchers used a mixed methods approach and administered an online survey that inquired about

respondents' participation in STEM related interests and courses they took in high school. The researchers gathered data pertinent to the participants' influence in their decision to pursue STEM careers and the barriers and challenges they seem to think contributed to collective and individualistic engagement in the aspirations.

Skvoretz et al. (2020) contended that to gain positive social capital outcomes such as a mentor, resources must be available, accessible, and activated. The concept of social capital drove one's interest in personal networks and formed clear academic and career pathways. The study results revealed that although there was a difference between men and women and their availability and access to STEM-related resources, the major finding was the significant differences in inactivation based on the ethnic-racial group. So, the question of how organizational culture shapes the mindsets and actions of leadership to support African American women ascending the corporate ladder remains.

Though various barriers hampered African American women in STEM fields, researchers have found that by attaining leadership positions with positive reinforced organizational culture. African American women could create different experiences than their White counterparts (Collins, 2018; McGee, 2018). Nevertheless, African American women have reported exclusion from formal and informal networks, which affected their career advancement (McGee, 2018). With an increase in the importance of diversity and inclusion in the workplace for African American women, researchers are still focused on understanding the lived experiences of African American women in STEM leadership roles (McGee, 2018). McGee (2018) cited that the perceptions of different networking systems have narrowed the path for African American women ascending the corporate

ladder in STEM and highlighted the complex characteristics organizations faced while promoting and supporting diversity and inclusion in the workplace.

Opportunities in STEM careers are predicted to grow faster than ever before, so there is a question regarding why women are among the most underrepresented groups in such fields (Jorstad et al., 2016; Miller, 2017; National Science Board, 2018). Jorstad et al. (2016) examined the projecting impact of factors on female community college students' intention to transfer to STEM. Researchers highlighted the imperative need to fill the talent pool in STEM fields and addressed the influence of social capital and its effect on female workers. According to Jorstad et al., the lack of women in STEM reflects educational unpreparedness but a lack of social capital to offer additional insight into STEM aspirations.

Jorstad et al. (2016) shared the misconceptions of lack of education, family priorities, and social relationships to understand female participation in STEM academia and careers. The researchers also proposed that status attainment and socialization functions were complex and multifaceted and affected academic and career success. Using a quantitative approach and administering the STEM Student Success Literacy (SSSL) survey, the researchers collected and analyzed data from 565 diverse student populations located in Florida. After reviewing the data, the researchers used a regression model that included social capital factors and demographic characteristics to generate their findings. Both descriptive and inferential statistical analyses revealed significant results including: (a) factor analysis (both exploratory and confirmatory) indicated how social capital, chilly climate, and engagement were measured using SSSL survey items,

and (b) multinomial regression analysis revealed significant predictors of female community college students' STEM aspiration. Each result highlighted the usefulness of data that could be used to inform organizations, educators, and policymakers of the importance of creating and sustaining programs to assist women with their STEM aspirations (Jorstad et al., 2016).

Mentorship

Gender disparities in STEM have shifted over time as new evidence and interpretations have merged in various studies. Nonetheless, mentoring was a resource that could be beneficial to the success of STEM as equal access, understanding, and addressing the complex issues of African American women ascending the corporate ladder was essential. The benefits to STEM and society would result in qualified African American women in the industries, support change, and improve the sense of belonging and performance in the workplace (Charlesworth & Banaji, 2019; Ismail et al., 2017; Xu, 2017). Charlesworth and Banaji (2019) presented an article about gender and racial disparities, and mentoring was a process that was highlighted based on addressing gender bias and the ability to reduce the lack of diversity in the workforce.

Researchers suggested that to reduce such biases of perceivers and to increase their willingness to promote change in the workplace, strategies to break habits must be implemented in organizations. The interventions may reinforce self-promotion, competitive personal goals, and individual career advancement. Charlesworth and Banaji (2019) stated that women perceive STEM environments as a mismatch between their goals and values; therefore, men are more likely to endorse interest in pursuing and

persisting in STEM. The researchers used quantitative viewpoint articles to evaluate recent evidence on the extent, causes, and solutions to gender disparities in STEM. Results indicated that to reduce perceivers' biases and increase their willingness to promote change, interventions using a "habit-breaking" approach have effectively reduced racial and gender biases (Charlesworth & Banaji, 2019).

Stereotype theories suggested perceptions of STEM were impressionable, and interventions such as attitudes reinforced by parents and peers prepare African American girls and women for personal advancement in such fields (Casad et al., 2018). Casad et al. (2018) also suggested role model interventions to address the sense of belonging. Researchers have found that role models improved outcomes for women and minorities in STEM and influenced career sustainability (Casad et al., 2018).

Casad et al. (2018) reviewed six "wise" psychological interventions to improve gender and race equality in STEM education by addressing psychological processes that hindered career success. The researchers highlighted each intervention briefly and provided practical strategies to target specific psychological processes that caused disinterest, disengagement, and poor performance in STEM education. Results of the study indicated that the most positive impact of role models for African American women should be portrayed as inspiring and self-relevant, with attainable success. Researchers also depicted the effectiveness of belonging interventions such as mentoring and role model involvement introduced African American women to individuals who could demonstrate teaching abilities and experiences, attitudes, places, and opportunities that were pivotal critical factors to creating a sustainable career (Casad et al., 2018; Smith

et al., 2019) and assisted with building mentoring networks. Mentorships and role models could encourage African American women and disadvantaged groups and support women to break through the glass ceiling (Alfred et al., 2019; Jones, 2017).

As a mentor, one can support an individual's attitude, way of thinking, behavior, and performance and help develop various skills in mentees. The ability to do such also allows the mentee to address their learning gaps and develop desired skillsets to perform at a high level in their current position (Jones, 2017). Jones (2017) highlighted the benefits of having a mentor as an "unsung hero" in development. The potential of mentoring is enormous, and with careful planning and much support, it can be impressively effective and build self-confidence.

Upon having a mentor or role model, African American women seemed to be willing to take a risk in the workplace, develop a sense of independence, accept criticism, and use it to advance their career development. Seeking a mentor could provide experience and objectivity to develop one's career, as some mentors could be non-judgmental, good listeners, honest, gives thorough feedback, and provide a foundation to share their good interpersonal skills. Jones (2017) used a qualitative case study that took a critical realist position and an interpretivist theoretical perspective to explain, clarify, and demystify learning from formal mentoring. Results indicated that mentoring was an exceptional component in the succession of African American women in White male dominated roles. This study demonstrated that both the mentor and mentee perceived learning within all four learning domains including: (a) cognitive, (b) skill-based, (c) affective-related learning, and (d) social networks.

Reaffirming African American women's identities and providing engaging learning experiences through mentorship relationships could help cultivate opportunities to seek STEM careers (Mondisa, 2018). Mondisa (2018) aimed to understand and identify mentoring approaches of African American mentors to shed light on practices that could be implemented in higher education to increase the number of minority graduates. The researcher used an interpretive lens to analyze interview transcripts, which were thematically coded to produce the most emerging and imperative themes about mentoring approaches.

While confronted with challenges and obstacles that adversely impacted their academic performances and social interactions, many African American undergraduates also felt a lack of support and an increase in isolation. However, during such research, it was highlighted that mentoring was proven to be a mechanism that assisted such undergraduates with remedies to eliminate the negative experiences. Results further indicated that mentors used familial guidance, resource acquisition, and empathetic mentoring approaches (Mondisa, 2018). These approaches promoted the development of self-belonging and STEM identities to support student persistence. This study intended to establish a foundation for future research to examine and identify characteristics of mentoring practices and approaches that created concepts to close the gaps and equalized the disparity so that students could receive the same level of education while ensuring a sense of belonging.

Mentoring was highly perceived as valuable and promoted relationships, whether long- or short-term, and assisted with overall career success, and was a resource for

African American women in STEM who struggled with a sense of belonging (Amunga & Musasia, 2021; Butz et al., 2019). Such techniques, learning environments and resources also address African American women's psychosocial and emotional needs in STEM (Alexander & Hermann, 2016; Seymour et al., 2019). Improving motivation in STEM was vital as such proposed choices could alter developmental trajectories from an early age (Ibourk et al., 2022).

According to Wigfield et al. (2015), having such motivation factors as mentoring and role models at an early age could also maximize STEM learning opportunities and impact career choices later in life. Butz et al. (2019) posited how effective the utilization of mentoring raised the cultural awareness of mentors who increased the knowledge of how addressing diversity matters, which benefited African American women in STEM. As seen through the literature review, gender was an essential element to consider when studying STEM, as gender could be understood as a daily process, whereas there were significant advantages for African American women and ethnic minority students to have a safe place where resources could be shared freely (Adams-Harmon & Greer-Williams, 2020; Rainey et al., 2018; Shepherd, 2016).

Organizational Cultural Change

According to Eisenberg et al. (2019), effective decision-making could be complex due to conflict or the orientation of organizational crises; yet such a strategy also had a significant effect on organizational performance. To maintain a positive relationship with employees, an organizational leaders must implement strategies that foster an open communication policy, collect data, process the data, and follow up with the best possible

solutions to tackle effective decision-making. These tactics offset personal bias and create an environment of transparency. The lack of effective decision-making could impact an individual's ability to communicate and a team's dynamic, leading to disengagement and distrust (Gadirajurrett et al., 2018). When organizations ignore the personal perspectives of their employees, underlying behaviors could reflect poorly on the organization's culture (Fatourou et al., 2019; Sharifirad, 2013).

African American women in STEM struggle with such issues daily in the workplace. As cited by Kaplan et al. (2014), leaders' actions were essential to consider when expounding on such factors. A leader's behavior could lead to trust or distrust, and depending on which is formed, employees may take that moderating influence and adapt their behavior based upon such dynamics and limited communication (Metwally et al., 2019). Communication was one of the most challenging issues in organizations; it was an area most frequently complained about by stakeholders, and failure to provide the appropriate data at the appropriate time could result in a vested concern about how the organization's reputation was sustaining and projecting its ability to provide greater means for positive social change (Bendl et al., 2019; Macintyre et al., 2019). Such information may affect the stakeholders' behaviors and caused the organizational structure to appear inflexible or rigid (Macintyre et al., 2019).

According to Schlaile et al. (2021), the definition of organizational culture is complex; nonetheless, it was defined as shared beliefs and values within an organization that shaped their employees' behaviors (Fitria, 2018). This definition was pertinent to this study as it supported the efforts of the researcher to explore the lived experiences of

African American women who have successfully ascended the corporate ladder in STEM. Such definition also explored the progression of discrimination and highlighted the barriers and opportunities that could assist with understanding the importance of African American women's career advancement in STEM.

Organizational culture must create a navigation system that allowed organizational structure and its stakeholders to better understand different behaviors, perspectives, and decision-making, which could influence organizational progress and impact stakeholders' engagement (Patro, 2016). This insight into how organizational culture played a vital role in diversity and inclusion provided an overview to overcome an organizational crisis and helped avoid unnecessary conflicts and misunderstandings at the workplace (Duchek et al., 2019). For this study, a crisis was an event or series of events that created a threat to an organization's existence (Hällgren et al., 2018). Henceforth, the unplanned situation or threat that suddenly occurred within an organization out of nowhere could be effectively managed and dealt with was known as crisis management (Hällgren et al., 2018).

The organizational culture transformation could also address prescriptive gender norms, positive counter-stereotype imaging, development training, networking, and career advancement for African American women in STEM fields (Carr et al., 2018; Srivastava, 2016). As organizational leaders adopt conservative approaches, take the initiative to reflect, and identify problem areas and devise appropriate strategies to overcome such an organizational crisis (Carr et al., 2018), the deconstruction of challenges faced by African American women in STEM would dissipate, and robust

support systems would be formed to implement the organization's mission. Formulating processes to address any need for improvements in the workplace and, in turn generating a shared vision to support the organization's competencies could lead to maintaining the organization's creditability to both internal and external stakeholders (Akinbode & Shuhumi, 2018; DeAro et al., 2019).

While organizational structures were often based either on product or function (Oliveira & Takahashi, 2012), the effect of stakeholder preferences and organizational structure on an organizational crisis was suggested to impact individual behavior and organizational performance (Joseph & Gaba, 2020; Kansake et al., 2021). As a leader, one should focus on embracing the improvement of the organization by providing a refined understanding of managing interpersonal relationships, effective negotiations, and networking building to reinforce diversity and inclusion. Identifying different crisis-response strategies that could affect stakeholders' attributions of organizational responsibility, emotional response, reputation, and supportive intention (Cho et al., 2021) for African American women in the workplace can strengthen workplace ethics.

Further research and reflection suggested that an essential element was missing, which indicated that organizations must focus on planning and preparing their leaders for potential crises by creating a diverse environment and creating pathways for African American women to successfully ascend the corporate ladder. Such best practices could lead to employees appropriately embracing and enforcing the organization's purpose, mission, vision, and goals (Kansake et al., 2021; Li et al., 2018) without personal biases. Therefore, leaders were responsible for ensuring that employees' efforts and engagement,

which affected an organization's financial performance (Afsar et al., 2020), were cultivated to create and transform an organizational structure that implements a welcoming environment through comprehensive interventions that addressed structural and systemic changes (Kang & Kaplan, 2019).

Relevant Research

Glass ceiling, sticky floor, labyrinth, and social capital theories were used in recent research to view the barriers and opportunities African American women in STEM fields have faced while successfully acceding the corporate ladder. Jordan (2021) employed the glass ceiling, sticky floor, and labyrinth metaphors to support the research on African American women and their development of equal opportunities and representation to ascend corporate leadership positions successfully. Jordan explored the barriers 15 women of color encountered seeking corporate leadership positions and why women of color were not gaining the same promotion opportunities as nonwomen of color. In the study, Jordan discussed the barriers African American women faced related to resources and support, lack of proper training, advocacy for women, and the impact of promotion of African American women. Jordan was able to focus on the organizational impact of promoting women as such could lead to the following opportunities including: (a) creating a diverse environment; (b) traditional recruitment practices; and (c) experiences of the glass ceiling, and (d) equal opportunity, which all lead to leadership positions. The study results led to African American women's most important concern was not having equal opportunities as their White counterparts.

Social capital theory was also used in a recent study to understand a range of social mechanisms and collective assets that built positive, constructive relationships between organizations and their employees, specifically African American women. Yang et al. (2020) studied the impact of having direct and indirect relationships and the need to encourage positive intergroup relations in STEM. The authors applied intersectional frameworks and used a nationally representative dataset to probe patterns of discrimination accessed to social capital among six ethnic and gender groups. The research findings supported the double jeopardy approach, with a simple hierarchy of gender and race/ethnicity that implied all men have a higher social networking platform than their women counterparts.

The results were viewed through a social capital theory lens to explain gender and race as factors in African American women's negative experiences in STEM fields while ascending the corporate ladder (Yang et al., 2020). Nearly all African American women who have reached executive level positions felt alone and isolated; it was imperative that organizational leaders played a vital role in understanding and communicating the importance of diversity and inclusion in the workplace. Such adaption of organizational culture could promote the direct correlation to recognizing the benefits of African American women's representation in executive level positions. Such adaptation can also highlight the keys to building strategies to eliminate attitudes and behaviors that could oppose potential obstacles to African American women's career advancement and the organization's outlook on positive social change and clear financial goals.

I considered the lived experiences of African American women who have ascended the corporate ladder in STEM, the behaviors, and decision-making processes, and how the organizational structure in context to how stakeholders responded to an organizational crisis was handled overall as it related to business ethics. Are employees afraid, panicking, and looking to leave the organization, or are they calm due to the open communication between them and their leaders? Are external stakeholders pulling their stocks due to the lack of communication, the organization's diminishing reputation or credibility, or lack of diversity and inclusion?

Most of the research I reviewed discussed the topic from a mixed methods perspective, which focused on various theoretical perspectives. Thus, there was a gap in the literature concerning qualitative data that explored the phenomenon of African American women in STEM who have ascended the corporate ladder, leadership behaviors, and organizational culture in its effect on the organizational structure and its stakeholders. Such factors actively invited me to dialogue about multiple ways of learning and implementing new strategies on what was critical to discussing issues addressing diversity and inclusion for African American women in STEM.

Summary and Conclusions

The theoretical grounding of my study's conceptual framework drove the development of the integrative literature review in this chapter including: glass ceiling (Cornelius & Skinner, 2005), sticky floor (Berheide, 2013), labyrinth metaphors (Haber, 2009), and social capital (Bourdieu, 1977b, 1986). Since the purpose of the study was to explore the lived experiences of African American women who successfully ascended the

corporate ladder in STEM, using the glass ceiling (Cornelius & Skinner, 2005), sticky floor (Berheide, 2013), labyrinth metaphors (Haber, 2009) and social capital (Bourdieu, 1977b, 1986), perspectives were appropriate. The African American women's experiences were both gender, race, and economically related, which created the relevancy of such theories. Chapter 2 included a review of the literature and covered relevant issues about African American women in STEM who successfully ascended the corporate ladder and evaluated those perspectives based upon the opportunities and barriers African American women faced in STEM and ensured that each aforementioned theory was appropriate to incorporate and used to assist in analyzing the lived experiences of the participants.

This integrative literature review presented an overview of the history regarding race and gender disparities of African American women in STEM appended to their lived experiences of ascending the corporate ladder, which included organizational structures such as mentoring and ERGs that reinforced change that contributed to fostering diversity and inclusion in the workplace. Social capital resources such as the value of mentorship and how much networking opportunities could enhance career development and success for African American women in the workplace were also briefly examined. The historical context of the study's phenomenon of African American women in STEM leadership was also presented. Despite an increase in the literature regarding all women in leadership, more studies are needed to address and explore African American women's underrepresentation and ability to obtain executive level positions, mainly in STEM (Beckwith et al., 2016). Chapter 3 discusses the research design and rationale, the role of

the researcher, study methodology, issues of trustworthiness, and data collection strategy that were addressed in this current study.

Chapter 3: Research Method

The purpose of this qualitative, single case study with embedded units was to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields. Meeting the purpose of this exploratory case study addressed the literature gap on the experiences of those African American women who successfully ascended the corporate ladder in STEM (see Vuong et al., 2021). I used a single case study with an embedded unit design (see Yin, 2017). The unit of analysis in the identified case study was the African American woman in a STEM field.

African American women experience multiple forms of oppression in STEM environments compared to White women or men (McGee, 2018; Wilkins-Yel et al., 2022). Raising awareness of successful experiences of African American women in the STEM workplace drives positive social change by altering perceptions on providing access to leadership positions to African American women in STEM fields, which creates a dynamic of positive social change (Smith et al., 2019). This chapter provides detailed information on the research method and rationale for conducting a qualitative single case study with embedded units. The central research question (CRQ) guiding this empirical investigation is presented along with the participant selection strategy, data collection

strategies and data analysis, the researcher's role, ethical considerations, and a summary of the critical ideas of Chapter 3.

Research Design and Rationale

The research question drove the research strategy (see Browne & Keeley, 2015). As a researcher, I identified the right question for the study to get answers and results that met the purpose of the study. Consistent with the purpose of this study, the CRQ was as follows: What are the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields?

The research question also supported the focus of diversity and inclusion methods organizational leaders use to illustrate the effects of having African American women in executive level positions in STEM, the positive outcomes of increasing diversity and inclusion in the workplace, and how such methods could help to restructure the organization's sustainability and contribution to social change. Based on the understanding of social change, this qualitative research study was vital to my research. Diversity and inclusion could decrease idle resources and focus on the possibilities of progressing into a new form of processes and procedures through different angles (Sandberg & Tsoukas, 2014).

African American women's representation in science and medicine has slowly improved (Bassok et al., 2016; Miller, 2017; National Science Board, 2018). Nevertheless, this expansion has not been harmonized with the rise of gender inclusion, as the National Science Board (2018) indicated that low statistics continue to sustain the STEM fields. However, various diversity and inclusion initiatives were highlighted and

implemented in STEM organizations. Still, African American women in STEM are underrepresented and face bias and discrimination compared to White men in these fields (National Science Board, 2018). Globally, the STEM industry was crucial to future economic growth (Ismail et al., 2017; Xu, 2017), and the lack of influence to promote African American women was in dire need of attention to address the concerning advancement of these individuals in leadership positions (National Science Foundation, 2019).

The literature presents little about the experiences of those African American women who successfully ascended the corporate ladder in STEM (Vuong et al., 2021). The qualitative method was appropriate for this study because it aligned with my purpose, which was to gain a deeper understanding of the experiences of African American women's successful experiences within the STEM fields. Conducting a qualitative case study would also support the need to create an inclusive approach to creating awareness of gender theory, the importance of diversity and inclusion, and how such an inclusive approach affects workplace performances (Jin et al., 2017).

Quantitative methods were inappropriate for this study since I did not seek to examine relationships among variables, test theories statistically, and collect quantifiable data. A mixed methods approach was not appropriate because quantitative data were not suitable to answer the study's research question. The research problem and the study's nature required a qualitative research design to explore a complex social process (Merriam & Grenier, 2019). Qualitative research could effectively explore the contextual influences on the research issues and address why social issues need further clarification

so researchers could offer recommendations for future theoretical studies on an emerging topic in the literature (Tracy, 2020).

In this study, the research design I used was Yin's qualitative single case study design with embedded units. The case study design was chosen over other qualitative designs such as grounded theory, phenomenology, and narratives because it allowed the researcher to accurately understand the case in a real-world environment (see Yin, 2017). A case study approach was broad enough to provide the flexibility needed to extend a theoretical model (see Halkias & Neubert, 2020).

Extending theory through a design like narrative inquiry and its storytelling approach or phenomenology's focus on the meaning of lived experiences would not be suitable to meet the purpose of my study. The grounded theory design involves the construction of hypotheses and theories through the collecting and analyzing data and would not be suitable, as my study did not aim to develop a new theory but extend knowledge of existing ones (see Merriam & Grenier, 2019). Instead of using hypotheses, I developed "theoretical propositions" to drive the data analysis process of the study (see Yin, 2017) that were derived from the academic literature, theories, empirical data analysis, and triangulation of results with multiple sources of evidence. To meet the research design needs of this investigation, Yin (2017) recommended that a case study should be used when the research is intended to address what occurred or the reason why it occurred).

Role of the Researcher

Upon reviewing the analytic and field notes related to the identified topic, such a research process highlighted the journey of discovering how the promotion and support of diversity and inclusion affected and shaped data outputs. All efforts were made to discover and understand various diversity phenomena and social capital issues such as education, mentorship, and career selections of African American women in STEM. As a graduate scholar, interviewer, and researcher, the goal was to relate and reflect upon the construction of diversity and inclusion meanings and lived experiences of African American women in STEM fields throughout the research process.

As a researcher, I obtained the experiences and perspectives of African American women who have held executive level positions in STEM fields on goals, barriers, and accomplishments during their journey to attain executive level positions. To identify potential participants, I collected and analyzed their interviews and attempted to collaborate with various professional organizations I am affiliated with, such as Black Organization Leading in Diversity, MOSAIC, and Women in Science and Engineering. Due to my active participation with these organizations, obtaining permission was reasonably straightforward as I had connections to human resources and executive leadership teams. However, my collaboration was limited to the LinkedIn group, Black Women in Pharma, and colleagues in higher education who focus on STEM curricula.

Although I am affiliated with various STEM organizations, I ensured that I did not have personal or professional relationships with any of the participants selected. The attempt to successfully interview African American women in one’s work environment

would have been challenging as interviewees could suppress their personal experiences or provide conflicting information regarding challenging perspectives and assumptions regarding the importance of diversity and inclusion in STEM. Upon conducting research, the following ethical issues may have caused a conflict of interest related to my moral background. I am an African American woman who works at one of the nation's most prominent global pharmaceutical/biotechnology organizations. The coding and analyses of the data from this research study could also enhance the influence of social change. The finding was helpful for African American women who are still aspiring to ascend the corporate ladder in STEM fields.

Methodology

According to Sliwa (2017), a researcher must learn to plan the research process to acquire the information needed to support its identified phenomenon and distinguish biases and perceptions to eliminate personal views when approaching research preparation. As cited by Mohajan (2018), qualitative research is an inquiry process of understanding and exploring several areas of social and human behaviors for the development of organizations. McDonald et al. (2019) cited that to ensure the research data's quality, trustworthiness, and credibility were a measured standard, a researcher must analyze the data and realize when data saturation has occurred. Saturation was achieved after repetitive responses from participants were identified during the coding process. To evaluate and eliminate personal views or biases (Amin et al., 2020), I developed self-referent skills to cross-examining previous notions from my perspective

(see Shufutinsky, 2020). As a result, the research suggests that quality, trustworthiness, and credibility concerning the research and data were presented.

I aimed to gain a deeper understanding of the experiences of African American women who have held executive level positions in STEM fields. I used an exploratory qualitative single case study with embedded units (see Yin, 2017) for this study.
A single case study was conducted to gain a holistic, real-world view and emphasizes intensive investigation and analysis of a unit embedded in a case to realize a meaningful contribution to knowledge by confirming, challenging, or extending a theory. Data from multiple sources, such as participants' narratives of experience and reflective field notes, generate a whole picture of the phenomenon (Merriam & Tisdell, 2015; Yin, 2017).

A case study may be a person, event, entity, or another unit of analysis, and a single case study intensively emphasizes an investigation and analysis of a unit embedded in a case (Hancock & Algozzine, 2016). The unit of analysis in the identified case study was the African American woman in a STEM field. Purposeful sampling was appropriate for identifying and selecting information-rich cases related to the phenomenon of interest in qualitative research to accomplish this task (see Tracy, 2020). I used the purposive sampling technique, the snowball sampling approach, with a defined criterion to select the participants. This sampling technique was beneficial when recruiting participants who have experienced the phenomenon. The criteria for choosing the sample participants for this study were African American women who have successfully ascended the corporate ladder in STEM. Moreover, the women must have had a minimum of 5 years in a STEM field and have attained an executive level position in the United States.

Participant Selection Logic

Population

The population group for this study and from which the sample was recruited involved all African American women in executive leadership positions within the STEM industry sector. As of 2020, African American women comprised 18% of the workforce, with only 3.9% of African American women in executive level positions (Catalyst, 2022). Nevertheless, a pool of new diverse leaders could increase the benefits of positive social change (Chanland & Murphy, 2017) in STEM fields. The importance of creating optimal developmental networks in STEM organizations enhances and uplifts African American women to propel into the upper echelons of their organizations and board positions (DeAro et al., 2019).

Sampling Strategy

Participants for this case study were recruited using criterion and snowball sampling strategies and assessed with the following inclusion criteria: (a) African American women over the age of 18 who held executive level positions in STEM, (b) each woman was open and willing to share their perspectives regarding the identified research topic, and (c) each woman was willing to participate in the in-depth interview openly and honestly. I conducted six semi structured, online interviews with African American women in the United States with successful STEM careers to gather data to meet the study's purpose, and I continued the interviews until data saturation occurred.

The study participants were randomly selected from a list of individuals who met the criteria for the study. The snowball sampling technique was used to identify and

contact additional African American women in STEM fields who met the criteria for the study to participate in the study. Each participant was asked to recommend others who would be willing and able to participate in the study. This process was repeated as necessary to meet the desired sample size for the study. The study results were not biased or coerced due to snowball sampling; this approach did not present any disadvantages.

Personal contact with the participants was necessary to obtain the needed responses for the study. The participants had to be fluent in English to participate in the interview process and to ensure the accuracy of the data collection process. According to Patton and Schwandt (2015), determining the sample size depends on the information sought, the impact of the study, and the purpose for which the data were being used. I used the purposive sampling technique, the snowball sampling approach, with a defined criterion to select the participants. This sampling technique was beneficial when recruiting participants who have experienced the phenomenon. Given that the approach sought valuable data from each participant, the choice of five to 10 participants was appropriate for this case study, as saturation could be reached with six or fewer participants. At saturation, participants presented no new information, indicating that I could move forward with the information received (see Merriam & Tisdell, 2015).

Instrumentation

The primary data collection included a researcher-development instrument, 11 semi-structured open-ended interview questions tool (see Appendix B) facilitating in answering the research question. The interview items were grounded in the extant literature reviewed in Chapter 2. The researcher-developed instrument assisted in

establishing the validity of this study due to the interview protocol questions derived from the CRQ for the participants. The interview guide ensured that each participant remained focused on the scope of the study. As a researcher, I set aside preconceived notions or knowledge and allowed the interviewing process to articulate participants' real-life experiences. Driven by the interview protocol (see Appendix B), the semi structured interviews involved in-depth conversations with the participants, who discussed their lived experiences and concluded by data collection (see Whiting, 2008).

Qualitative computer assisted data analysis utilizing Microsoft Word and manual hand coding managed the data collection from the interview. Demanding translucence with methodological accuracy, Microsoft Word and hand-coding were used to protect the files, data coding, organization, and retrieval of coding and themes, and output each supporting the configuration of the semi-structured interview questions in alignment with the research question and conceptual framework concepts.

Procedures for Recruitment, Participation, and Data Collection

As a researcher, one must understand the prerequisites for recruiting participants and collecting data (Moser & Korstjens, 2017). The enlistment of participants took place with the dissemination of a recruitment e-mail blast and snowball sampling. The recruitment e-mail blast letter (see Appendix A) was promoted on LinkedIn (in various STEM-focused groups), ERGs such as Black Organization Leading in Diversity, MOSAIC Multicultural ERG, and Women in Science and Engineering to obtain qualified participants. Upon receiving an "interest to participate" response, a consent form was sent to the potential participant. Written permission for recruitment was obtained after Walden

University's Institutional Review Board (IRB) approval. The IRB approval number was appropriately displayed in the study as per Walden University's protocol.

Recruitment

I solicited research participants with a recruitment e-mail blast letter on LinkedIn and within ERGs (see Appendix A) and further used the snowball sampling technique. Using the snowball sampling technique, the research participants assisted me with targeting other individuals who met the criteria for the study by recruiting from multi-sources such as friends or colleagues from groups of which they were members (see Chambers et al., 2020). There was limited research in the literature to determine the hypothetical biases using snowball sampling (Leighton et al., 2021). The snowball sampling technique was used to select participants, including the same criteria as the initially recruited participants, professional executive African American women with a minimum of 5 years' experience in STEM fields, fluent in English, who resided in the United States. Once the recruitment requirements were met, I obtained participants for my study.

Upon reviewing e-mail responses from each participant, an e-mail was drafted and sent for a "consent to participate." The consent form was sent via e-mail with a subject line that read, "I understand and consent to participate." The acceptance e-mail also included "I understand and consent to participate" in the body of the text to ensure the participant was aware that they agreed to participate in the study. As required by Walden University's protocol, the consent form was provided to all participants prior to the start of the interview process.

After all consent forms were received, the interview process took place via Zoom that was appropriately aligned to the participants' availability. Each interview took approximately 60 minutes; after each interview, each participant was thanked for their time and participation in the study. After each interview, I provided participants with copies of the interpretations of the interview and asked each participant to review (i.e., member checking) to ensure the accuracy of the data captured. I provided such documents within 72 hours when a participant requested transcripts.

While I understood that the participants' purpose of the phenomenon might be different from their own (see Birt et al., 2016), I advised each participant that if a response was not received within 24 hours of providing the transcripts, there was an assumption that the data collected and interpreted were indeed accurate and the voice of the participant, which constituted the beginning of the analysis process. The data collection process included recruitment, interviewing all participants, and interpreting the collected data. In this study, I interviewed six participants and met data saturation; however, to ensure I captured the essence of each participant's lived experiences, I continued until I obtained the perceptions or lived experiences of eight women to eliminate the process of missing any new information.

No personal contact with the participants was obtained unless additional data were needed for the study during the member checking process. To ensure the facilitation of the data collection process and the accuracy of data collected, each participant had to have been fluent in English. A recruitment e-mail blast on LinkedIn, and other appropriate social media mediums in each of the identified ERGs, within the United

States to advertise for participants. The method for recruitment of participants was a critical component of this research study, as it ensured the correct number of participants needed to validate the research data (see Moser & Korstjens, 2017).

Participation

As per Walden University's protocol, each participant had to have signed a consent form. An electronic signature was acceptable and occurred in the form of an acceptance in the body of an e-mail or subject line, stating "I understand and consent to participate." The consent form was provided to the identified participant's personal e-mail address to sign electronically before the interview. The participant was encouraged to utilize their personal e-mail to limit the risk of conflict of interest related to their working business hours. Prior to the start of the interview, I advised each participant that their participation was voluntary and that they could stop the interview at any time. Each participant certified that they understood their participation obligations. The solicitation of five to 10 participants for my study resulted in six identified participants. Data saturation took place when there was no new information. I used such data to proceed with the study with the information received or when additional coding did not generate any new themes (see Fusch & Ness, 2015), as failure to reach data saturation impacts the quality and validity of the research conducted.

Immediately upon the interview's conclusion, I started the member's checking process requirements, confirmed, and verified the participant's e-mail, and informed the participants to expect the interview transcriptions within 1 to 2 days via e-mail. The promotion of the study was continued by distributing the recruitment e-mail blast letter

(see Appendix A) until six potential participants were obtained. During the promotion of the study, I ensured the potential participants resided in the United States and met the criteria for the study. Upon selection of the identified participants, I advised each participant that at any time, they had the option to not continue with the study if they so deemed appropriate. If the participant declined to continue with the study at any time, I continued to promote the recruitment e-mail blast to replace the participant. A telephone call to follow up with each participant to clarify any ambiguity in the data collection from the in-depth, semi-structured interviews also ensured accuracy.

Data Collection

The interviews were scheduled via Zoom based on the participant's preference and availability. Based on the participant's responses from the interview, interpretations of the data were conducted, and the data were based on a thematic analysis. Each recorded interview session was transcribed within 72-hours of the interview and returned to the participant for member-checking. The initial analysis was performed manually by hand-coding to address the research question.

To ensure each participant was comfortable before the interview, a rapport was developed through casual conversation, setting a precedent of transparency, and allowing a display of openness. The researcher validated such exposure by advising each participant to ask appropriate questions throughout the interview process. The data were collected mainly through in-depth, semi-structured, and open-ended interview questions (Appendix B). To ensure the confidentiality of each participant, pseudonyms and a

unique numeric identifier was used. Upon conclusion of the interview, each participant was thanked for volunteering their time for my research study.

Data Analysis Plan

Ravitch and Carl (2016) defined the qualitative data collection approach as an interactive context that was cyclical, developing, and recursive, consisting of five steps - data organization and management, immersive engagement, writing, and representation. Written data transformed such data analysis – notes and interview proceedings- and transposed into findings and conclusions (Tracy & Hinrichs, 2017). Most scholars implementing qualitative research used case study methods in the academic field (Rashid et al., 2019).

Yin (2017) cited that a case study analysis combined four phases - the foundation phase, pre-field phase, the field phase, and reporting phase. These phases were built upon and were aligned relative to the research question of the data being sought. Based on the general criteria, theoretical contributions and exploratory design approaches were used. This methodology demonstrated the importance of creating collaborative approaches to interact and embrace African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. (Wolff et al., 2019).

I simultaneously conducted data collection and analysis to prevent this scenario in this study. Before data analysis commenced, I prepared a detailed description of the research setting (Yin, 2017). To increase the research rigor, the interweaving of data collection and analysis processes (Wood et al., 2020) transpired, and I conducted both

concurrently in this study. Before data analysis began, I prepared a detailed description of the research setting (Yin, 2017) to prevent any challenges confronting researchers.

The identified research problem and the research question drove the research design and provided strategies for collecting and analyzing the themes through manual hand-coding. This single case study explored the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields. As a vital component in conducting research, the data analysis would better understand African American women's opportunities and challenges in ascending executive level STEM fields.

One research question steered each participant to collect the relevant data needed to guide and support the study (Yin, 2017). To support the purpose of the study, I used a qualitative, single case study with embedded units; as a researcher, one must collect data that may support the following (Yin, 2017):

- the study of real-world issues, which was based on everyday life matters
- communicating and revealing contextual issues of the lived experiences or perspectives of individuals
- contributed to the current or developing concepts that may assist with human social behavior and positive social change
- attempted to utilize various sources of evidence rather than relying on one own notion.

Upon reviewing the analytic and transcription notes related to the identified topic, the researcher had a better understanding of various data methods and analyzed such data to critically provide relevant, up-to-date data related to the phenomenon of study (Ravitch & Carl, 2016). In this case, organizing the data were critical due to the qualitative

inquiry, and the qualitative research must be implemented in cycles. Notes also taken during each interview were used to provide a consistent flow of information, and the recording feature in each application was used.

After completing each participant interview, I began the initial review and coding of the identified data. I carried out three cycles of coding that would synopsize the codes into categories for thematic analysis, which were the primary data analysis technique cited in Yin's (2017) pattern matching process. The notes and audio to the text files provided trustworthiness for data management, representing the qualitative approach to validate this study.

The researcher transcribed the data collection and had each participant review the notes within 24 hours of each interview to certify the essence of the data collected (Brear, 2018). This data analysis step was critical to the data collection and reflected the accuracy of each participant's experience (Cridland et al., 2014). Upon confirmation of accuracy from each participant, the researcher used the Word software to analyze and streamline the organized data collected from the participant's interviews. The data were divided into three cycles of coding.

Coding was a crucial phase of qualitative data analysis as it generated the essence of every statement in the transcript of data (Saldaña, 2016). The first cycle entailed examining data from notes captured during interviews or transcriptions of such interviews (Saldaña, 2016). Such coding allowed the researcher to extract vital data directly from each participants' description of the phenomenon. Such findings also interpreted the data, leading to the second coding cycle.

The second cycle was related to what was determined and discovered by reviewing such transcribed notes in the first cycle and assisted the researcher with exploring what was identified or heard during the interviews and further reflecting upon such data (Saldaña, 2016). Based on descriptions by each participant regarding the phenomenon, the researcher then identified the premise of the phenomenon. Such validation was referred to as member checking. Upon member checking of the data, the researcher then categorized the identified codes and themes by the similarity of meaning and developed the significance of the study.

The last cycle of coding contributed to the narrative from the identified themes of each interview (Saldaña, 2016), which determined the context or setting that influenced "how" the participants experienced the phenomenon (Creswell, 2007). Each interview was manually abstracted into themes to understand the participants' shared experiences better. During the analysis, no discrepant cases occurred during the study process. All data were compared based upon empirically and predicted patterns, examined to seek matching repetitions, proposed explanations where necessary, interpreted the findings, and concluded the study (Yin, 2017). The responses were recorded, transcribed, and evaluated for thematic content using Word to complete the data analysis plan. Observation of the ethical compliance rules for researchers was implemented by submitting all data to the Institutional Review Board (IRB).

Lastly, this study was framed by two key concepts that focused on aligning with the purpose of the study to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields:

(a) Bourdieu's (1977a) concept of social capital and (b) Collins' (2015) concept of intersectionality. The alignment of these theoretical frameworks to the overall findings from the case study research and as a lens to explain the results was critical in interpreting qualitative analysis results.

To validate the finding of this study, the identified data were compared with the results of similar studies (Stake, 2010). Baker and Kim (2019) wrote that trustworthiness in qualitative studies was vital in establishing the research's dependability, credibility, transferability, and confirmability as it was critical in legitimatizing the studies. To understand the considerations in qualitative studies, as a researcher, one must analyze, interpret, and report discrepant cases, which are also referred to as disconfirming evidence, unfavorable circumstances, or outliers (Ravitch & Carl, 2016).

This process of analyzing, interpreting, and reporting accurate data were critical as help the researcher expand, modify, or endorse the patterns developing from the data analysis and further increase the study's credibility (Maxwell, 2020). I reported the case study outcome by using impenetrable explanatory narratives. I presented a wide-ranging picture of African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields to promote and support positive social change in the identified STEM industry sectors.

Issues of Trustworthiness

Cypress (2017) cited that the trustworthiness of qualitative research ensured the study had credibility and could be reproduced following the researcher's ability to collect and process the identified information during literature reviews. Such data transferability

was elaborated to allow the researcher adequate information to critique a study's hypotheses, which increased a deeper understanding of the data (Cypress, 2017). A greater understanding of the collected data also assisted researchers with finding similarities in codes, themes, and categories of the identified research study. The reliability of data were referred to as dependability, as it addressed the study's processes to recognize the framework of the study's methods and its effectiveness; and to reinforce trustworthiness, confirmability must occur, which identifies a detailed methodological narrative that assists readers with defining the study's progression through the data-oriented approach. (Cypress, 2017).

Credibility

Daniel (2019) defined credibility as an approximation of the truth of inference that enhances the accuracy and sureness of the data collected; it will require the collected data to match the identified problem being studied and yield evidence to support findings. To ensure the credibility of the data, the member checking approach will be used. With this technique, the data, interpretations, and derived conclusions will be shared with the participants in the study, allowing them to double-check their responses. The member checking strategy will enable participants to clarify objectives, correct any errors, and include necessary data (Shufutinsky, 2020).

After the interview and transcription of the discussions, each participant was given the transcripts to read for accuracy. The participants then provided feedback on the transcripts if necessary; they were also allowed to clarify accounts of their lived experiences that were ambiguous or needed retraction. This process gave the participants

with autonomy over the shared data. Upon reviewing the interview notes, Word was used to sort data, and the Word cloud was used to create codes from data collected for visualization to confirm the emerging themes. The Word cloud generated patterns based on the interview guide responses from the participants and was not manipulated (Bletzer, 2015). This process did not reduce or compromise the data but ensured the rigor and validity of the data were credible.

Transferability

Founded on an understanding of research as a systematic and reflective process, qualitative research methods developed knowledge that could be queried and easily transferred (Creswell & Plano-Clark, 2017). Such methods assisted in attaining the transferability of collected findings which established assumptions (Adu, 2019). A researcher must be prepared to use probing results and interpretations instead of assuming the data were accurate. As a researcher, one must also assess the internal and external validity of the results instead of approximating them to be prominent or comprehensive. Although there may be issues with establishing transferability because of the whole body of participants or the sample size, detailed information on the research design and process was shared. The researcher always considered the effect of context and bias.

Dependability

Parallel to reliability, dependability refers to the researcher's ability to replicate a study with a clear description of the research and the intent of obtaining similar results (Gaus, 2017). To ensure data reliability, the data collected was from various participants, and a detailed record of the data collection tools and processes was kept (Miles et al.,

2020). Member checking and conducting an extensive review of the interview transcripts also ensured there were no obvious mistakes, and data comparison with codes ensured there were no changes in the definition or meaning of the codes (Hennink et al., 2016) was also used to provide triangulation which was one method to attain reliability. Various techniques were used to ensure triangulation to acquire a complete understanding of the participants' shared experiences. The first method was to conduct semi-structured interviews via Zoom. The second was to keep a researcher's journal, which reproduced the study's findings based on previous literature reviews. The last method was compiling the data and creating themes to ensure the confirmability of evaluating the gathered data.

Confirmability

Defining the objectivity of a study, confirmability refers to the extent to which other researchers could collect and examine data and validate the outcome of the study during the auditing process (Yilmaz, 2013). The researcher's personal bias was removed during the interview process. As with dependability, further member checking occurred throughout the study to ensure the substance of each recorded interview was accurate. Checkpoints and revisions for clarity throughout the study were monitored, and the researcher and a transcriber validated the accuracy of the collected data. The researcher and transcriber viewed the notes taken during the interview to guarantee that the information the researcher asserts was accurate (Cypress, 2017). Based upon the transcriber's audit, triangulation and reflexibility occurred as confirmability aligned to the identified methodologies were used to gather the data for analysis (Newman & Clare, 2016).

To attain the shared experiences of African American women who have successfully ascended the corporate ladder in STEM and the essential codes and themes to ensure saturation, I used a notebook, the telephone, and an audio recorder to capture their verbal language, which also provided clarity and validity of the participant's interview. The participants were provided with two different methods for the interview process (Microsoft Teams or Zoom) and selected what way of recording was appropriately aligned to their needs. I drafted and engaged in nonspecific semi structured questions to clearly understand the participants. Still, to gain clarity and form a sense of transparency, all participants were allowed the opportunity to expound on their lived experiences.

The rigor of the systematic approach in qualitative research design and the process of data analysis contended dependability characterized with honesty and rationality (Belotto, 2018) as the interpretation and presentation of the data determined the trustworthiness of the provided data in the study. To ensure other researchers could reproduce the identified study or conduct its analysis to explore further the exact identified problem with the same population sample, a detailed record of each data collection tool and the process were used. Such data collection tools and techniques ensured that the study's outcome was parallel.

Ethical Procedures

To conduct data analysis, a researcher must implement ethical procedures to ensure the participants' perspectives were captured accurately and not the researcher's perception. Each participant's in-depth interview responses were recorded, transcribed,

and evaluated for thematic content using Microsoft Word software. To ensure the process was ethical, I followed the guidelines established by Walden University's IRB. Mandated by current regulations and ethical considerations, the IRB ensures that human subjects participants involved in a study were protected from being harmed or injured in any way during a study (White, 2020). I was required to observe and comply with the ethical compliance rules and understand better how to distinguish biases and perceptions to eliminate personal views when approaching research preparation (see Sliwa, 2017) per Walden University. Upon approval of IRB, I attached the approval number to the study and included the expiration date that supplements the study. A recruitment e-mail blast letter was produced (see Appendix A), and the consent form for the identified study participants.

Upon reviewing the analytic and transcription notes related to the study, no ethical concerns were identified in the research study. During the in-depth interviews, all participants were treated professionally and provided a courtesy to align to their time to ensure work-family life balance appropriately. To develop a rapport with the participants, I used active listening skills to improve open communication and transparency.

The informed participants of the study decided to continue their participation voluntarily. The in-depth interview took up to 60 minutes and was recorded, as field notes were captured and engagement with each participant was reinforced. Upon completing each interview, I provided each participant with the interview transcription to ensure the data collected were captured accurately. I advised each participant that they had the right to withdraw during the study due to the content of the study.

As per the protocol of Walden University, no foreseen ethical issues were noted at this time to gain the participation of the identified subjects. Participants were informed that Walden University's dissertation committee and I would have access to the data collected. I ensured the study results would be secured and password protected to satisfy the confidentiality of the study. I further informed the participants that all collected data either electronic or written accompanied each participant's agreement would be securely stored in a file cabinet and locked in compliance with the ethical standards of 5 years as per Walden University standards.

There were no foreseen associated risks identified for any participant in my study. Each participant was allowed to select a time conducive to their schedules to partake in the interview to complete the study. The recruitment e-mail blast letter provided participants' information about the research, and the informed consent form stated there was no monetary value for participating in the interview process. Participants were also informed that their efforts would contribute to a positive social change by promoting professional executive level African American women in STEM lived experiences and perceptions on career advancement.

If a participant voiced or distributed emotional issues during the in-depth interview, participants were able to withdraw their participation from the study at any time, and I noted how their privacy would be protected by ensuring confidentiality and anonymity. To proactively manage any potential conflicts of interest, I took precautions to certify that I did not have personal or professional relationships with any of the participants selected. The attempt to successfully interview African American women in

one's work environment could have been challenging as interviewees may have suppressed their personal experiences or provided conflicting information regarding challenging perspectives and assumptions regarding the importance of diversity and inclusion in STEM.

Summary

In Chapter 3 of this study, I elected to use a qualitative single case design over other qualitative methods such as ethnography, grounded theory, phenomenology, and narratives. I substantiated the rationale for adopting the research design. As a qualitative researcher, I highlighted my function as a research instrument, observer, recorder, and qualitative data analysis rather than as a participant in the study. I identified potential research biases that could have arisen from the research and discussed how reflexivity would control such biases. The single-case design was grounded into an appropriate methodology for selecting and recruiting the participants using the criterion-based snowball strategy and collecting research data from multiple sources (interview, archival data, and reflective field notes). The interview protocol was framed by two key concepts that focused on aligning with the purpose of the study to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields, which included: (a) Bourdieu's (1977a) concept of social capital and (b) Collins' (2015) concept of intersectionality.

The thematic analysis of the study's data to produce analytically based findings and interpret them using Yin's (2017) pattern matching was presented. The credibility, transferability, dependability, and confirmability of data results were addressed to support

the study's overall trustworthiness of findings. The intent of Chapter 3 was to outline the crucial roles of the researcher and the obligations and responsibilities for conducting research based on the standards and ethical procedures guided in the IRB process. I described actions necessary to achieve such ethical research conduct to study and explore the lives and perceptions of human subjects, mandated by the IRB. Chapter 4 will provide a detailed description of the research setting, demographics, data collection, data analysis, evidence of trustworthiness, and the study results.

Chapter 4: Results

In this qualitative, single case study with embedded units, I aimed to explore African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. My study used a single case study with an embedded unit design (see Yin, 2018). I conducted six semi structured, online interviews via Zoom with African American women in the United States with successful STEM careers to gather data to meet the study's purpose.

Thematic analysis guided by Yin's (2018) pattern matching logic sequence was used as a data analysis tool. Data were triangulated with reflective journal notes and archival data on career trajectories and labor statistics of African American women in the STEM industry to support the trustworthiness of the study results and make recommendations for future practice and research (see Farquhar et al., 2020; Halkias et al., 2022). The first three chapters of my study provided an introduction to the problem, a review of the literature surrounding the identified topic, and an exploration of the methodological design used for this study.

Chapter 4 will present the results that emerged from such data collection with highlights around the thematic patterns of this study based on the identified research question. The CRQ I sought to answer in this qualitative, single case study with embedded units was: "What are the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields?" Chapter 4 also includes sections on (a) a summary of the case study setting, (b)

demographics, (c) data collection and analysis, (d) evidence of trustworthiness, and (e) the results.

Research Setting

This single case study with embedded units was conducted with six African American women in the United States with successful STEM careers to meet the study's purpose. Determined to interpret better and explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields and how those experiences, past, and present, affect their professional choices and the success of such decisions, African American women who met the inclusion criteria were interviewed. The inclusion criteria for participants in this study were the following: (a) African American women over the age of 18 who held executive level positions in STEM, (b) each woman was open and willing to share their perspectives regarding the identified research topic, and (c) each woman was willing to participate in the in-depth interview openly and honestly.

The six participants in this research study were employed in STEM fields in the United States. This study excluded men and focused only on African American women in the United States, who have successfully ascended the corporate ladder in STEM fields and now hold executive leadership positions. I believed that interviewing the women online via Zoom established a sense of trust. Open communication and transparency allowed the participants to feel comfortable and fostered a power distribution level while expressing themselves without feeling threatened (Adamu & Mohamad, 2019). The sample was intended to include various STEM positions throughout the United States.

The intent was to have a broad range of African American women in executive level positions by age and geographic location.

Each interview was conducted analogously in the privacy of their homes. During the interview recruitment and consent processes, each participant was provided the option to select the best day and time to accommodate their family, work, and life. As a researcher, I ensured the security of our calls. Each call was noise fee and recorded via the Zoom recording feature and later was transcribed using the Otter.ai site to ensure the interviews were captured accurately. Each transcript was saved, sent to the participants for member checking, and later printed for manual review of thematical analysis.

Demographics

Six African American women participated in an 11 question semi structured interview to explore the CRQ of this research study. Each woman held an executive level position, and five out of six participants had a bachelor's degree or higher. The women held more than 10 plus years in their respective industries, while two of the women have started their private businesses in retrospect of their positions in STEM fields. The women served in leadership roles, including CEO, project manager, engineer, director, finance development enablement lead, HR information systems manager, and medical director. The women's ages ranged from 34 to 57, and five out of the six were mothers.

In this study, all women were eager to depict their experiences and perspectives of how African American women in STEM fields face opportunities and challenges while ascending the corporate ladder. The six women were conversant and conscious of the

empowerment of diversity and inclusion in the workplace. See Table 2, which reflects the demographics of each participant.

Table 2

Participants' Demographics

Pseudonym	Title	Degree attainment	Job tenure	Age
Participant 1	CEO/project manager	Ph.D.	17	34
Participant 2	Train engineer	Associates	15	39
Participant 3	Director	Masters (2)	26	57
Participant 4	Finance development enablement lead	Bachelors	15	40
Participant 5	HR information systems manager	Masters; currently working on Ph.D.	10	38
Participant 6	Medical director	Ph.D.	16	46

Data Collection

Upon receipt of the IRB approval (05-06-22-0326278), which expires on May 5, 2023, the data collection process started. Six African American women answered 11 questions from Walden's approved interview protocol (see Appendix B). The interview protocol designed for the study helped capture participating African American women's experiences and perceptions of the opportunities and challenges they faced ascending the corporate ladder in STEM fields.

To identify African American women in executive-position in STEM fields, LinkedIn (in various STEM-focused groups) and ERGs such as Black Organization Leading in Diversity, MOSAIC Multicultural ERG, and Women in Science and

Engineering were used. Upon receiving an "interest to participate" response, a consent form was sent to the potential participants, followed by an availability email asking for dates and times that appropriately aligned with the participants' schedules. Each Zoom call took approximately 45–60 minutes, and after the interview, each participant was thanked for their time and participation in the study.

In addition, after each interview, participants were provided with copies of the interpretations of the interview, and each participant was asked to review (i.e., member checking) to ensure the accuracy of the data captured. The participants were advised that if a response was not received within 24 hours of providing the transcripts, there was an assumption that the data collected and interpreted were indeed accurate. At this time, the participant's voice constituted the beginning of the analysis process. Data collection took place from May to late June 2022.

Data Analysis

Ravitch and Carl (2016) defined the qualitative data collection approach as an interactive context that was cyclical, developing, and recursive, consisting of four steps including: (a) data organization and management, (b) immersive engagement, (c) writing, and (d) representation, which was identified in Chapter 3. Each interview recording was transcribed, and time stamped by Otter.ai and provided to participants for review. Upon review of each transcript, I reflected on the CRQ and scrutinized the research problem, purpose, theories, and concepts to extract conceivable codes, categories, and themes.

The identified research problem and the CRQ drove the research design and provided strategies for collecting and analyzing the themes through manual hand coding.

This data analysis step is critical to the data collection and reflected the accuracy of each participant's experience (Cridland et al., 2014). Utilizing Microsoft Word, I was able to code, organize, retrieve, and sort the data to formalize both similarities and differences in the data. I carried out three cycles of coding that would synopsize the codes into categories for thematic analysis, the primary data analysis technique cited in Yin's (2017) pattern matching process. The notes and audio to the text files provided trustworthiness for data management, representing the qualitative approach to validate this study.

Upon review of all the data, the notes and audio to the text files provided trustworthiness for data management, representing the qualitative approach to validate this study. I used each participant's responses verbatim, coded the data, and compared each participant's transcript, which was member-checked for accuracy, including reflexivity (see Brear, 2018), to formulate codes, categories, and themes used to describe the study's results. See Table 3, which provides the CRQ, themes, categories, and codes.

Table 3

Research Questions, Themes, Categories, and Codes

Research question	Theme	Category	Code
CRQ	The Importance of Mentorship	Networking, planning, leadership training, support, transparency	Mentorship, allies, family, spiritual leaders, religious programs, building reputation
	The Sense of Self or Belonging	Purpose, empowerment, knowing self, unique treatment and experiences, self-confidence	Cultural differences/uniqueness, experiences – negative and positive, hair, makeup, lack of voice, exclusion, isolation, microaggression, code-switching
	Success Strategies: Overcoming the Barriers	Planning, intentions of success, positive interactions, Controlled biases	Pressure to be perfect, speaking up, self-empowerment, challenging the status quo, self-awareness

Evidence of Trustworthiness

The trustworthiness of this qualitative single case study with embedded units ensured the study had credibility and could be reproduced following the researcher's ability to collect and process the identified information during literature reviews (Cypress, 2017). Such collected data provided me with adequate information to critique a study's hypotheses, which increased a deeper understanding of the data (see Cypress, 2017). A greater understanding of the collected data also assisted me with finding similarities in codes, themes, and categories of the identified research study, which was discussed in Chapter 3.

Credibility

To ensure the credibility of the collected data in this study, each participant received the exact 11 questions on the interview protocol document (see Appendix B), and the member checking approach was used. With this technique, the data, interpretations, and derived conclusions were shared with the participants in the study, allowing them to double-check their responses (see Shufutinsky, 2020). After each interview, the transcription of the discussions was provided to each participant to read for accuracy, and when necessary, each participant was allowed to clarify accounts of their lived experiences and perceptions that were ambiguous or needed retraction. This process gave the participants autonomy over the shared data. Upon reviewing the interview notes, Microsoft Word was used to sort data, and the Word Cloud was used to create codes from data collected for visualization to confirm the emerging themes. The Word Cloud generated patterns based on the interview guide responses from the participants and was

not manipulated (see Bletzer, 2015). This process did not reduce or compromise the data but ensured the rigor and validity of the data were credible.

Transferability

Founded on an understanding of research as a systematic and reflective process, qualitative research methods developed knowledge that could be queried and easily transferred (Creswell & Plano-Clark, 2017). Such methods assist in attaining the transferability of collected findings which established assumptions (Adu, 2019). In this qualitative single case study with embedded units, participants provided data to assist with understanding the experiences and perceptions of African American women in STEM fields and the opportunities and challenges they faced while having successfully ascending the corporate ladder. The probing results and interpretations ensured the data were accurate. The transferability was established as detailed information on the research design and process was shared and not generalized, and the data were considered the effect of context and unbiased.

Dependability

To ensure data reliability, the data collected were from six participants, and a detailed record of the data collection tools and processes was kept (see Miles et al., 2020). Member checking and conducting an extensive review of the interview transcripts also ensured there were no obvious mistakes. Data comparison ensured there were no changes in the definition or meaning of the codes (see Hennink et al., 2016), which was also used to provide triangulation to obtain reliability. During each interview, every participant provided data that aligned with the identified phenomenon; yet some

outcomes also revealed major similarities and minor differences. Various techniques were used to ensure triangulation to acquire a complete understanding of the participants' shared experiences. The first method was to conduct semi structured interviews via Zoom. The second was to keep a researcher's journal, which reproduced the study's findings based on previous literature reviews. The last method was compiling the data and creating themes to ensure the confirmability of evaluating the gathered data.

Confirmability

Defining the objectivity of a study, confirmability was ensured as my personal bias was removed during the interview process, and furthermore, member checking occurred throughout the study to ensure the substance of each recorded interview was accurate. Thorough checkpoints and revisions for clarity throughout the study were monitored, and the data were validated after the interview to guarantee that the information I asserted was accurate (Cypress, 2017). Based on the transcriber's audit, triangulation and reflexibility occurred, as confirmability aligned to the identified methodologies were used to gather the data for analysis (see Newman & Clare, 2016).

To attain the shared experiences of African American women who have successfully ascended the corporate ladder in STEM and the essential codes and themes to ensure saturation, I used a notebook, the telephone, and an audio recorder via Zoom to capture their verbal language and nonverbal cues, which also provided clarity and validity of the participant's interview. To further gain clarity and form a sense of transparency, all participants were allowed the opportunity to expound on their lived experiences and perceptions. To ensure other researchers could reproduce the identified

study or conduct its analysis to explore further the exact identified problem with the same population sample, a detailed record of each data collection tool and the process was used. Such data collection tools and techniques ensured that the study's outcome was parallel.

Study Results

This qualitative, single case study with embedded units aimed to explore African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields as modeled in the central research question. Six African American women participated in the research and responded to 11 semi structured interview questions. The data were extracted based on the participants' responses, which comprised their experiences and perceptions of African American women in executive level positions in STEM fields.

Following the extraction of each transcript, three themes emerged and were cross-referenced with each participant's responses and the literature review in Chapter 2. The outcomes of the data support the CRQ and highlight opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields. In this section of Chapter 4, the CRQ and supporting themes will be discussed to denote the results. Participants were coded as Participant 1 through Participant 6 for anonymity.

Research Question 1

The CRQ was: "What opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields?" Every

participant expounded upon their lived experiences and perceptions of African American women's opportunities and challenges they faced while aspiring to ascend into executive level positions. Each woman discussed the importance of education, mentorship, a sense of self or belonging, and strategies to overcome barriers successfully. While five out of the six women held bachelor's degrees or higher, many were still able to discuss the obstacles faced by microaggression behaviors within the workplace by their White counterparts. They were forced to stay silent or resolve their appearances to traditionally fit in the "old boys" or "old girls" club. However, each participant was able to maintain their professionalism and obtain the development and training needed to ascend the corporate ladder in their respective STEM fields. In the next section of this Chapter, I will highlight the descriptions of each participant and the identified themes that surfaced from the CRQ, including: (a) the importance of mentorship, (b) the sense of self or belonging, and (c) success strategies – overcoming the barriers.

Description of the Participants

In this section, I present a brief description of each participant and the interpretations of each theme that emerged from the data analysis. Participants were interviewed via Zoom, and their responses were recorded, transcribed, and later member checked. Upon review of each interview, themes were identified and implicated the necessary diversity and inclusion development and training opportunities for all stakeholders and affirmed traditional and non-traditional pathways to ascend the corporate ladder as an African American woman in STEM fields. Each theme afforded

each participant to assess their experiences and perceptions based upon their own career aspirations.

Participant 1 – Interview Analysis

During the interview, Participant 1 seemed to be eager to participate and answered each question enthusiastically as if she could not wait to provide me with details of her lived experiences of ascending the corporate ladder. Participant 1 was 34 years old and had a doctorate degree with 17 years of experience in the field. She is a hybrid project manager and CEO of her own business and attended a prestigious university where the education is on par with that of the Ivy League. Participant 1 felt that she was fortunate enough to be exposed to STEM curricula at an early age. When asked about her advice to other African American women aspiring to ascend the corporate ladder, she replied,

> Exposure is the reason why the field is the way it is because White males, like females, they grow up with their parents already being engineers and mathematicians and things of that nature. And they are exposed to it early. A lot of our parents are not, but we are now, and we can help our community by exposing them to it.

When asked about her experiences ascending the corporate ladder, Participant 1 felt that she had not been treated fairly, yet having a mentor assisted her with "the ability to get a different perspective, and not just see everything from my personal lens if that makes sense." She later explained still had trouble with her White counterparts listening

to her ideas or taking credit for the work she implemented, which took a major toll on her self-esteem or sense of belonging.

P1 highlighted how one counterpart advised her,

> I do not think it is a good idea. And then they will hear it in a different tone from a White male, and they will think it is the most amazing thing I have ever heard. So, I honestly think just being who I am walking into a room is automatically assumed, especially because my name is unique. And, you know, whatever the case may be, I do not know what I am talking about, or there is no way that I can contribute because of who I am or what I look like.

Throughout these obstacles, Participant 1 was still capable of successfully identifying how such mentorship and the ability to see things from a different lens also allowed her to become stronger in believing in herself. She felt her negative experiences presented her with the ability to overcome barriers by utilizing her education and exposure to STEM.

P1 stated that such abilities fueled the process of:

> Starting STEM engineering funnel, where we will get school-aged children, they will start like studying at different universities, during the summertime in order for them to get exposed to different types of STEM subjects. And then from there, what we are trying to do is to get those same universities to provide scholarships for those students that once they graduate from high school, they go to those schools and then turn around and are able to, you know, be a productive stem person, well, once they finish at the university. I think, in doing that, and you

> know, being a Black female myself, I will be able to be the face for these girls who do not see themselves every day.

P1 stated,

> Like my prime example, I went to Purdue for my math class alone. Fifty people in it, only a Black person, the only female. Yeah, I had a class of 400 students because, you know, Purdue is humongous. It was a lecture; there were nine Black people in it, two Black females, sorry, nine people of color, because everybody was not Black. So, nine people of color and two Back females. That was it. So, I want to go back to my school and see 400 students, and there are 100 that are, you know, people of color and 30% of them at least are female, that will make me feel better, and make me feel like I did my job coming from that organization. And I still have connections from Purdue; I still have connections from all of the universities that I have attended. And I want to be able to tell them, like, okay, I want more people that look like me to be able to come to your university and produce the way that I am producing. And I feel like being a good representation of that, they will be more inclined to do it.

Participant 2 – Interview Analysis

Participant 2 seemed to be nervous about participating during the interview, as if she was apprehensive about providing me with details of her lived experiences of ascending the corporate ladder. Participant 2 was 39 years old and had an associate degree with 15 years of experience in the field. She is an on-ground train engineer and attended a community college where her education did not consist of STEM curricula but

theological studies. She was raised as a pastor's kid; she used such a foundation to guide her through her career and personal choices.

Participant 2 felt she was provided an opportunity to be exposed to a great mentor who later assisted her with getting involved in the STEM field. She explained, "working with a mentor influenced me by providing patience and hands-on training; as I do not feel antsy, I feel confident." She also advised how her sense of self and belonging was achieved through such mentorship as she stated, "I feel as a woman, I have to work twice as hard. So, the mentor that I was with allowed me always to strive to prove myself better."

Participant 2 later emphasized that her experiences ascending the corporate ladder can sometimes still give her a sense of uneasiness to see such a low percentage of African American women in executive level positions in STEM.

Participant 2 clarified

> Um, I think just as in a lot of most fields, you know, men and other counterparts dominate the fields by whom they know. We, as African American women, have too as well. I think the biggest barriers and challenges with us are the men as an opponent. Once again, you know, as African American women, we must work extremely hard. And I feel like I am blessed to happen to be in a career where most men, they have been so easy to work with. However unfortunately, I have to take it there, but just seeing how things are now is White privileged. As an African American woman, I see that because I am not White or Caucasian, it is all about who you know, and things are pretty much given, or the road is planted for

> them. Whereas if I have a higher education, or not, then oh well, then, of course, they are going to go along with them for the executive level position versus me, the Black woman. And they probably just have a high school education., so yep, it is, unfortunately, more of a race issue.

Participant 3 – Interview Analysis

Participant 3's energy seemed to match Participant 1's as she too was eager to participate and answered each question unreservedly as if she wanted to provide me with details of her lived experiences and perceptions of African American women ascending the corporate ladder. Participant 3 was 57 years old and had two master's degrees with 26 years of experience in the field. She is a hybrid director of diversity, equity, and inclusion and CEO of her own business and attended universities where her education was effective in assisting her with exploring opportunities to become an associate manager right after graduation. Although Participant 3 graduated with two masters and became a manager after college, she also struggled with ascending the corporate ladder as she cited, "It took me 20 years to get from being a D, E and I associate to a director."

When asked how working with a mentor influenced her ascension into an executive level position, she replied, "Mentorship and mentors taught me how to be more transparent." She further discussed how networking and mentorship allowed her to "reach people authentically." As an African American woman aspiring to ascend the corporate ladder, she felt that one must "beware of your mental health that is so important in this climb." Furthermore, she explained how one must be prepared to ask, "do you

understand, or do you want to change? Alternatively, are you comfortable being that person who is not afraid to expose yourself to and what your barriers and biases are?"

Participant 3 also touched on a topic that many are afraid to open up about publicly about D, E, and I; she felt that her organization's willingness to promote African American women into leadership roles is a work in progress as they are "making an effort to change the narrative."

Participant 4 added,

> Only in America do we really look at color" when it comes to D, E, I. Many organizations look at the Diversity and Inclusion landscape differently, as North America and Canada have different regulations and guidelines regarding how "we define what people of color.

Her goal is to "make sure that D, E & I are embedded in training and become part of an organization's culture and one's belief."

Participant 4 – Interview Analysis

Participant 4 was bubbly, and her liveliness allowed her to participate without reluctance as she answered each question fervently with details of her personal and personal lived experiences of ascending the corporate ladder. Participant 4 was 40 years old and had a bachelor's degree with 15 years of experience in the field. She is a hybrid one finance development enablement lead and attended an accredited university, but her formal education and training did not contribute to her preparation for obtaining her executive level position.

Participant 4 felt that her life experiences are "what prepared her for the role she has today." She touched upon how one of her barriers was indeed her education. She described how she was unaware of STEM curricula growing up, but more so the primary studies and aspiration of becoming "musicians or athletes."

Participant 4 exclaimed,

> Hoping we see an increase there, quite honestly. I think it is just because we were not exposed to it, which is why we do not see as many of us in industry, Black women, or Black men; there are not many of us.

When asked about her advice to other African American women aspiring to ascend the corporate ladder, Participant 4 replied,

> Exposure is the reason why the field is the way it is because white males, like females, they grow up with their parents already being engineers and mathematicians and things of that nature. And they are exposed to it early. A lot of our parents are not, but we are now, and we can help our community by exposing them to it.

Participant 4 further advised,

> It is rarely about what you know. It is definitely about who you know. So having the right network and putting yourself out there can be super uncomfortable, but it is definitely very rewarding. I have worked in finance, and I do not have a not a bit of finance background at all. I know two plus two. And that is the extent of it. But because I met, as I mentioned to you, you know, someone who saw my talent and something in me that maybe I did not see in myself. They helped me to get to

that next level. They helped me make the right connections with people so that when opportunities presented themselves, I am available.

Participant 4 recognized the obstacles and the opportunities to successfully overcome barriers by removing her biases and old ways of thinking to get promoted. Having a mentor to assist her with such support, Participant 4 also advised how such helped her navigate through both personal and professional obstacles to align with her professional aspirations. She now works with her organization to head up a global initiative to promote and support the value of diversity and inclusion in the career advancement process for African American women in the pharmaceutical field.

Participant 5 – Interview Analysis

Participant 5 was excited and ready to start the interview immediately. She answered each question unreservedly and added more than enough information to enrich my study with data that would be valuable to the identified problem. Participant 5 was 38 years old and had a master's degree, and currently working on her doctoral degree with 10+ years of experience in the field. She is a hybrid human resources information systems manager and CEO of her own business and attended several prominent universities. Participant 5 felt that although she was blessed to be overly educated, she still struggled with breaking the barriers to earn six figures. She cited that during interviews, she would always hear, "Oh, she has too much education, oh, she is bougie, or she is this, and she is that."

While she knew her value as "the glue of the entire organization," she still advised of the barriers she faced while excelling in an executive level position.

When asked about the barriers she faced that may have caused her hesitation in excelling to the next level, Participant 5 shared,

> There has been a lot of times where I would interview for a role, and I would either be told overqualified or underqualified for a position where I know that I could definitely rock and roll. However, it took over 10 years to finally crack the egg, get into the six-figure range, get into my field, and be respected enough to have the opportunity. I have been trying to think of some things over the years. Like, I know around the time when the economic downturn happened, back then I was told I was too educated, so I could not get some of the opportunities for which I knew I qualified for if I had a bachelor's or a master's degree because there just was not any money in the economy. However, nowadays, it is more of an employee market. It is kind of like how the housing market failed. The housing market failed back in around 2007 or 2008, and you were able to get practically a brand-new home for pennies on the dollar. So, it was a buyer's market. That kind of analogy I like to use is that right now, the employer's market and employment market are like a buyer's market. So now I can put my credentials on paper. Like, I will give you a prime example on LinkedIn. I always get recruited lately for my next role. On LinkedIn without doing anything. And the first thing that the recruiter or the recruitment team would say is, am I reading this correctly? Are you working on a Ph.D.? We must have you on our team. And it is kind of like a double-edged sword because I remember over 10 years ago when I tried to get a role like this. I could not qualify because I was told I had too much education.

> That is kind of one of the barriers. It is like a disparity between whether you are of the right race, the right level of education, or not. That is kind of what I dealt with in my career."

Later, Participant 5 explained how we as a people, in general, are still struggling with "women's rights." She said,

> I feel like no matter what color you are as a woman; a lot of people do not respect you as an It. And that is a fight that I deal with every day in my role. In my role, I cannot possibly know more. I will just give you a prime example. We have a full It team of more than 40 people, but I am doing the job of ten people because no one understands the TNA systems I manage. I manage seven-time and attendance systems. I can sit an IT person down, and I can ask them anything about Kronos or Paychecks or any of the systems I configure daily, and they're clueless. So, with that being the case, it is like, well, how did you get here? Like, how did you get your role where it took me so long to get mine? And I know this stuff, but then you want to kind of hide me behind a curtain. When there is a meeting, you either exclude me from the meeting because I know too much or if you want to include my thoughts, you will pose them as your own. Like, that is kind of what I deal with.

Participant 5 beat the odds, overcame the barriers of microaggression and discrimination, and used such experiences to capitalize on her opportunities. Today, she owns not one but three businesses on the side of her day-to-day executive STEM position.

Participant 6 – Interview Analysis

The last interview where data saturation occurred took place with Participant 6. Participant 6 was excited to participate in the interview, and as the process began, she was ready to discuss the opportunities and challenges she faced while ascending the corporate ladder successfully. Participant 6 was 46 years old and had a doctorate degree with 6 years of experience in the continuing medical education (CME) field and 10+ years of teaching scientific courses. She is a remote medical director of CME and attended several prestigious universities where she earned degrees in biology and trained at a well-known center in Georgia. Participant 6 advised that she was not lucky enough to be graced with mentorship but advised how she wished she could have had the opportunity as it may have assisted her with ascending into an executive level position earlier in her career. She advised, "It took me about 5 years to get to where I am now."

Participant 6 had the education and qualifications to enter into an executive role; just like the other participants, she, too, was forced to face obstacles that many of her counterparts were not presented with during their experience. She advised how her advisor/mentor in graduate school advised her not to proceed with exploring options outside of the laboratory.

Participant 6's exact words were,

> I had a mentor in graduate school. And she was dead set against me doing anything outside of the laboratory. Because when we started our programs and there were maybe three or four of us African American students, we were always trying to say, okay, do we really want to stay here and deal with the grant

> situations? Do we want to stay in the lab? And everybody kept saying, no, you need to stay in the laboratory and go the academic route. And it was not until, like I said, just searching and meeting other people doing other things with their degree that I realized there were other opportunities out there. So, when I finally got a job in CME, my boss was like, well, where are you finding these jobs? She was like, because it was always just hammered into us that you need to go to academic route. So, there was really no mentoring outside of that.

When asked about other barriers while aspiring to ascend the corporate ladder, Participant 6 replied,

> I think not having that mentor, not having someone to say that these are opportunities that are available to you, someone to support your need for exploring things that might matter to you. It should not be just, oh, you are either a doctor or an academic. You should be able to find what matters most to you. And I think I did not have that, and it felt very lonely to me. It felt very lonely not being able to have that guidance to let somebody know I need some help here.

Moreover, when asked about her perceptions of why she thinks there is such a low percentage of African American women in executive level positions in STEM, Participant 6 felt:

> Number one, they do not know about the opportunities. Number two, even though, for example, when I was in high school, I was in a magnet program for science and mathematics, even though we were like the upper echelon at my high school, when I got to college, it was nothing like what college was. So, I felt

> unprepared. I felt like it was nothing that I was doing in high school, as it was not preparing me for the real thing. I feel we need more exposure to STEM curricula early in school. So, even though we might come out with the 4.0 averages and things like that, sometimes it is not representative of what is out there. Thus, you may not progress as much as you think that you should have. I am trying to think what else. I think those are the major things for me.

To successfully overcome the barriers, she faced during her ascension into an executive level position; Participant 6 discussed how "being isolated" can cause doubt for anyone, yet as an African American woman, one must understand that "there is so much more out there" to explore. "The opportunities are there. You just have to take them and take advantage of them. Furthermore, there are people trying to push you. There are people like my old supervisor pushing you to go and do these other things." However, one must continue to participate locally in communities to share the importance of STEM and how such fields can create careers with better options than what is presently showcased.

Summary

Grounded in theories and concepts, which included two key concepts: (a) Bourdieu's (1977b) concept of social capital and (b) Collins' (2015) concept of intersectionality. This empirical investigation aimed to advance research and address a literature gap on the experiences of six African American women in the United States who successfully ascended the corporate ladder in STEM. It also shed light on the potential for integrating and promoting African American women in STEM fields and

captured the attention of such barriers to career development and advancement (Vuong et al., 2021). Data for this study were collected through semi structured interviews and thematically analyzed for reemerging findings.

The results of the study are presented in this chapter. The CRQ guiding this qualitative, single case study with embedded units was: “What are the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields?” Data analysis of the 11 question semi structured interview revealed three main themes: (a) the importance of mentorship, (b) the sense of self or belonging, and (c) success strategies: overcoming the barriers. More than 95% of the participants identified each of the themes as elements that influence or prevent African American women in STEM fields while ascending into executive level positions.

In Chapter 5, I will present the interpretation of the findings and provide a brief overview of the research literature in Chapter 2 to interpret and analyze the findings. Moreover, a brief assessment of the conceptual framework, theories, and concepts that focus on aligning with the study’s purpose, limitations, and recommendations were also discussed. Finally, Chapter 5 will provide an implication for positive social change for all stakeholders and a conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

This qualitative, single case study with embedded units aimed to explore African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. The disparities of opportunities within the STEM workforce for African American women to successfully ascend into executive level positions raised awareness of the various challenges that caused the researcher's pursuit of exploring deeper into this matter. The theories and concepts that grounded this study included two key concepts: (a) Bourdieu's (1977b) concept of social capital and (b) Collins' (2015) concept of intersectionality. This empirical investigation aimed to advance research and address a literature gap on the experiences of those African American women who successfully ascended the corporate ladder in STEM. It also shed light on the potential for integrating and promoting African American women in STEM fields and captured the attention of such barriers to career development and advancement (Vuong et al., 2021).

Over the years, various concepts and theories have explained why African American women have not ascended the corporate ladder in STEM. Such theories range from the glass ceiling metaphors (Cornelius & Skinner, 2005), sticky floor (Berheide, 2013), and labyrinth (Haber, 2009), all falling under the umbrella concept of intersectionality. Collins (2015) grounded the concept of intersectionality in Crenshaw's (1991) theoretical works about aspects of people's identity (e.g., race, gender, class, sexual orientation) interacting with the condition of people's lived experiences (Crenshaw, 1991). Six interviews with African American women in the United States

who held executive level positions in STEM provided further insight and data on this phenomenon of how African American women are faced with such opportunities and challenges and the critical components needed while ascending the corporate ladder in STEM fields. Based on the findings, three main themes emerged from the study, which distinctively answered the research question explored in this study. The six African American women in STEM each sufficiently shared their lived experiences and perceptions through one-on-one 45–60-minute semi structured interviews. With an emphasis focused on a CRQ guiding the study: "What are the opportunities and challenges African American women faced while successfully ascending the corporate ladder in STEM fields?" The data from each interview were coded and manually thematically analyzed to unveil findings that confirmed and extended the knowledge of the literature reviewed earlier in Chapter 2.

Based on the findings of this study, the participants found that their ability to ascend the corporate ladder in their careers was difficult based upon their race, gender, sense of belonging, and the lack of mentorship and early knowledge of STEM curricula. In comparison, each African American woman discussed how their organization's ability to promote and support mentorship programs and diversity training was achieved, yet the organization's ability to ensure diversity at executive levels of the business was not attained. According to Jefferson (2019), only 5% of executive level careers are held by both African women and men, with only 4% of STEM executive level roles are held by women of color (which includes African, Asian, and Latina women), and 22% by White women (Metcalf et al., 2019); African American women would have to wait until 2119 to

obtain equal pay for work-related roles (Institute For Women's Policy Research, 2018; Vuong et al., 2021). Scholars have contended that women's inclusiveness may lead to new innovative ideas for equity and build a gender gap in the workplace (Mitchneck et al., 2016; Smith et al., 2019).

Chapter 5 focuses on answering the research question by: (a) reviewing the fundamental discoveries, (b) highlighting the limitations, (c) making recommendations, and (d) presenting a summary of the study.

Interpretation of Findings

Undergirded by Bourdieu's (1977b) concept of social capital and Collins' (2015) concept of intersectionality, this empirical investigation aimed to explore the experiences of those African American women who successfully ascended the corporate ladder in STEM and emphasized leadership development and training to foster opportunities and mitigate challenges African American women in STEM fields faced during career advancement (Vuong et al., 2021).

Six African American women participated in an 11-question semi-structured interview to explore the CRQ of this study. Each woman held an executive level position, and five out of six participants had a bachelor's degree or higher. In this study, all women were eager to depict their experiences and perspectives of how African American women in STEM fields face opportunities and challenges while ascending the corporate ladder. The six women were conversant and conscious of the empowerment of diversity and inclusion in the workplace.

Four theories framed this research study including: (a) glass ceiling (Cornelius & Skinner, 2005), (b) sticky floor (Berheide, 2013), (c) labyrinth (Haber, 2009) metaphors, and (d) social capital (Bourdieu, 1977b, 1986), as the specific problem that was being studied was how women are still underrepresented and face bias and discrimination compared to White men in the STEM fields (Adams-Harmon & Greer-Williams, 2020; Amon, 2017). For example, each woman discussed aspects of being bypassed for promotions although they held higher degrees than their counterparts. Each woman illustrated the feeling of being excluded or isolated based upon their differences of opinions in comparison to their less qualified colleagues.

The three main themes were formulated by transcribing and analyzing data and coding and cataloging to complete the data collection process. For anonymity, participants were coded as Participant 1 through Participant 6.

Theme 1: The Importance of Mentorship

Upon interviewing the six participants, each believed that a mentor added to their accession to an executive level position as a mentor provided different perspectives of situations within their personal and professional experiences. Although four out of six had mentorship experiences, the two who did not have such experience indicated they thought it would have been beneficial to have a life coach mentor them while ascending the corporate ladder. Now that each participant has ascended into executive level positions, they each described how they maintain mentorships to continue the dynamics of interpersonal, cultural, and structural hierarchy within the workplace.

For example, Participant 1 explained how her mentor allowed her to look past situations and take a different perspective. She expounded upon the importance of eliminating one's own biases and grasping an understanding of "allowing me to look past some things and kind of move forward to gain more experience and work with different kinds of people."

Nevertheless, Participant 3 discussed how her mentor encouraged her to stay in the race for advancement into an executive level role and to limit her code switching based upon others' opinions.

She advised that her mentor encouraged her to:

> Wear my hair straight if I want to wear my hair curly if I want to wear a wig, and I want to color my hair a different color, that's who I am. It doesn't take away from the fact that I know my job, am well educated and am well-spoken. And I can run circles around my own boss.

Yet she shared her perception of African American women in STEM fields as "impeccable." Participant 3 stated, "Their intelligence is beyond anything I've ever seen. And their desire to make the world better is more than anyone I have ever encountered in corporate America. I love the fact that many of them become mentors themselves."

Lastly, Participant 4 not only used mentorship to assist her with the ascension to an executive leadership role, but she also was "fortunate to be a part of Employee Resource Groups (ERGs). These ERGs made a difference for African American women in STEM and supported her ability to network and get guidance to continue her career advancement." Participant 4 further exclaimed how she was able to connect with

someone in HR who became her mentor and assisted her with obtaining her current role as a one finance development enablement lead. Her words of elation were, “It was quite interesting because my mentor didn’t pull any punches with me; she was like, this is what you need to do. This is how you need to do it. And we’re going to get you there.”

Each participant agreed that creating awareness of the critical need to form programs that provide different resources for diversity and inclusion is vital. Furthermore, each woman’s stance on the importance of mentorship led to the need to have an ally to support and influence them by building trust, providing patience to listen, and being a safeguard to shield the increased microaggressions (McGill et al., 2021) they face while ascending the corporate ladder in STEM fields. Providing such mentorship, having an understanding, and creating a safe haven for African American women in STEM fields tends to attract and retain a diverse pool and, in turn, allow the frustration of new ideas.

Theme 2: The Sense of Self or Belonging

Participants agreed on the impact of assessing the workplace pathways successfully to ascend into an executive level position; one must take traditional and nontraditional paths. Navigating the systemic obstacles of an organization’s culture can require African American women to work twice as hard as their White counterparts. Such interpersonal behavior can form a sense of feeling excluded or lonely.

Participant 1’s perception of African American women in STEM fields was as such:

> Honestly, I feel like we're only targeted to fill a spot. And to say that we know that this organization has someone that looks like us, I don't think that we're targeted for what we have to offer, which is a big issue for me.

In addition, Participant I further explained the barriers she faced that may have caused hesitation in excelling to the next level of her career. The sense of belonging was a major issue. She discussed how having a unique name made her feel excluded. Participant 1 reflected on a time when she encountered by sharing:

> Walking into a room. It's automatically assumed, especially because my name is unique. And whatever the case may be, I don't know what I'm talking about, or there's no way that I can contribute because of who I am or what I look like. And I personally think it's funny now because I've matured, but when I was younger, I thought it was very offensive. Of course, it is still offensive, but I used to get upset about it. I don't do that anymore because I can't control someone else's ignorance. I'm learning that as well.

Participant 2 exclaimed how she felt confident as an African American woman, yet she has to "work twice as hard" as her counterparts, so she continues to strive to prove herself. She further expounded upon the barriers she faced that may have caused hesitation in excelling to the next level of her career and the sense of belonging. Participant 2 cited,

> Even when I work in a place where there's like a lot of men, you know, or even … White woman, we always have to do extremely better. Or push us to the max as a Black woman, it doesn't come as easy, you know, for us.

Yet she made it known that she continues to focus on her confidence and would advise other African American women aspiring to ascend the corporate ladder into an executive level position to:

> Never question yourself. Stand firm in what you believe. And think back on what you were taught, whether it's from home mentors, you know, certain teachers that you looked up to believe in yourself. When you believe in yourself, the sky's the limit. Remember, mentorship is very important, and try not to be or don't get intimidated. You're more worthy than most, and above all, pray and keep believing in God; that will definitely help you. That's really number one. So basically, make sure you have a spiritual foundation.

Participant 3 further defended her perception of why she thinks there is such a low percentage of African American women in executive level positions in STEM.
She exclaimed, "people are scared" of change:

> People think we're going to come in and absolutely wipe out the old boy, old girl club, and we will. And so, for them being so used to having someone who looks like them, who thinks the way that they do, that they feel comfortable with in positions of power, it is very uncomfortable to have someone come in with everything that their bosses may have had and decide to shake things up… you have no option but to hire because of talents.

Yet, the advice she would give other African American women aspiring to ascend the corporate ladder into an executive level position is to remember:

> "You have the education. Unfortunately, we are still in the era where you got to do 100 times better than others to get at the same level. But beware of your mental health, which is important in this climb. Because you're going to be hit with so many biases and prejudices, you're going to be hit with racism. And you have to remember that it is not about you. It is them. Okay, and if that's somewhere you really love where you're at, and where you're going, you keep fighting through that, and you learn your rights, backward and forward. And don't be afraid to speak up and take action and align yourself with people willing to mentor and advocate for you at all times."

Participant 4 focused more on the barriers she faced that may have caused hesitation in excelling to the next level in her career. While she discussed feeling awkward at times, she also emphasized that "not all of them – White counterparts" cause a sense of isolation. Still, when the olive branch is extended, she questions if their allyship is "genuine or if it's guilt, as they just want to meet a quota." She also explained how, when faced with different barriers, "it's important that African American women just try to encourage each other and ring up our spirits as we understand that there's enough room at the top for all of us."

While she also confided in me that she sometimes fakes confidence. Participant 4 stated,

> So much that I don't think I can do, and I'll try it, right. I'll be like, oh, I messed it up. I'll figure it out," but she "manages to put herself out there, which is super uncomfortable" and in turn "build her brand, and that's something that I will tell

> anyone. It's about selling your BRAND, work hard, but work harder to build your network.

Participant 5 reflected on how valuable she is in the STEM field, as "the glue of the entire organization, yet she still feels bothersome at times as her White counterparts do not value her opinion."

She shared how when attending an executive leadership meeting,

> Other nationalities and other VPs, or Directors would like to take credit for the work that I'm doing. So as an African American woman, I never felt respected in the STEM field or in the high-risk field that I'm in because when things are discussed, it's always I'm not intelligent enough. Still, the work is getting done and is highly regarded across the board. That's probably the best way I can sum up some of the things I've dealt with.

Such behaviors gave her the impression that she was a threat. Many were "intimidated" by her, especially since her educational experiences succeeded her counterparts. Participant 5 also advised that she "still deals with the same challenges every single day; it's just that my skin is so thick that I don't let it bother me anymore. It's sad." She has learned how to bury the sense of isolation, rise above the noise, and create an "easier plight" throughout her career.

Lastly, Participant 6 perceives African American women in STEM as "unicorns." She discussed how her organization has "a lot of women of color, but there aren't very many African American women in the space of executive leadership."

She also explained how because there is such a limited amount of representation of African American women in leadership roles:

> When we do appear, I think it's the expectation that you need to be better than everybody else or to really showcase your talent way over, and beyond what most people do, you know other nationalities. And then there's always that stigma if you make a mistake that is like, oh, it's so much bigger than what maybe somebody else (other nationalities) would get if they did the same kind of mistakes. So, it's a lot of pressure. You're trying not to be too angry, not be too anything. You just want to stand out, but simultaneously, you want to blend in, and just kind of not make any waves. So, it's a little bit of a difficult trick.

However, Participant 6 also stressed that as an African American woman, "you should be able to find what matters most to you. And I think I didn't have that, and it felt very lonely to me."

Inclusively, each participant felt a sense of loneliness or isolation and described how such spirits prevented African American women from speaking out against the status quo, keeping their heads down, and playing the bureaucratic game in the workplace. Such a feeling of being ostracized can not only mentally and physically tarnish one's view of navigating the workplace pathways but also entails a lack of diversity and inclusion within organizations (Cortina et al., 2021).

Theme 3: Success Strategies – Overcoming the Barriers

The six participants shared several commonalities. However, the one theme of overcoming barriers continued to emerge through all of their responses. Each participant created and sustained their own professional pathways within the workplace and ensured they obtained their desired level of success. Despite the barriers they faced while ascending the corporate ladder, they each managed interpersonal rejections or discrimination; they also managed to focus on furthering their education or on mentorships and networking to assist with their positive results in the workplace. The women all addressed how the landscape of increasing the presence of African American women in STEM fields in executive level positions is critical to the benefit of STEM and society as productivity and innovation can impact investments (see Charlesworth & Banaji, 2019) for all stakeholders.

Participant 1 advised how her education and training experience contributed to her preparation for obtaining an executive level position.

Participant 1 stated,

> Definitely getting my master's in information technology. I also believe going to Purdue, the name itself kind of helped a bit. I did do a bunch of internships while at Purdue. I interned at John Deere; I interned at General Electric. And with those two different organizations, that kind of helped to pad my resume for moving forward. I also did get a master's in crime analysis from Tiffin University. And with that, I was granted the opportunity to get clearance, which helped me kind of get into the government world.

She also explained how she was exposed to STEM curricula in middle- and high school. “I was exposed to engineering at the age of eight. So, I knew at the age of eight I wanted to be an engineer; I had if engineering didn’t exist, I wouldn’t have gone to college.”

She believes,

> That a lot of people who are or could be interested in engineering don’t know it, because they’re not exposed to it. So, I think being exposed to it early on, exposing your children to and exposing your nieces and nephews to it. I believe that it’s something that we can definitely do more of. Because exposure is the reason why the field is the way it is because White males, like females, they grow up with their parents already being engineers and mathematicians and things of that nature. And they’re exposed to it early. Many of our parents aren’t, but we are now, and we can help our community by exposing them to it. And making sure that they understand like, you don’t have to be you don’t have to be good at math to be good at science. You don’t have to be good at science to be good at technology; sometimes, there’s an alternative route. And if it’s something you really want to do, find a means of doing that, like, get them interested in it, expose them to it, and, you know, find your place, and move up. That’s all you can do fight for it if that’s really what you want. Unfortunately, that’s what we have to do. And I don’t think there’s anything wrong with it. We shouldn’t have to fight more, you know, than everyone else. But it’s nothing wrong with that if that’s what you won’t fight for it. And if you don’t find an alternative.

Participant 2 cited that she used mentorship and God to keep herself grounded. She went on to say that African American women should:

> Stand strong in what you believe. And think back on what you were taught, whether it's from home/personal mentors, you know, certain teachers that you looked up to believe in yourself. When you believe in yourself, the sky's the limit. Remember, mentorship is very important, and try not to be or get intimidated. You're more worthy than most, and above all, pray and keep believing in God; that will definitely help you. That's really number one. So basically, make sure you have a spiritual foundation.

Participant 3 overcame her barriers as she focused on her education and gained feedback from her mentor to assist with advocating for her abilities to ascend the corporate ladder.

She explained,

> People think that when you walk in the door, looking a certain way, or being a person of a particular color that they can speak to you any way they want, and that you're going to be okay with it. Or that they doubt that you're as qualified as you are. And the abuses, the verbal, the nonverbal abuses that you face can be demeaning. And a part of it, I would say, is that I will walk off a job in a minute because I have a temper. And I believe in God, so I believe in stepping out on faith. And if something doesn't feel right to me, I know it will only worsen because I've experienced it before. I've experienced White women coming up to me and saying, you should wear a sweater because, at the time, I was going

> through an episode with hives, right? Or you're very pretty for a Black woman, or you're very intelligent for a Black woman. And I'm thinking to myself, are you out of your mind? And didn't say anything, but the anger increased? Until I started saying, you know, that's really out of line. And I'll give them an example. Do you like being told, you know, it's those blonde women who are crazy? And you must be fun, too? Did you dye your hair blonde? Because you wanted to have fun? Is that why? Do you know those kinds of things? I said, how do you feel when someone says that to you? Do you like hearing something like that? And so, I've learned to give relatable stories, to at least begin to change the narrative in many people. This means, of course, I have to open up my life and talk about the hurtful things and hope that I am reaching if there's a whole audience of 50 people, that if I reach out to people that they make that connection, and I've done my job. I like that.

Participant 4 managed interpersonal rejections or discriminations by "being more embracive."

She further discussed,

> We have stereotypes in our mind about Black women just in general, right? Like, oh, they going to ask you to this and that, or oh, they think they're better than, the other counterpart. In actuality, the women I've worked with in STEM are like down the earth. And we all kind of want the same thing to grow and be respected for our work, and not have our, you know, being Black be something that's looked down on or held against us, right? Especially when we have the same

> qualifications, the same education, you know, as our counterparts, so my perception of women, Black women in STEM specifically, I rock with them, I really do. And I've taken this chance to go a step further, and just trying to get to know people, everyone's not, you know, is great; everyone's not welcoming.

More importantly, Participant 4 used networking to gain her ascension into an executive level position. She encourages African American women to "make the right connections with people so that when opportunities presented themselves, they are like, oh, you know what, she would be a great fit."

Participant 5 developed her brand by furthering her education and taking on projects to overcome the barriers she faced while ascending the corporate ladder. She had to deal with being given the opportunity to prove herself.

Participant 5 shared,

> So, there has been a lot of times where I would interview for a role, and I would either be told overqualified or underqualified for a position where I know that I could definitely rock and roll. However, it took over 10 years to crack the egg finally, get into the six-figure range, get into my field, and be respected enough to have the opportunity."

However, the one piece of advice she would give other African American women in STEM ascending the corporate ladder is:

> Reach for the stars. And if you fall over the moon, then get back up and keep climbing up the stars. But I feel like you are a part of history, and if you can start making your mark, it's interesting. I say this to all my friends; wow, I just made

> my mark in another organization. So everywhere that I go, everyone remembers me.

Finally, Participant 6 overcame her barriers by preparing for her executive level position using a combination of her education and personal self-affirmations. She not only has her "Ph.D., but I have my bachelor's in biology and also my master's in biology." She leverages her education to break the barriers and "helped with opening up one of the pharmacological pharmaceutical companies" she was employed with.

She also advised African American women ascending the corporate ladder to:

> Be true to yourself. You know, try not to worry about what you think everybody else wants you to do. I think you should just seek what makes you happy. Of course, be professional, have decorum, and do those types of things. But at the same time, if you spend your whole life trying to play this role, you'll never find the fulfillment you need. So, I think just really be honest and true to yourself and anybody studying in the sciences, just keep going. Keep going to go ahead and get that Ph.D., go ahead, and get those high academic honors, because otherwise, you can't even get through the door; unless you at least have something a little bit higher for people to notice, like an MBA. You have to have some type of advanced degree for anybody to even look at you to see that.

She later expressed that she does not think that other nationalities require the same type of attention to ascend the corporate ladder. Participant 6 shared,

> I've met so many people who just have their bachelor's, but they somehow are like CEOs or CFOs, or they're doing other things, and they don't have the same

> level of education that I have. So, I feel like women of color, particularly African American women, need to have the higher ones. But you're not going to have your counterparts have the same degrees usually.

Collectively, the data saturation revealed that more exposure to STEM curricula, the ability to further one's education, and gaining a mentor to assist with the mental and physical stressors are all essential elements to help with the ascension of the corporate ladder. While African American women are still underrepresented and faced with different opportunities and challenges than their White counterparts, their capabilities continue to succeed them (Ferguson & Martin-Dunlop, 2021). Their ability to overcome several dynamics within the workplace can be overwhelming, yet they tend to rise to the occasion and embrace the discrimination.

Limitations of the Study

In the initial proposal for this study, a few limitations were of concern and needed to be considered when interpreting such research implications. First, the analysis was based on self-reported data. I relied on intuitive answers from participants through social media outlets such as LinkedIn, Facebook, and ERGs in the United States. Each participant was accessible for interviews based on their schedules and understood that their participation in such study was voluntary. As a result, each participant's responses may be conditioned to their intentions to safeguard one's reputation or to retain their executive level position in such STEM organizations.

To amend this potential bias, I used Zoom meetings for the data collection method, which allowed observation of each participant's verbal and nonverbal cues. The

research design, sampling, methods, and CRQ were to explore African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. Understanding such opportunities and challenges allowed one better to understand the business case for diversity and inclusion. I assumed the research participants were all African American women in STEM. White women and all men were excluded from this study. Therefore, the transferability of this study is limited based on contextual intentions and not generalizable, which may still pose limitations. However, the voices of other minority women from STEM organizations may have provided more depth to the interviews.

Secondly, a fair-balanced analysis based on different women's perspectives would shed more light on the effect of sustainability efforts on diversity and inclusion and socially conscious societal growth in STEM organizations promoted and supported by leadership styles, behaviors, and decision-making strategies. Finally, other potential biases may have impacted the study, providing limitations. For example, I am African American woman in STEM and work in an executive level leadership capacity.

As such, my role and perspective of the opportunities and challenges while successfully ascending the corporate ladder in STEM fields may have predispositions. However, to interject such opinions of having shared similar experiences, as a researcher, I minimized such biases by reflective journaling. Upon the completion of each interview, the video or voice recordings were transcribed and emailed to each participant for review, which entailed member checks to ensure the accuracy of the captured data. As a researcher, I was cautious not to suggest or influence the participant responses as my

association in the interview process was vital for such qualitative research (see Patton, 2015).

Recommendations

From this qualitative, single case study with embedded units, recommendations for future research ensued, and two were highlighted, which may assist with acquiring beneficial results. Due to the collected data during this study, it is recommended that further research should examine the importance of teaching early STEM curricula in middle and high school in urban communities. Additionally, further research may highlight the importance of promoting and supporting the retainment and advancement of African American women in STEM fields. In this study, African American women explained the impact of having a mentor, the ability to reinforce the sense of belonging, or knowing one's self-worth, which further provides access to change, which may lead to advanced roles in leadership. While the experiences of the six interviewed African American women in leadership positions in STEM fields involved their perceptions, it would also be vital to study organizations committed to diversity and inclusion. Evaluate those organizations and the implementation of the successful best practices that have proven to make an impact on the development and progress of African American women in STEM fields.

Moreover, it would be critical to reinforce the significance of how ERGs in organizations assist with the development and progression of African American women in STEM fields. It impacts leadership development and training and improves the disconnect between companies and the abilities to be allies and commit to racial equity

growth within the workplace (Krivkovich et al., 2022). Furthermore, such ERGs can also clear a critical path to equip all employees to challenge bias (Krivkovich et al., 2022) to assist with the support of career development for underrepresented but qualified African American women in STEM ascending the corporate ladder. The findings from Krivkovich et al. (2022) also included pain points in which corporate pipeline hinders the promotional strategies of African American women in STEM fields, as well as the concrete, evidence-based steps that organizational leaders can implement to champion change that will make a significant difference.

Implications

The implications for positive social change include the potential to increase the society, culture, and organizations awareness of the importance of diversity and inclusion in STEM fields and how African American women are viewed based on their educational and professional achievements. Such importance of diversity and inclusion in the workplace cannot be overstressed in addressing the lack of African American women in executive leadership positions in STEM fields in the United States. This research helped encourage the need to create an inclusive approach to diversity that maintains and supports an open line of communication, transparency, and challenges that African American women faces that affect equal opportunities, organizational growth, and its stakeholders. This study's potential findings may also lead to positive social change by creating responsiveness to how organizations make sense of diversity and inclusion and how African American women believe that career advancement is being considered in a fair balanced aspect, which creates equal opportunities for advanced promotion.

To that effect, this research study's results may fill the literature gap. It may have encouraging possibilities as it relates to positive social change. One result is the implementation of major characteristics of effective diversified inclusion can lead to being strategic, transparent with stakeholders, and being prepared to expand the multicultural workforce that may improve the workplace setting (Gilstrap et al., 2015) and create financial competitiveness for African American women in STEM. Positive social change can also occur when organizations are proactive in assessing diversity and inclusion within their workplace not just based on gender; but also, on racial equity (Cheryan et al., 2017), build networks through ERGs, and provide incentives to employees who are allies to navigate through the structural dynamics of leadership paths. The second result will present a competitive advantage for organizations as all stakeholders' perceptions will remain optimistic and, in turn, remove the stigma of deficit credibility and the lack of diversity and inclusion, which may also improve the organization's culture (Coldwell et al., 2011). Nevertheless, exploring the underrepresentation of African American women in STEM remains valuable and recognizing their ability to alter the outlook of identity shifting within the workplace.

Conclusions

While African American women in executive level positions in STEM are still underrepresented, one needs to examine the approaches and dispel the lack of positive influences these women bring to organizations, the importance of mentorship, and early studies of STEM curricula. All these factors can foster the impact of and assist with the benefit of the nation's social, economic, and environmental responsibilities. In turn, it

helps improve diversity, equity, and inclusion in careers within such fields. This study served as a platform for African American women in STEM in executive level positions to share opportunities and challenges they faced while ascending the corporate ladder. As organizations create diverse and inclusive foundations to reinforce the improvement in achieving internal and external stakeholders' expectations to stimulate positive outcomes, the impact of African American women in STEM fields may advance.

After thoroughly reviewing the participants' interview transcripts and existing literature, I have acquired a better understanding of the CRQ and purpose from a theoretical, qualitative point of view. Each method provided a theoretical framework and focused on the ethical perspectives that expanded not only the gap of my identified problem of diversity and inclusion in STEM fields; but also provided data that aligns with my research question of how to improve awareness within such fields.

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Appendix A: Recruitment Letter

Dear Prospective Participants,

I am a doctoral student at Walden University, studying Leadership and Organizational Strategy, inviting you to participate in my research study.

This study explores African American women's opportunities and challenges while successfully ascending the corporate ladder in STEM fields. Researching this topic is an important issue to increase awareness of the potential for integrating and promoting African American women in STEM fields and capture the attention of such barriers to career development and advancement which may create a dynamic of positive social change.

The purpose of this study is to gain a deeper understanding of the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields. I believe that your experience would be a significant contribution to the study.

The study is significant, as the findings may encourage the need to create an inclusive approach to diversity that maintains and supports an open line of communication and transparency challenges African American women face that affect equal opportunities, organizational growth, and stakeholders. Furthermore, this study's potential findings may also lead to positive social change by creating responsiveness to how organizations in STEM fields make sense of diversity and inclusion, creating equal opportunities for advanced promotion.

If you would be interested in participating in this study, please review and return the signed consent form attached to this letter. If you would like to request additional information, you may reply to this email. Thank you in advance for your consideration.

Respectfully,

Malika Nelson-Wicks, EMBA, MPhil; Ph.D. in Management Candidate
Walden University
College of Management and Technology

Appendix B: Interview Protocols

Participant No: _____

Gender: _____

Age: _____

Race: _____

Highest Academic Degree: _____

Years' experience as STEM Professional: _____

Remote, On-ground or hybrid work setting: _____

Preliminary Actions:

Interviewer to participants: Thank you for accepting my invitation to be interviewed in your capacity as a professional in the STEM field. The purpose of this qualitative, single case study with embedded units is to explore the opportunities and challenges African American women faced while having successfully ascended the corporate ladder in STEM fields.

Before we get started and ensure consistency among participants' interview responses, I would like to share the definitions of terms we may use within the interview process as they are defined within this study.

Diversity: Diversity is an approach in which one avoids the risk of exclusion by being different, diverse, or varied and generating a sense of solidarity. Such an approach embraces people from different races and cultures and combines the focus of the community or individual principles (Frémeaux, 2020).

Glass ceiling: An invisible or informal barrier or norms that hinder women or

minorities from reaching senior-level positions in the workplace despite qualifications and skills (Kaur, 2021).

Inclusion: A process that ensures people with or without disabilities are provided with equal rights, opportunities, and shared practices that help the individual function concerning his or her duties and goals (Magnanini & Morelli, 2021).

Labyrinth: A confusing or complex maze of paths bordered by entanglements and dead-end corridors which hinder the ability to obtain one's goals (Mohigul, 2020).

Mentoring: A one-on-one relationship between two people in which a senior employee offers guidance or support to a junior employee (Mohtady et al., 2019).

Sticky floor: Barriers or obstacles that women face while ascending organizations that retain them in lower and middle hierarchical positions (Berheide, 2013; Rincón & Martínez, 2020).

If you need clarification on any questions being asked, please do not hesitate to ask me to explain in greater detail. In addition, periodically, I may ask clarifying questions or encourage you to describe your response in greater detail as well. Note that you are invited to elaborate where you feel comfortable and decline when you do not add additional information.

Before we begin the interview, I ask that you be comfortable in your location setting and you feel free to participate without interruptions. Do you feel this description describes your setting at this moment?
May I begin the interview?

1. What is your current position title?
2. How long did it take to reach such an executive level position?
3. What educational and training experience contribute to your preparation for obtaining such an executive level position?
4. How did working with a mentor influence your ascension to an executive leadership position?

5. Can you tell me your perceptions of an African American woman in the STEM field?
6. What barriers have you faced that may have caused hesitation in excelling to the next level in your career?
7. Why do you think there is such a low percentage of African American women in executive level positions in STEM?
8. What advice would you give an African American woman aspiring to ascend the corporate ladder into an executive in the STEM field?
9. How do you feel about your organization's willingness to promote women of color into leadership roles?
10. How do you think you can help your organization see the value of diversity and inclusion in their career advancement process?
11. As an African American woman with a successful career in a STEM field, do you have any final thoughts to add now that we have come to the conclusion of our interview?

Thank you for assisting me with this research study. I will contact you via email once the transcription from our interview is finalized. I will provide a summary of the interview, and I would like you to review the summary to confirm that I have captured the essence of what you have shared with me. If any discrepancies are found within the transcript, please advise immediately and I will correct the interpretations. In the meantime, if you have any questions or concerns, please do not hesitate to contact me via email.