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Lived Experiences of African American Women Engineers Regarding Employee Engagement, Organizational Support, and Organizational Commitment

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Walden University
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Abstract

Lived Experiences of African American Women Engineers Regarding Employee

Engagement, Organizational Support, and Organizational Commitment

by

Tamika Gwendolyn Riley

MA, Michigan State University, 2009

BS, Michigan State University, 2006

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Industrial and Organizational Psychology

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August 2023

Abstract

African American women are underrepresented in the engineering workforce. Limited research exists focusing on the experiences of African American women engineers. This qualitative study aimed to understand the perceived lived experiences of African American women engineers concerning employee engagement, organizational support, and organizational commitment. Relational cultural theory and feminist theory comprised the theoretical framework used to guide this descriptive phenomenological study. Data were collected using semi structured interviews with 11 African American women engineers. An inductive thematic data analysis produced 15 themes to answer the study's three research questions. The themes that addressed the first research question, on engagement, included (a) professional engineering group opportunities, (b) connections to colleagues, (c) teamwork, (d) doubting feedback and proving self, and (e) discrimination. The themes that addressed organizational support and the second research question included (f) empowerment and voice being heard, (g) public recognition and rewards, (h) mentoring and training, (i) software and request systems, (j) supervisor accessibility and support, and (k) diversity and inclusion initiatives. Last, the themes that addressed the final research question regarding organizational commitment included (l) commitment level, (m) organizational culture, (n) connecting to people, and (o) lack of diversity. The research findings may impact positive social change by helping organizational leaders understand the experiences of African American women engineers and develop ways to improve workforce diversity by identifying and implementing processes to improve the organizational culture and employee well-being.

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Chapter 1: Introduction to the Study

Women continue to be underrepresented in science, technology, engineering, and mathematics (STEM) professions (U. S. Census Bureau, 2021). In 2017, 12.8 million men compared to 10.1 million women were full-time scientists and engineering professionals (National Science Foundation, 2017). Additionally, about 70% of scientists and engineering professionals who worked full time were White (National Science Foundation, 2017). However, most of the United States labor force are women, with the highest percentage being African American women (U.S. Bureau of Labor Statistics, 2017). Despite this data, African American women are significantly underrepresented in STEM occupations, specifically engineering (Alexander & Hermann, 2016; Gibson & Espino, 2016; National Science Foundation, 2017). For example, African American women held 11,000 of the 1.7 million engineering occupations in 2017 (National Science Foundation, 2017).

In 2019, the total population in the United States was 328,239,523, with 60.1% of people identified as White, 18.5% Hispanic or Latino, 13.4% African American or Black, 5.9% Asian, 1.3% American Indian and Alaska Native, and 0.2% Native Hawaiian and Pacific Islander (U. S. Census Bureau, 2019). Out of an estimated 1,980 644 total bachelor's degrees conferred by postsecondary institutions, White graduates earned 62.3% of all bachelor's degrees. In contrast, Latino graduates earned 12.2%, African American graduates earned 10.1%, Asian/Pacific Islander graduates earned 7.2%, and American Indian/Alaska Native graduates earned 0.5% (Education Data, 2021; National Center for Education Statistics [NCES], 2020). Of the total bachelor's degrees conferred,

331,000 (18%) were in STEM fields (NCES, 2020). The percentage of STEM degrees

awarded to White students were 18%, Latino 15%, African American 12%, Asian/

Pacific Islander 15%, and Indian/Alaska Native 14% (NCES, 2020). As of 2018, an

estimated 7% of African American students earned a bachelor's degree in engineering

(American Physical Society, 2021). The estimated percentage of African American

women who earned bachelor's degrees was 11.4%, compared to 8.9% of African

American males (NCES, 2020). Women made up to 20% of engineering graduates and

women of color, including African American women, made up less than 4% of

engineering graduates (Agboola, 2018).

According to Fry et al. (2021), women earned 53% of the STEM degrees in

higher education programs in 2018. Women earned only 22% of the engineering degrees

(Fry et al., 2021). As it relates to STEM occupations, representation has remained

stagnant since 2016 (Fry et al., 2021). The STEM occupations with the lowest percentage

of employed women are engineering, computer, and physical science jobs (Fry et al.,

2021). African Americans in science and engineering occupations represented less than

5% of the workforce (National Science Foundation, 2017). This percentage reflected the

disproportion of women and African American college graduates with STEM degrees

(Fry et al., 2021). Black and Latino undergraduates were less likely to continue as STEM

majors than their White and Asian American peers (Chang et al., 2014; Riegle-Crumb et

al., 2019). Additionally, not all women who held STEM degrees worked in a STEM field

(Noonan, 2017). Women who earned their STEM degree and entered the job market in a

STEM field, particularly engineering, faced limited opportunities and freedom, sexual

discrimination, harassment, and lack of rewards (Amon, 2017; Brown et al., 2016; Rice, 2011).

Some researchers who studied women in the engineering field have focused on the attitudes, challenges, experiences, job status, and elements affecting the retention issues (Amon, 2017; Mallette, 2017). The results showed that women faced wide-ranging barriers to achievement, such as being stereotypically categorized because of role tasks, discrimination, not being seen as authority figures, and gendered role expectations (Amon, 2017; Mallette, 2017). Buse and Bilimoria (2014) and Fouad et al. (2016) explained that women who left and women who stayed in the engineering field experienced the same barriers to navigating the organizational climate. The difference between both groups, however, was the experience with organizational support, organizational commitment, and their ideal self, which influenced work engagement and commitment (Buse & Bilimoria, 2014; Fouad et al., 2016). Despite the need to close the gender and race gap in the engineering field, few studies exist specific to the unique organizational experiences of engagement, organizational support, and commitment of African American women in the engineering profession (Alexander & Hermann, 2016; Rice & Alfred, 2014).

Understanding African American women engineers' experiences of employee engagement, organizational support, and organizational commitment might help address the issues with retention, recruitment, discrimination, harassment, and limited opportunities (see Amon, 2017; Fletcher et al., 2017; Mallette, 2017). Examining and understanding African American women engineers' experiences might improve the

recruitment and retention of African American women in STEM programs and the engineering profession. Information from the perspectives of African American women engineers may inform organizational and educational leaders of the unique experiences of this underrepresented population. Furthermore, being aware of their experiences might implement relevant systems to support African American women engineers.

Chapter 1 includes a brief review of the literature on the research topic as background for the study, research problem, purpose of the study, research questions, and the theoretical foundation to support this study. The remaining sections in this chapter cover a description of the nature of the study involving the research design and methodology used. The definitions of key concepts mentioned in the study, the assumptions, scope and delimitations, and limitations of the research study are shared. The chapter concludes with the significance of the study, the proposed contribution of this study to social change, theory, and practice, and a summary of the main ideas.

Background of Study

Recruiting and retaining students in engineering undergraduate programs has been a perpetual issue in the United States (Geisinger & Raman, 2013). Research shows that students who began their undergraduate program majoring in a STEM program switched to a non STEM program or dropped out of school without earning a degree (National Science Foundation, 2017). Fewer students remained in their program when they began their undergraduate education majoring in science and engineering than those majoring in nonscience and engineering programs (National Science Foundation, 2017). The number of women who have earned a degree in engineering has increased over the last 20 years

(National Science Foundation, 2017), while the percentage of men participating in engineering programs remains higher than women participating in engineering programs (Rincon, 2019).

Increasing gender and racial diversity in the engineering field has been an ongoing discussion (Rice & Alfred, 2014; San Miguel & Kim, 2015). According to the National Science Foundation (2017), more men were employed than women across all racial and ethnic groups in the science and engineering professions. In the profession, engineers can work in various sectors depending on their industry and position (National Science Foundation, 2017). More women tended to work in the educational sector (National Science Foundation, 2017). More men tended to work in the business setting (National Science Foundation, 2017).

The lack of women in the engineering profession has influenced the number of role models and educators available for future and current women pursuing a degree and career in engineering (Gibson & Espino, 2016; Johnson et al., 2019). When it came to participation, inclusion, and satisfaction in engineering, having role models and educators with similar cultural and ethnic backgrounds were important factors, specifically for African American women (Gibson & Espino, 2016; Johnson, 2011; Johnson et al., 2019). Without having access to relatable mentors, feelings of exclusion and neglect were found to be exacerbated (Gibson & Espino, 2016; Johnson et al., 2019). The scarcity of women in engineering has also proven to subject women to stereotype threats (Beasley & Fischer, 2012; Jackson et al., 2014). Awareness of the negative stereotypes associated with their identified groups has negatively affected women's performance, a consequence

of the thought that one may reinforce the associated negative stereotypes (Gibson & Espino, 2016). In addition to stereotype threats influencing performance, it was also a predictor of feelings of inclusion and leaving STEM programs (Killpack & Melón, 2016).

Women have experienced gender differences with men while working a career in the engineering profession (Rincon & Yates, 2018). These existing gender differences materialized in motivations, self-efficacy, and social identity threats (Hall et al., 2015; VanAntwerp & Wilson, 2015). Differences were found in the intrinsic motivations as more women engineers expressed a nontechnology focus and were generally not as dedicated to engineering as the male engineers (VanAntwerp & Wilson, 2015). Moreover, women's introjected motivation to pursue engineering was affected by their self-esteem and how they perceived their performance in engineering (VanAntwerp & Wilson, 2015). Women engineers reported higher social identity threats when engaging with their male colleagues, exposing feelings of not belonging and incompetence (Hall et al., 2015). Social identity threat was a common experience of African American women, which occurred when they felt their identified group was judged negatively (Gibson & Espino, 2016). The effects of social identity threat were shown in psychological burnout tied to gender differences resulting from the emotional difficulties experienced (Johnson et al., 2019).

Gender differences in retention rates exist between men and women (Rincon & Yates, 2018). Women in the engineering field have left the profession faster than men (Rincon & Yates, 2018). The organizational culture of the engineering profession was one of the leading reasons women decided to leave the engineering field (Fouad et al.,

2016; Rincon & Yates, 2018). It has been reported that gender stereotypes, gender role expectations, discrimination, and low recognition for women has helped formulate the engineering organizational culture (Buse et al., 2013; Fouad et al., 2016). For the women who have continued in the engineering profession, Buse et al. (2013) reported that identifying with being an engineer and having high self-efficacy were essential components in persisting in the male-dominated field.

For African American women, identifying as an African American and a woman creates a complex experience in the engineering world (Rincon & Yates, 2018). Their challenges are multiplied as they were at the junction of racism and sexism (Fletcher et al., 2017; Rincon & Yates, 2018). Based on research, the experiences of African American women in STEM were substantially influenced by their identity (Johnson, 2016; Sparks, 2017). According to Ross et al. (2021), race, gender, and role identity contributed to the development of African American women's engineering identity. African American women have faced gendered racism in a White male-dominated environment because of their gender and racial identity (Beasley & Fischer, 2012; Gibson & Espino, 2016). Their experiences included being placed in race and gender social identity groups with inflicted expectations of being angry, oblivious to the skills needed to be an engineer, and being labeled too feminine by faculty and peers (Gibson & Espino, 2016). The gendered racism endured by African American women in engineering programs also affected their sense of belonging (Gibson & Espino, 2016; Kachchaf et al., 2015). A sense of belonging was identified as having a significant impact on how women

of color developed their social identity in an engineering environment (Johnson, 2011;

Johnson, 2016; Johnson et al., 2019).

Diversity within organizations is beneficial to the company's profitability and

worker satisfaction (Eagly, 2016). Additionally, it brings various ideas and perspectives

from individuals with varied backgrounds (Woolley et al., 2015). With diversity in

engineering, the field increases the chance of innovative advancement, success, and user

satisfaction (Dezsö & Ross, 2012; Matthews, 2020; Van Dijk et al., 2012). Some existing

organizations and programs that were created to drive more diversity include professional

groups such as Blacks in Technology, National Action Council for Minorities in

Engineering, Society of STEM Women of Color, and mentorship programs such as

Million Women Mentors (STEM Study, n.d.).

Data show that African American women have pursued engineering degrees

nearly three times less often than their male counterparts (Fletcher et al., 2021; Slaughter

et al., 2015). The obstacles of gendered racism faced by women of color tends to be

endured quietly and their experiences did not receive the acknowledgment deserved in

research and analysis (Slaughter et al., 2015). It is believed that research focused on the

experiences of men of color were assumed to reflect women of color (Slaughter et al.,

2015). Likewise, studies of women of color were assumed to reflect the experiences of

their majority counterparts, who were White women (Mohr & Purdie-Vaughns, 2015;

Rincon & Yates, 2018). These assumptions have illustrated that women of color were

invisible (National Research Council [NRC], 2011). Race and gender have been

identified in research as reasons why African American women left the engineering

industry (Brown et al., 2016; Gibson & Espino, 2016; Ross & Godwin, 2016). Despite the published literature, there remains a gap in research that explores other unique areas African American women have encountered in the engineering industry. This study filled this gap by providing insight into the experiences of employee engagement, organizational support, and organizational commitment of African American women in the engineering field.

Problem Statement

A lack of diversity exists across various occupational fields (Rice & Alfred, 2014; San Miguel & Kim, 2015). The National Science Foundation (2017) reported that 16,000 African American women held engineering occupations instead of the leading groups of 1,041,000 White males and 171,000 White women. This data shows that African American women are underrepresented in the engineering field (San Miguel & Kim, 2015). For the African American women who proceeded into professional engineering careers, research was limited on their career experiences (Gibson & Espino, 2016; Rice & Alfred, 2014).

In a study on understanding African American women's experiences in STEM academia, findings showed reports of feeling a scarcity of support from faculty and students, a lack of culturally competent support systems, exclusion, and the importance of students' science identity were all factors linked to their STEM commitment (Alexander & Hermann, 2016; Gibson & Espino, 2016; Johnson, 2011; Johnson, 2016; Johnson et al., 2019; Kachchaf et al., 2015). Additionally, having professional STEM role models

has been tied to a positive influence on student interests and engagement in STEM

programs (Shin et al., 2016).

Research on African American women engineers has explored experiences with

organizational social support structures in the workplace (Amon, 2017; Rice, 2011).

Women engineers collectively have been studied, centering on their varied experiences

with organizational supports that have influenced organizational engagement and

commitment (Buse & Bilimoria, 2014; Fouad et al., 2016). Among the research studies

focused on women engineers, women reported a lack of recognition because of gender

issues and were not acknowledged as authority figures (Amon, 2017; Gill et al., 2008).

Women reported being subjected to a gender-stereotypical organizational culture and

career hurdles involving a lack of rewards for professional development, lack of

teamwork, and lack of social impact, which reduced their effectiveness (Amon, 2017;

Gill et al., 2008).

Buse and Bilimoria (2014), Fouad et al. (2016), and Rincon and Yates (2018)

dedicated their research to identifying factors that kept or deterred women in the field of

engineering. Women who continued in the engineering field described it as part of their

identity, reported high self-efficacy, and saw challenges as motivators (Buse & Bilimoria,

2014; Buse et al., 2013). Buse et al. (2013) and Fouad et al. (2016) found differences

associated with engagement, organizational support, and commitment levels between

women who stayed and those who left the engineering profession.

Despite this research on women engineers, the existing research has grouped all

women, generalizing the results across all women (see Gibson & Espino, 2016; Rice &

Alfred, 2014). In addition, limited research has been conducted on African American women engineers focused on exploring engagement, support, and commitment simultaneously (see Alexander & Hermann, 2016; Rice & Alfred, 2014). This study was designed to understand lived experiences of employee engagement, organizational support, and organizational commitment of African American women in the engineering profession.

Purpose of Study

The purpose of this descriptive qualitative phenomenological study was to understand how African American women engineers experienced employee engagement, organizational support, and organizational commitment in the workplace. This study aimed to explore the lived experiences of African American women working in the engineering profession. Exploring this population aligns with diversifying the engineering profession of African American women and other underrepresented populations.

Research Questions

Research Question 1 (RQ1): What is the experience of engagement by African American women in the engineering profession?

Research Question 2 (RQ2): What is the experience of organizational support for African American women in the engineering profession?

Research Question 3 (RQ3): What is the experience of commitment among African American women engineers?

Theoretical Foundation

The study framework included relational cultural theory (RCT) and feminist theory (see Allen, 2018; Miller, 1976). RCT and feminist theory highlight the importance of relationships in the organizational experiences of engagement, support, and commitment of African American women engineers. The theories also emphasize how women of color believe gynocentric feminism does not incorporate their collective experiences (Allen, 2018; Miller, 1976). The use of these theories assisted in recognizing themes and provided enlightenment on the distinctive experiences of African American woman engineers.

Relational Cultural Theory

The RCT was developed using Miller's (1976) previous works on human development as a foundation (Jordan, 2018; Jordan & Hartling, 2008). The goal of this collaborative theory-building group was to gain a better understanding of the psychological development of women as the theories during that time were mostly written by men, which led to misrepresentations of women (Jordan, 2018; Jordan & Hartling, 2008; Jordan et al., 1991).

Models of psychological growth in the late 1970s stressed that an individual's healthy development involved independence and autonomy (Jordan, 2018). In contrast, recent scientific studies support the need for people to maintain relationships and show how exclusion and isolation can cause distress (Jordan, 2010; Jordan, 2018). The RCT was used to create growth-fostering relationships by reducing barriers and increasing mutual empathy (Comstock et al., 2008; Jordan, 2010). RCT was developed to better

understand women's psychological experiences in relationships and ultimately expanded to understand the overall human experience (Miller, 1976). The idea that individuals grow through connections and disconnections with others served as the main concept of the RCT, which is discussed more in-depth in Chapter 2 (see Comstock et al., 2008). Concepts describing growth-fostering relationships are also addressed in Chapter 2. RCT involves challenges related to social injustices due to race and gender connected to work and relational experiences (Comstock et al., 2008). This theoretical framework was suitable for helping to understand the importance of African American women's organizational relationships through their experiences of engagement, support, and commitment.

Feminist Theory

The theory of feminism states that women experience illegitimate oppression compared to men (Allen, 2018). Women and oppression can be interpreted differently, manifesting in different experiences (Allen, 2018). Feminism should not be considered a single philosophical doctrine or imply an agreed political program (Allen, 2018; Disch & Hawkesworth, 2018). Most women's movements were formed to liberate women from men's dominance (Ferguson, 2017). The social living views of feminists are contingent on the widely accepted opinions that women are socially disadvantaged and experience gender inequality in the way women and men interact in workplaces and marriages (Ferguson, 2017). Although people who advocate for feminism have argued that men and women are equal in political and social matters, it was not witnessed in the real world (Ferguson, 2017).

Disch and Hawkesworth (2018) stated that while women's associations formed more intense and stronger groups, women of color started condemning the gynocentric feminists. They claimed White women who held top positions in women's movements never addressed the issues of class and race (Disch & Hawkesworth, 2018). As a result, a new group of feminists who were women of color emerged. The gynocentric feminists were criticized for not addressing race in their campaigns (Disch & Hawkesworth, 2018). Black women claimed that discrimination on a gender basis could not be isolated from the class and racial aspects (Disch & Hawkesworth, 2018). Disch and Hawkesworth (2018) explained that women of color believed gynocentric feminism did not incorporate their experience. They thought that gender, class, and race should have been addressed collectively (Disch & Hawkesworth, 2018). This theory provided the framework to examine the lived experiences of African American women engineers' employee engagement, organizational support, and organizational commitment.

Nature of Study

Phenomenological methods are used to explore the experiences of individuals (Lester, 1999). A phenomenology approach to this qualitative research focused on the commonality of a lived experience within a particular group (Suter, 2012). This study used a descriptive qualitative phenomenological investigation to describe the lived experiences of African American women engineers in terms of employee engagement, organizational support, and organizational commitment. Descriptive phenomenology emerged from the works of Edmund Husserl (Christensen et al., 2017). Husserl (1931) was viewed as the founder and father of phenomenology who sought to describe the

subject's perspectives by exploring consciousness and experiences (Beyer, 2018; Carlotto & Dinis, 2019; Giorgi, 2009). Husserl defined phenomenology as the study of consciousness (Smith, 2018). He proposed analyzing various experiences as we experience them in order to examine them from the individual's perspective (Smith, 2018). In addition to studying consciousness, he proclaimed that phenomenology involved studying meaning (Smith, 2018). The meaning of an object was defined by how an individual understands the object in their experiences (Smith, 2018). He proposed that through the epoché technique and bracketing, one must turn to their own conscious experience to understand the natural world around them (Smith, 2018). The practices of epoché and bracketing help a researcher avoid biases' potential effects on the research results (Bednall, 2006).

Another pioneer in the phenomenological movement was Martin Heidegger (1927), who began as a student and then assistant of Husserl (Horrigan-Kelly et al., 2016). He developed interpretive phenomenological research techniques to help understand and describe lived experiences (Horrigan-Kelly et al., 2016). He proposed that humans do not need to study experiences and activities by bracketing the world because we are in the world (Horrigan-Kelly et al., 2016). Instead, he suggested that we made sense of our environmental interactions with things in the world (Smith, 2018). Thus, he originated the concept of "Dasein," in which we question and investigate our being in the activity and being in the world (Horrigan-Kelly et al., 2016; Wheeler, 2020). This phenomenon approach related to my research study goal of obtaining relevant information about participants' lived experiences by using open-ended questions.

Based on Husserl and Heidegger, phenomenology is a form of qualitative research that allows for recounting experiences and their meanings in a manner described as stable and consisting of substance (Giorgi, 2009). The qualitative research methodology allows for capturing and understanding individuals and group experiences while using data saturation to identify emerging themes and common descriptions (Buse et al., 2013; Sargeant, 2012). Phenomenological qualitative research approaches were used in previous research to shed light on the common themes experienced by all women pursuing STEM education and working in a male-dominated engineering profession (Alexander & Hermann, 2016; Blosser, 2017; Buse et al., 2013; Kachchaf et al., 2015; Rice & Alfred, 2014). This research approach was used in this study to reveal information about the experiences of engagement, organizational support, and organizational commitment specific to African American women engineers.

Purposive sampling methods were used to recruit participants who met the selection criteria. Criterion sampling was the primary method used in the recruitment process. The contingency plan used the snowball sampling method when obstacles occurred accessing the studied population. Criterion sampling in this study included sending a recruitment letter to prospective participants in the United States using the LinkedIn social media website, Walden's participant pool, and African American professional engineering associations. The recruitment letter was sent to individuals and groups using direct messaging to describe the study purpose, procedures, criteria, voluntary participation, and time obligation. Individuals interested in participating in the study were advised to email me.

The snowball sampling method was used, and willing individuals were asked to pass along the recruitment letter to others who they believed met the research study criteria. The interested individuals were informed that they had no obligation to share the information. This process continued until saturation point was met (see Parker et al., 2019). The criteria included African American women, currently working in the engineering profession full-time for a minimum of 5 years, residing in the United States, and completed at least a bachelor's degree in an engineering major. This study used an interview protocol (Appendix) with open-ended questions to collect the data related to their experiences of engagement, organizational support, and organizational commitment. Participant interviews were conducted over the telephone and through Zoom video conferencing. Conducting semistructured individual interviews allowed for the exploration of the participants' perspectives related to the phenomenon. Data analysis was conducted using an inductive approach. An inductive thematic data analysis allowed for the emergence of themes based on the descriptive data (see Fereday & Muir-Cochrane, 2006; Suter, 2012). NVivo was used to analyze the data, categorize themes, and form a conclusion based on the results.

<center>**Definitions**</center>

Definitions are provided to clarify the concepts within the research study. The defined concepts were essential to the research and used consistently in the discussion.

African American: Individuals who refer to themselves as African American or Black and have origins in a Black racial group in Africa (U.S. Census Bureau, 2020).

Commitment: An employee's psychological attachment to an organization (The Oxford Review Briefings, 2021).

Disengagement: The cognitive, emotional, and physical withdrawal from one's work performance (Kahn, 1990).

Engagement: The ability of individuals to show themselves cognitively, emotionally, and physically during their work performance (Kahn, 1990).

Organizational support: Employees' perception regarding the degree to which the organization appreciates their contributions and is concerned about their well-being (Eisenberger & Stinglhamber, 2011).

STEM: Refers to science, technology, engineering, and math educational programs whose mission is to prepare students with the skills necessary to have careers in those fields (U. S. Department of Education, 2020).

*Women engineer: R*efers to the women who completed the necessary engineering education and now perform in an engineering role. The engineer role can involve mathematics, science, or technology. The type of engineering can fall under any of the following six divisions of engineering: Electrical, Civil, Geotechnical, Management, Mechanical, and Chemical (Types of Engineering Degrees, 2019).

Assumptions

There were few assumptions in this study. First, I assumed that the participants voluntarily and honestly described their lived experiences of employee engagement, organizational support, and organizational commitment as African American women engineers. Another assumption was that the lived experiences of African American

women in the engineering field were different from the experiences of engineers from other racial backgrounds. Next, I assumed that the results would yield outcomes that answered the research questions and revealed a unique lived experience for African American women engineers. Also, interviews were conducted to gain insight into these lived experiences, so it was assumed that participants understood the interview questions and could answer the questions to describe their unique lived experiences. Lastly, it was assumed that researcher bias was addressed throughout the study exploration, data collection, and analysis.

Scope and Delimitations

This study focused on participants who identified as African American women, currently working in the engineering profession full-time for a minimum of 5 years, resided in the United States, and completed at least a bachelor's degree in an engineering major. By focusing on this population, I wanted to understand the lived experiences of employee engagement, organizational support, and organizational commitment of African American women in the engineering field. The minimum time working in the engineering profession allowed for the participants to have acquired enough meaningful experiences. The omission of individuals from other racial backgrounds and gender delimited this study. The focus of this study included specific participants and was narrowed down to one type of research design. Other theoretical and conceptual frameworks related to this research study were not investigated, such as critical race theory.

Limitations

Due to the limited number of African American women in the engineering field, a

limitation was availability and access to participants. In addition, a limitation of the

research design was that participants might not have accurately recalled specific

experiences related to engagement, support, and commitment. Furthermore, a noted

limitation was the inability to verify what was being reported by participants. Lastly,

researcher bias was a limitation because I am an African American woman (see

Moustakas, 1994). During the research process, I used techniques to acknowledge any

biases. Reflection was done through journaling and bracketing to reduce biases (Tufford

& Newman, 2010). In addition, a personal epoché was incorporated in chapter 2 to

increase validity by showing the life experiences of women of color in the engineering

profession and setting aside any preconceived ideas related to the phenomena (see

Moustakas, 1994; Tufford & Newman, 2010).

Significance of Study

For STEM careers, specifically engineering, to remain competitive in the United

States the focus should include exploring the unique skills and experiences that women of

color bring to STEM fields (Matthews, 2020; National Science Foundation, 2000). This

study focused on an underrepresented and rarely researched group in the engineering

field, African American women (see San Miguel & Kim, 2015). This phenomenological

research study was an inquiry into African American women engineers' experiences of

employee engagement, organizational support, and organizational commitment. In

addition, research on this topic might offer guidance towards increasing the retention of

African American women engineers. This positively influences the engineering profession by improving workforce diversity (McKoy et al., 2020).

By using semistructured interview questions, this study included promoting the voice of African American women engineers on their experiences specific to engagement, commitment, and support. The data analysis included information on the challenges experienced which could lead to identifying and implementing processes and supports to improve African American women engineers' well-being in the profession and in educational programs. This could create an organizational culture more appealing to African American women and lead to closing the gender and disproportional racial gap in the engineering profession, thus creating positive social change. Furthermore, information regarding their experiences might add to research and could support constructing or resuming systems that promote and develop the engineering field, particularly with the engagement, support, and inclusiveness of underrepresented minorities.

Data from this study could help to influence positive social contributions to the discipline of I/O psychology. I/O psychology aims to evaluate the different dynamics presented in the workplace (Claus et al., 2020). More specifically, aspects involving group, organizational, and individual points of view are explored to classify difficulties and create solutions to improve employee well-being and organizational performance (see Bakker & Demerouti, 2018; Wood & Ogbonnaya, 2018).

Summary and Transition

Chapter 1 explained in detail the topic of this research study and provided a summary of the qualitative study to explore the lived experiences of African American women engineers' engagement, organizational support, and commitment. I presented the background and foundation of this topic and explained why the research was relevant and needed. Then I expounded on the problem statement, purpose, research questions, and theoretical framework of the study. I also provided a description of the nature of the study, definitions, assumptions, scope and delimitations, limitations, information on the study background, and a statement of the problem. This descriptive qualitative phenomenological study aimed to gather data to understand how African American women engineers experience employee engagement, organizational support, and organizational commitment in the workplace. RCT and feminist theory were used as the theoretical lens in examining the lived experiences of employee engagement, organizational support, and organizational commitment of African American women engineers. The study's significance was described by stating the research study's impact on developing knowledge in I/O psychology, influencing the engineering practice, and providing a positive social change in STEM fields and for African American women engineers.

In chapter 2, a review of the literature establishes the relevance of the research problem. Chapter 2 also includes a discussion of the search process of the databases and search engines used to find literature related to the phenomena. In addition, I include a more in-depth discussion of the theoretical foundations.

Chapter 2: Literature Review

The purpose of this research study was to explore the lived experiences of engagement, support, and commitment of African American women engineers. Previous research on women engineers exists (see Amon, 2017; Block et al., 2011; Buse et al., 2013; Etzion, 1988; Fouad et al., 2016; Gill et al., 2008; Jorgenson, 2002; Maskell-Pretz & Hopkins, 1997; Robinson & McIlwee, 1989; San Miguel & Kim, 2015). However, the results have been generalized across women from all backgrounds and limited research focused on engineering (see Gibson & Espino, 2016; Rice, 2011). Therefore, this research study collected data on the lived experiences of African American women to better understand their unique experiences of employee engagement, organizational support, and organizational commitment in the engineering profession.

Researchers have suggested that several systemic factors work against African American women employed in engineering (Amon, 2017; Block et al., 2011). Those factors include lack of visible role models in engineering, stereotype threat, biculturalism, tokenism, feelings of isolation, and pay inequities (Amon, 2017; Block et al., 2011). African American women in engineering must put in additional effort to overcome these challenges at the intersection of racial and gender inequality (Amon, 2017; Block et al., 2011; Buse et al., 2013). Limited research has been conducted on African American women engineers exploring employee engagement, organizational support, and organizational commitment simultaneously. Research on the outlook of organizational support by women engineers has suggested that support influences engagement and commitment (Buse & Bilimoria, 2014; Fouad et al., 2016). Research on African

American women showed that having STEM role models influenced interest and engagement in STEM programs (Shin et al., 2016). Findings from research on African American women in STEM and academia showed inadequate support systems, isolation, a lack of culturally competent support systems impacted the participants (Alexander & Hermann, 2016; Gibson & Espino, 2016; Johnson, 2011; Johnson, 2016; Johnson et al., 2019; Kachchaf et al., 2015). As such, my study targeted African American women in the engineering professions by collecting data on their lived experiences of employee engagement, organizational support, and organizational commitment concurrently.

This chapter reviews the present literature surrounding the unique experiences of African American women engineers with employee engagement, organizational support, and organizational commitment. As a foundation for the study, the research questions included the following:

RQ1: What is the experience of engagement by African American women in the engineering profession?

RQ2: What is the experience of organizational support for African American women in the engineering profession?

RQ3: What is the experience of commitment among African American women engineers?

The literature review includes analyzing relevant literature acknowledging the underrepresentation of African American women in engineering. The review also develops insight into the experiences of engagement, support, and commitment of women and African Americans in the engineering field and STEM programs. STEM programs

and their lack of diversity are widely discussed topics in research, academics, and the professional field (Beasley & Fischer, 2012; Blosser, 2017; Chang et al., 2014; Rulifson & Bielefeldt, 2017; Schaefers et al., 1997). The first area of the literature review examines current literature on women in STEM. This area provides an understanding of the challenges women face in STEM programs. The second area of the literature review examines current research focused on women's engineering experiences and engagement of all backgrounds. The final section of the literature review includes exploring what is known about African American women and their unique experiences and engagement in the engineering field. These three areas include a comprehensive analysis of African American women's experiences and engagement in STEM-related professions relevant to today's society.

Literature Search Strategy

A thorough search strategy was conducted for current peer-reviewed articles beginning in 2018. This search took place using the Walden University online library databases. These online databases included: Academic Search Complete, ERIC, PsycARTICLES, PsycINFO, Business Source Complete, and Education Source. Due to the scarcity of peer-reviewed articles studying African American women engineers in the workplace, a wider search strategy was implemented by increasing the time from 2013-2019 to 2008-2019. The search was narrowed based on publication type (academic journals), language (English), and geography (United States). Documents such as newspaper articles, book reviews, and magazines were excluded. In addition, research outside of the United States or not in English was excluded. When the Walden University

library databases were searched, increasing the time doubled the search results specific to African American women engineers and STEM.

Literature searches included using academic books and Google Scholar to locate electronic articles. Thousands of sources appeared to focus on African American women engineers and STEM when searching on Google Scholar. However, after the sources were reviewed, most did not meet the relevancy of the study or did not include a full article.

The following search terms were used on the Walden University online library and Google Scholar databases to locate articles related to the study: *experiences, African American, women, engineers, work experiences, Black women, engineering, STEM, women of color, engagement, support, commitment, lived experiences, racial and ethnic differences, and female.* These terms were combined in various ways using Boolean connectors for extensive search outcomes.

Theoretical Foundation

Relational Cultural Theory

RCT is a relational development model that involved identifying and decreasing obstacles to mutuality to create connections and growth-fostering relationships (Jordan, 2010). The theory was developed by Jordan, Kaplan, Miller, Stiver, and Surry (Jordan, 2010; Jordan et al., 1991). The foundation of the theory was based on the previous works of Miller (1976), which focused on women's development and growth (Jordan, 2010). The origins of RCT stemmed from the need to accurately represent and understand the psychology of women (Jordan, 2010). RCT was derived from organizational dynamics,

diversity, social justice, and feminist movements in psychology (Jordan, 2010).

Throughout the development of RCT, the theory was reframed to emphasize relationships

and connections (Comstock et al., 2008; Jordan, 2010). According to Jordan et al. (1991),

the main ideas of RCT in growth fostering relationships are:

1. People grow through relationships during their life span.

2. Movement toward mutuality rather than separation characterizes mature
   functioning.

3. The ability to participate in increasingly complex and diversified relational
   networks characterizes psychological growth.

4. Mutual empathy and empowerment are at the core of growth-fostering
   relationships.

5. Authenticity is necessary for real engagement in growth-fostering
   relationships.

6. When people contribute to fostering relationships, they grow because they
   participate in such relationships.

7. The goal of development is the realization of increased relational competence
   over the life span (Comstock et al., 2008, p. 279).

Miller (1976) suggested that being connected and growth fostering relationships

produced the following characteristics: an increased sense of personal zest, the ability to

perform in various facets of life, the ability to view oneself and the other individual more

accurately, an increased sense of worth, and an increased drive to connect with other

people beyond primary relationships (Comstock et al., 2008). Disconnected relationships

depicted the exact opposite characteristics. Individuals who experienced disconnection experienced low energy, fear, decreased performance and a sense of worth, shame, and confusion in the way they view themselves and others (Comstock et al., 2008; Jordan, 2000). These characteristics of disconnection discouraged individuals from wanting to form relationships (Comstock et al., 2008). Condemned isolation developed if the opportunity to form relationships became stagnant (Comstock et al., 2008; Jordan, 2000). These feelings of condemned isolation can then form into psychological and emotional challenges (Comstock et al., 2008). This framework helped to understand the significance of African American women's organizational relationships through their experiences of engagement, support, and commitment. The connection and disconnection constructs provide insight into how African American women engineers experience organizational engagement, support, and commitment.

Feminist Theory

Feminist theory is deep-rooted in the movement for justice, freedom, and equality between women and men (Ferguson, 2017). It sought to explore the dynamics of power differences between women and men and to explain how the inequity can be revolutionized (Stacey, 1993). The history of feminist theory was classified into three waves. The first wave focused on women's rights in relation to political inequalities and the fight for their own legal identities (Iannello, 2010). Beginning in the mid-1900s, the second wave was concerned with women experiencing no identity and self-worth in the work world (Iannello, 2010). During this time women's family role primarily influenced their meaning of self-identity (Iannello, 2010). Feminism sought for and achieved some

women's liberation and social equality within the workplace, specifically in male dominated professions and education access (Iannello, 2010). The third wave beginning in the 1900s to present day faced criticism of the feminist movement due to it being dictated by upper-class white women and its lack of diversity (Iannello, 2010). It was acknowledged during this time how various identities such as gender, race, and sexuality were all connected in playing a part in the experiences of privilege and oppression (Iannello, 2010). The third wave gave emphasis to rejecting the concept of collective identity and moved towards diversity and attention on postcolonialism, poststructuralism, postmodernism, and globalization (Iannello, 2010).

In the 20th century, postmodernism attempted to reassess the ideas of the modern period (New Zealand Council for Educational Research [NZCER], 2017). Postmodernism was the ending of a traditional structure and unitary modern thought and control (NZCER, 2017). The idea of it being one course of action to meet universal goals related to knowledge, equality, and justice shifted to plurality in postmodern times (Agger, 1991; NZCER, 2017). The notion of postmodernism was that knowledge is subjective, and it is examined through historical, cultural, and personal views (Agger, 1991; NZCER, 2017; Schneider, 2004). In postmodernism, various pathways were highlighted and there was a focus on diversity and differences (NZCER, 2017). Individuals were seen as being multifaceted and having connections to others (Agger, 1991; NZCER, 2017). Individuals displayed their many identities as they operated in different situations, ideas, and cultures (NZCER, 2017).

Using a feminist lens required recognizing the history of women from a societal context and achieving inclusiveness and equality between men and women despite race and sexual orientation (Valenziano, 2008). When applying the feminist theory to the workplace, issues such as oppression, discrimination, equity, and social power relationship were explored (Brisolara, 2003). Why women were underrepresented in STEM programs and careers was studied using a feminist, educational, and scientific approach (Sarseke, 2018). The feminist approach centered on socio-cultural conditions and emphasized that gender was socially created and produced (Sarseke, 2018). The study concluded that the underrepresentation was associated with genetics and socio-cultural factors (Sarseke, 2018). Masculine views, a male-dominated environment, and traditional gender roles were the key barriers for women when it came to succeeding in the STEM fields (Sarseke, 2018). Smith and Gayles (2018) used the feminist theory to examine gendered experiences in engineering education and in the workplace and found that women experienced implicit bias, sexism, and sexual harassment. The results suggested a need for future research and the development of techniques to create a more inclusive and supportive environment for women in engineering (Smith & Gayles, 2018). In a research study conducted by Khilji and Pumroy (2019), a feminist perspective was used to give a voice to women engineers and to understand their experiences in career development and the challenges endured. Results revealed that the women engineers tackled structural and cultural barriers, negative stereotypes, and contradicting demands (Khilji & Pumroy, 2019). Organizational and societal norms dictated their behaviors and experiences within the workplace (Khilji & Pumroy, 2019).

Applying the feminist theory to this study gave a platform for African American women engineers who faced a double bind of race and gender to voice their experiences. This theory was selected due to its focus on inequality, equity, and oppression of women (Ferguson, 2017; Iannello, 2010). In addition, its emphasis on the importance of how the experiences of women is influenced by connections to multiple identities such as race and gender (Ferguson, 2017; Iannello, 2010). The feminist theory provided a framework to give a voice to African American women engineers' while considering how their racial background and sex shaped their experiences of employee engagement, organizational support, and organizational commitment.

Literature Review Related to Key Variables

Women in STEM

STEM has remained predominantly male in the areas of occupational roles and educational programs (U. S. Census Bureau, 2021). Researchers investigated women's experiences in STEM programs and identified reasons for the possible continued gender disparity consistently seen within STEM programs (Amon, 2017; Kachchaf et al., 2015; Kelley & Bryan, 2018; Rulifson & Bielefeldt, 2017). The findings of these studies revealed that factors such as unsupportive environments, stereotype threat, course difficulty, college experiences, and background characteristics contributed to the perseverance of underrepresented women and minorities in STEM programs and fields (Beasley & Fischer, 2012; Chang et al., 2014; Rulifson & Bielefeldt, 2017). Prior studies included factors on persistence in engineering majors (Green & Sanderson, 2018; Schaefers et al., 1997; Smith & Gayles, 2018). The lack of data suggested exploring why

students, particularly women, left engineering STEM programs (Rulifson & Bielefeldt,

2017). The results showed that variables such as self-efficacy, support barriers, and

interest impacted women's persistence in engineering (Green & Sanderson, 2018;

Schaefers et al., 1997; Smith & Gayles, 2018).

Previous studies examined the college experiences of women in STEM programs

where results revealed obstacles to achievements, curricular difficulty, lack of rewards,

stereotype threat, and lack of social inclusion and support (Amon, 2017; Kachchaf et al.,

2015; Kelley & Bryan, 2018; Rulifson & Bielefeldt, 2017). White, Asian, and Hispanic

women declared a STEM major at a lower percentage than their male counterparts when

entering college (Beasley & Fischer, 2012). In comparison, African American women

declared STEM majors at rates similar to African American men, which is close to the

rate of White men (Beasley & Fischer, 2012). In addition, African American and Latino

undergraduates were less likely than White and Asian American undergraduates to follow

through in STEM majors (Chang et al., 2014). More specifically, Beasley and Fischer

(2012) concluded that college students who identified as African American men and

women, Hispanic women, and White women were more likely to leave STEM majors

within the first couple of years compared to Hispanic, White, and Asian men. Race

moderated by unique college experiences and pre-college characteristics, such as

academic preparation, was a negative effect on African American and Latino students'

perseverance in a STEM major (Chang et al., 2014). Exposure to these moderating

factors made a difference in STEM degree achievement of underrepresented people of

color undergraduates (Chang et al., 2014).

Blosser (2017) conducted a study focused on addressing women's under-representation in STEM programs at universities, particularly in engineering programs. According to results, the faculty created gendered descriptions of majors which influenced women's selection of programs. Gendered descriptions of college majors were interpreted as fitting for men or women (Blosser, 2017). Except for chemical engineering, the masculine language used to describe engineering fields dissuaded women from participation (Blosser, 2017). This gendered culture exacerbated the issue of the underrepresentation of women in engineering programs (Blosser, 2017).

Another factor examined when studying the experience of women in STEM programs was stereotype threat (Beasley & Fischer, 2012). Stereotype threat can arise when one is judged by negative stereotypes associated with their identity group (Steele et al., 2002). Stereotype threat has been studied to investigate if it was identified as one factor leading to the underperformance of people of color and women, specifically in STEM. Beasley and Fischer (2012) found that although the experience of stereotype threat is stronger among people of color, it is faced by Hispanic, African American and White women, and African American and White men. The results showed that stereotype threat increased the probability of these minorities leaving the STEM program. Furthermore, strong evidence suggested that stereotype threat occurs during testing and continuous activities (Beasley & Fischer, 2012). Stereotype threats negatively affected the test-taking skills of women and minorities and their life experiences (Beasley & Fischer, 2012).

Women in Engineering

There is limited research on women's underrepresentation in engineering and the gender differences between men and women engineers (Fouad et al., 2020; Ghiasi et al., 2015). Concerning the gender differences in well-being between men and women engineers, women engineers reported gender issues attributed to the lack of recognition in the workplace (Gill et al., 2008). Etzion (1988) found that gender differences did exist in the correlation of private life and work-life on elements of well-being. The elements of well-being included burnout, satisfaction, and perceived success. Women tended to experience a conflict when combining work and personal life success, whereas for men, this did not occur (Etzion, 1988). However, no significant differences were seen between the men and women engineers concerning their outlook on the value they allotted to accomplishments in work or nonwork. Etzion (1988) found no differences between the men and women engineers' disposition for engagement in work or nonwork. Robinson and McIlwee (1989) found that gender differences between men and women engineers were related to job status. Few women engineers occupied high-level positions in design or management despite the similarities in job attitudes, educational background, and job experience (Robinson & McIlwee, 1989).

The engineering work environment and the organizational culture was characterized as encompassing stereotypical beliefs among male engineers (Gill et al., 2008; Williams et al., 2016). In engineering environments that were male-dominated or had a culture where gender stereotypes existed, reports showed that women often took on a distinctive positioning to appear qualified (Gill et al., 2008; Williams et al., 2016). To

seem competent the women engineers displayed several self-identifications. These identifications fell into categories, which included the ability to deal with a male-dominated, nonfeminist culture and reluctance in being recognized as part of a singular group (Jorgenson, 2002).

Amon (2017) found that women engineers were not acknowledged as authority figures in the workplace, which interfered with their career achievement. The women participants indicated they were aware of how they were regarded and spent a vast amount of time and energy to cope with the obstructions (Amon, 2017). Women engineers often experienced role transitions to deal with work demands and manage gender role expectations (Amon, 2017). They sought out social support to aid in coping with barriers experienced in the workplace (Amon, 2017). Also, they reported that maintaining a work-life balance offered a sense of control over their lives and meaning in their work (Amon, 2017).

Although efforts were put forth to recruit women in engineering programs, many women who graduated and entered the engineering profession eventually left the field (Fouad et al., 2016). It has been shown that women who continued versus those who left the field of engineering differed in their experience of supports in the workplace and levels of occupational commitment (Fouad et al., 2016). A higher percentage of women who left the field versus those who stayed reported that they wanted to pursue another career but were essentially pressured into engineering by people in their lives, such as their school counselors and parents (Buse et al., 2013).

Women who left the engineering field had done so for various reasons, including due to their work experiences (Buse et al., 2013). Women who decided to leave the engineering profession reported consistent themes of not identifying with engineering and low confidence (Buse et al., 2013; Fouad et al., 2016). Organizational culture and organizational factors such as gender bias, lack of recognition, scarce work supports, role stressors, micro- aggressions, and absence of advancement opportunities in the engineering field was named factors in why women decided to leave engineering (Buse et al., 2013; Fouad et al., 2016). Women who left reported harassment and discrimination and the majority of women did not express the need to adapt to the culture. Meaning, they did not attempt to fit into the culture by doing things such as wearing more modest hairstyles and clothing, and altering their voice tone (Buse et al., 2013). Women who continued in the engineering profession communicated that they identified with being an engineer, reported high self-efficacy, and viewed challenges as motivators (Buse et al., 2013). Another factor that contributed to women continuing in engineering was their ability to adapt in a male-dominated environment and enduring an organizational culture that displayed discrimination (Buse et al., 2013).

Although there were women who choose to stay in engineering for reasons stated previously, professional and psychological barriers existed that affected the advancement and well-being of women engineers (Maskell-Pretz & Hopkins, 1997; National Academies of Sciences, Engineering, and Medicine, 2018; San Miguel & Kim, 2015). According to the National Academies of Sciences, Engineering, and Medicine (2018), the sexual harassment of women in the engineering field damaged their professional

advancement and mental health. Other barriers to advancement opportunities included style, experience, mentoring opportunities, and performance levels (Maskell-Pretz & Hopkins, 1997; National Academies of Sciences, Engineering, and Medicine, 2018; San Miguel & Kim, 2015). Individuals were expected to conform to the style and expectation that men were aggressive and competitive (Maskell-Pretz & Hopkins, 1997). Even with the same experience, women engineers did not receive the same treatment. For example, they were not always offered hands-on opportunities (Williams et al., 2016). In addition, the shortage of mentoring availability for women contributed to women engineers' obstacles of advancement opportunities (Fouad et al., 2017; Maskell-Pretz & Hopkins, 1997; San Miguel & Kim, 2015). Performance levels was also a factor that affected women engineers' opportunities for advancement, which included performance being harmed due to awareness of being judged based on negative stereotypes (Block et al., 2011; Maskell-Pretz & Hopkins, 1997; McKinnon & O'Connell, 2020). Some of the psychological barriers associated with advancement in the engineering profession included family and work issues, sexual discrimination, and harassment issues (Buse et al., 2013; Maskell-Pretz & Hopkins, 1997; White & Massiha, 2016). Sexual discrimination and harassment had been found to exist in the recruitment and selection process, performance appraisal, promotion, and pay (Funk & Parker, 2018; Maskell-Pretz & Hopkins, 1997; National Academies of Sciences, Engineering, and Medicine, 2018).

African American Women in Engineering

Limited research has been conducted highlighting patterns and examining themes to understand the specific experiences of African American women who pursue

engineering programs and go into a career as an engineer (Alexander & Hermann, 2016; Kachchaf et al., 2015; Tate & Linn, 2005). Most research on African American women in engineering focused on their experiences in STEM programs (Brown et al., 2016; Gibson & Espino, 2016; Rice, 2011; Rice & Alfred, 2014). Programs established in schools were created to help educators prioritize science, technology, engineering, and mathematics to guide a more diverse student body into STEM fields (Varma, 2018). Program implementation responded to various officials' and leaders' heightened apprehension regarding the United States' adeptness to successfully compete in the science and engineering fields (Varma, 2018). Despite attempts, Varma (2018) explained that the representation of people of color remained an issue in STEM fields. Over the last ten years, the science and engineering workforce has seen a slight increase in the representation of people of color and women (Varma, 2018). However, when the statistical data was compared to the U.S. population, the science and engineering fields had yet to see a significant change in people of color and women (Varma, 2018). According to the National Science Foundation (2017), when it came to people of color in science and engineering occupations the representation was statistically lower than women's participation. African American women in 2014 made up just 0.99% of engineering bachelor's degree earners (National Science Foundation, 2017).

How African American women in STEM understood their race and gender identity in a culture that caused hardship and limitations on people of color influenced how they perceived their experiences within STEM programs and careers (Gibson & Espino, 2016). Research has been conducted to address how identity influenced the

experiences of women of color in STEM (Gibson & Espino, 2016). An explanation for the underrepresentation of African American women in STEM was the apprehension surrounding social identity threat which prevented them from entering STEM programs (Johnson et al., 2019). African American women in STEM tended to worry they would be belittled and trivialized due to being a part of a group of negatively stereotyped people (Johnson et al., 2019). For the African American women who entered STEM programs, their experiences within engineering programs were influenced by the multiple identities (McKoy et al., 2020).

African American women in undergraduate engineering programs have dealt with identities and expectations inflicted onto them regularly (Gibson & Espino, 2016). They reported feelings of not being highly regarded and not offered the same allowances as male students due to being an African American woman (Gibson & Espino, 2016). As a result of these feelings and being susceptible to negative judgment, they intentionally stood out by being an active role model on campus and performed well academically (Gibson & Espino, 2016). Because African American women were susceptible to negative judgment, they positively represented African American women and were more likely to identify with role models who were a part of their race (Gibson & Espino, 2016; Johnson et al., 2019). Access to role models while in a STEM program provided African American women with a sense of belonging and similarity in the educational environment, as it was a regular occurrence for them to feel misunderstood and not supported by both students and faculty members (Gibson & Espino, 2016; Johnson et al., 2019; Rice, 2011).

A common experience shared among African American women in STEM programs was feeling that the faculty were not concerned with their academic success and accomplishments as a student after working hard to convince faculty and peers they could handle the rigor of the course (Johnson et al., 2019; Rice, 2011). As a result, they were less likely to be guided, chosen, or recommended for research opportunities, fellowships, and internships (Gibson & Espino, 2016; Johnson, 2011). African American women engineering students reported feelings of exclusion and lack of belonging in academic environments when interacting and creating relationships with their peers and had trouble being involved in workgroups and projects (Brown et al., 2016; Etzkowitz et al., 2000; Johnson, 2011; Rice, 2011; Wilkins-Yel et al., 2019). Male students were aware that women were excluded from study groups and social groups because of gender and racial differences (Etzkowitz et al., 2000; Johnson, 2011; Rice, 2011; Tate & Linn, 2005).

Students from the same racial background tended to work together when it came to forming workgroups (Tate & Linn, 2005). Even frivolous actions such as finding a classroom seat contributed to feelings of rejection as they were avoided by white students (Johnson, 2011). When African American women engineering students were part of group projects, they reported feeling that their ideas were ignored, especially by their male peers (Gibson & Espino, 2016). African American women reported being assigned administrative work for the group instead of being seen as members of the group with good ideas (Gibson & Espino, 2016).

Although they described feelings of frustration because of constantly discrediting stereotypes and attempting to show that they belonged, they could navigate within a

hostile environment (Gibson & Espino, 2016). Social uneasiness in the academic environment was usually more difficult for African American women in a STEM academic program (Gibson & Espino, 2016). Women students of color had different experiences in STEM disciplines (Ong et al., 2011). African American women engineer students described themselves as double minorities because they were African American and a woman (Gibson & Espino, 2016; Ong et al., 2011). Included in reports about their experiences, they often described their gender identity and detailed how their racial identity made their experiences more complicated (Beasley & Fischer, 2012; Gibson & Espino, 2016). Mistreatment within the academic setting is often reported when African American women discussed their experiences in STEM programs (Beasley & Fischer, 2012; Gibson & Espino, 2016). From their viewpoint, how they were treated by peers and faculty was directly related to being a woman and being African American (Gibson & Espino, 2016). The treatment varied from feeling like a valuable part of the academic community to simultaneously facing the double threat of sexism and racism (Beasley & Fischer, 2012; Gibson & Espino, 2016; Ong et al., 2011). Peers added to the feeling of being different by bringing up their race frequently in a stereotypical manner (Tate & Linn, 2005). These actions exacerbated the lack of belonging in women of color, including African American women, and affected positive social identities (Tate & Linn, 2005).

African American women engineer students' identity in the academic setting influenced their sense of belonging, access to role models, commitment, and perspective of differences between themselves and others (Johnson, 2016; Johnson et al., 2019; Tate

& Linn, 2005). In STEM work, tasks required people to work in teams for successful completion and execution (Tate & Linn, 2005). Therefore, isolation has a significant impact on African American women in STEM majors (Johnson, 2011). Having a sense of belonging affected how women of color developed and maintained their identity in STEM majors and careers (Johnson, 2011; Tate & Linn, 2005).

Johnson (2011) and Rodriguez et al. (2019) discussed how women of color who had trouble forming their science identity reported their work as being overlooked and unrecognized. African American women in STEM programs tended to attribute overall negative experiences in the academic setting to being African American and a woman (Gibson & Espino, 2016). However, those whose contributions were acknowledged by faculty and their peers experienced positive identities as scientists (Johnson, 2011; Rodriguez et al., 2019). As explained, the separation and collaboration between different identities, such as gender, race, social, and academic, played a role in providing multiple lenses for recognizing women of color's complex experiences in engineering programs (Gibson & Espino, 2016; Johnson, 2011; Tate & Linn, 2005). Based on the literature, supportive academic environments and a sense of belonging were discussed as two factors that influenced the persistence of African American women in STEM programs. The collaboration between different identities, such as gender, race, social, and academic, played a role in providing multiple lenses for recognizing women of color's complex experiences in engineering programs (Gibson & Espino, 2016; Johnson, 2016; Johnson et al., 2019; Tate & Linn, 2005).

The literature presented in this chapter related to the dynamics surrounding

women in STEM and engineering. The review included possible factors that influenced

the racial and gender differences and disparity for African Americans and women in

STEM programs and careers (Etzion, 1988; Fouad et al., 2020; Ghiasi et al., 2015;

Gibson & Espino, 2016; Robinson & McIlwee, 1989). The literature presented the

recognizable inequality and barriers women faced in STEM programs and the

engineering field (Amon, 2017; Etzion, 1988; Fouad et al., 2020; Ghiasi et al., 2015;

Gibson & Espino, 2016; Kachchaf et al., 2015; Kelley & Bryan, 2018; Rulifson &

Bielefeldt, 2017). Lack of support from faculty and the educational environmental were

barriers identified in understanding women's underrepresentation in STEM (Amon, 2017;

Kachchaf et al., 2015; Kelley & Bryan, 2018; Rulifson & Bielefeldt, 2017). Receiving

support in and outside of the academic environment was an influence for women to

pursue and persist in the engineering field (Green & Sanderson, 2018; Schaefers et al.,

1997; Smith & Gayles, 2018). Self-efficacy was another factor that impacted women's

decisions to enter and persist in STEM (Green & Sanderson, 2018; Schaefers et al., 1997;

Smith & Gayles, 2018). African American women were living in a double bind and

experienced similar, yet a distinctive set of barriers (Ong et al., 2011). The literature

above revealed the obstacles encountered exclusively by African American women in

STEM (Brown et al., 2016; Gibson & Espino, 2016; Rice, 2011; Rice & Alfred, 2014;

Varma, 2018). An explanation for the underrepresentation of African American women

in STEM was the experiences and apprehension of stereotype threat (Gibson & Espino,

2016; Johnson et al., 2019; Rice, 2011; Tate & Linn, 2005). Access to role models,

having a sense of belonging, and support had an impact on the persistence and success of

African American women in STEM (Gibson & Espino, 2016; Johnson et al., 2019; Rice, 2011). Social identity threat was a barrier that prevented African American women from entering STEM (Johnson et al., 2019). African American women in STEM programs reported experiencing uneasiness, stereotypes, sexism, racism, and feelings of exclusion amongst peers and faculty (Gibson & Espino, 2016; Johnson et al., 2019; Rice, 2011). Race moderated by the college experiences, preparation, and background characteristics also had an influence on the persistence in STEM (Chang et al., 2014).

Summary and Transition

Chapter 2 detailed the search engines, databases, and key words used to search for literature. In addition, this chapter included a review of the literature pertinent to the research phenomenon and problem. The review opened with the discussion of how the theoretical foundation shaped this research study. Subsequently, the literature review centered on research relevant to women in STEM. The studies reviewed what influenced women's persistence in STEM programs and selection of STEM programs. The next section of the review described the experiences of women engineers relating to gender differences within the engineering experience, managing gender role expectations, and the various identities women engineers embody to deal with the stereotypical and male-dominating engineering culture (Amon, 2017; Etzion, 1988; Gill et al., 2008; Jorgenson, 2002; Williams et al., 2016). Research on why women stayed compared to why women left and the differences in their experiences with support and commitment was discussed (Buse et al., 2013; Fouad et al., 2016). Additionally, the barriers to advancement opportunities for women in engineering was reviewed. Lastly, the review detailed the

underrepresentation of African American women in STEM programs and the engineering field (National Science Foundation, 2017; Varma, 2018). The complex experiences of African American women engineer students were described as navigating different identities (Beasley & Fischer, 2012; Gibson & Espino, 2016; Johnson, 2016; Johnson et al., 2019; Tate & Linn, 2005). In addition, factors that created the unique experiences of African American women in STEM programs and influenced their persistence in STEM programs was discussed (Alexander & Hermann, 2016; Brown et al., 2016; Etzkowitz et al., 2000; Gibson & Espino, 2016; Johnson, 2011; Johnson et al., 2019; Kachchaf et al., 2015; Rice, 2011; Rice & Alfred, 2014; Tate & Linn, 2005).

Research regarding women in engineering tended to be generalized across all women (see Gibson & Espino, 2016; Rice & Alfred, 2014). Although several studies included the experiences of African American women in STEM and engineering programs, it is notable that previous studies had not investigated their experiences of engagement, support, and commitment simultaneously in the engineering field (see Alexander & Hermann, 2016; Amon, 2017; Beasley & Fischer, 2012; Johnson et al., 2019). This study sought to fill the gap by determining if any common themes emerged across the experiences of employee engagement, organizational support, and organizational commitment of African American women engineers.

Chapter 3 reviews the methodology and research design, and rationale for this qualitative study. Specifically, the research population and procedures that were applied to the participant recruitment process is identified. Chapter 3 reviews the role and responsibility of the researcher and the personal epoch. Information regarding the data

collection process and the data analysis plan is examined. Lastly, issues of

trustworthiness, ethical procedures, and how to manage bias are detailed.

Chapter 3: Research Method

This study explored the lived experiences of engagement, organizational support, and commitment of African American women engineers. Themes were identified relating to the experiences of engagement, organizational support, and commitment that African American women faced in their careers within a White male dominated environment. Through these themes, I sought to understand the similarities in the meaning of their experiences to distinguish engineering settings that encourage work engagement, support, and commitment to add to the research gap and give cause to create or continue structures supporting and developing African American women in the engineering profession. Previous research on women engineers generalized results across women from all racial backgrounds. Although little research existed on African American women in the engineering profession, researchers have reported the obstacles encountered by African American women in engineering (STEM) programs made their experiences difficult. The obstacles repeatedly reported were being negatively stereotyped, dealing with sexism and racism, and feeling a lack of belonging and exclusion (Beasley & Fischer, 2012; Brown et al., 2016; Etzkowitz et al., 2000; Gibson & Espino, 2016; Johnson, 2011; Johnson et al., 2019; Ong et al., 2011; Rice, 2011).

This chapter includes the research design and rationale, which details the research questions and the phenomenological methodology used to conduct the study. Furthermore, I discuss my role in this study as theresearcher. The methodology section covers the strategies for selecting and recruiting participants, instrumentation, and the

data analysis plan. Last, this chapter reviews issues of trustworthiness and concludes with a summary.

Research Design and Rationale

The research questions in this qualitative study were:

RQ1: What is the experience of engagement by African American women in the engineering profession?

RQ2: What is the experience of organizational support for African American women in the engineering profession?

RQ3: What is the experience of commitment among African American women engineers?

Quantitative methods are applied to research studies that involve using variables and numerical data to support or refute a hypothesis (Williams, 2007). The mixed-methods approach is best applied in research involving numerical and textural data to explain a phenomenon (Williams, 2007). This research study included investigating a phenomenon through the viewpoint and experiences of African American women engineers. Quantitative and mixed methods were not fitting for this study.

To address the research questions of the study, the chosen method of inquiry was a qualitative approach using a descriptive phenomenological analysis design. A qualitative methodology allowed me to focus on insights and complexities of each African American woman engineer's experiences and behaviors, which might not have been available through a quantitative or mixed methods approach. A qualitative methodology provided the opportunity to discover the similar and diverse meanings and

views the African American women engineers had about the phenomena (Creswell, 2007). A qualitative methodology also allowed for categories, patterns, and emerging themes from each participant to be analyzed (Creswell, 2007).

Many designs were available to perform qualitative research. These designs varied in their inquiry approach, supporting the direction of the research process (Denzin & Lincoln, 2011). The common designs in qualitative research are ethnography, narrative, grounded theory, phenomenology, and case studies. Ethnography was unsuitable for this study due to its focus on changes in the daily life of a cultural group and the time dedicated to data collection (Creswell, 2009; Suter, 2012; Williams, 2007). The narrative approach is achieved using a life story method and storytelling to understand a phenomenon (Creswell, 2009; Suter, 2012). Most narrative studies are completed with one participant (Suter, 2012). This inquiry form was not ideal for this study as the focus was on the experiences of engagement, support, and commitment of individuals in the work environment, which is one area of their lives. Grounded theory was not fitting because a theory is developed based on the data collected when employing grounded theory (Creswell, 2009; Williams, 2007). This research aimed not to develop a theory but rather to understand the experiences of engagement, support, and commitment of African American women engineers through possible patterns and themes developed from the data. Case studies tend to focus on a problem and not necessarily on an individual's experience (Creswell, 2009; Suter, 2012; Williams, 2007). Case studies require a lengthy amount of time for data collection and include restrictions surrounding

the data collection site (Suter, 2012). Consequently, implementing case studies for inquiry did not fit this study.

Giorgi's (2009) descriptive phenomenological methodology was chosen to conduct this research exploring African American women engineers lived experiences of engagement, organizational support, and commitment. Due to little being known about the phenomena, applying the phenomenological method was the most suitable approach to depict the insufficient data available on this topic. The intention of phenomenology was to bring forth a thorough account of the individual's lived experiences associated with the phenomenon (Giorgi, 2009). This approach was found most suitable in exploring African American woman engineers' because it strives to understand the perspectives of the individual undergoing the experience (Giorgi, 2009). The phenomenological approach was most fitting for this study because it provided a direct narrative from African American women engineers and provided them with a platform for expression and expounded on their experiences (Giorgi, 2009).

Giorgi's phenomenology research method applies Husserlian phenomenology as the theoretical basis (Giorgi, 2009). His phenomenological psychological method was applied effectively by assuming the phenomenological attitude. During this study, the process of undertaking a phenomenological attitude was accomplished through bracketing. Husserl's bracketing process informed me to leave my beliefs behind to uphold openness and maintain a sense of presence with the data (Beyer, 2018; Giorgi, 2009). Bracketing aimed to avoid the potential for influencing the participant's

conception of the studied phenomena which allowed the data to be viewed without speculating legitimacy and withholding existential claims.

In a qualitative study, various methods can be used to collect data from participants (Creswell, 2007). For example, data can be collected by examining records, artifacts, observation, or interviews (Creswell, 2007; Williams, 2007). Following Giorgi's (2009) phenomenological methodology, concrete or naïve descriptions were collected of the participant's lived experiences as an African American woman engineer through conducting interviews (Giorgi, 2009). The data collection instrument method determined most suitable for this study was an interview protocol (Appendix) that included semistructured and open-ended questions for individual interviews. The semistructured interviewing technique allowed participants to give a detailed description of their professional experiences of employee engagement, organizational support, and organizational commitment encountered as African American women engineers.

Role of the Researcher

My role as the researcher and interviewer in this study allowed participants to discuss their experiences in the engineering field as African American women. To remain unbiased, I recruited participants with whom I had no prior relationship. I reflected on how my racial, gender, and career background related to this research study and in the next paragraph I discuss how these factors may have influenced different phases of the research study. For example, how it might have influenced the interview process and the analysis of the research findings.

Due to the research study focusing on African American women in a specific workplace, my racial and gender background and familiarity working in an environment where African American women are underrepresented offered understanding. However, this might have interfered with my ability to see participants as having distinctive experiences. To address any bias, a process of reflection was implemented. To provide transparency and bring awareness to unconscious influences that were not detectable in the data, the reflection was done through journaling. Specifically, I bracketed any personal beliefs to reduce bias that may have affected the research process. This approach allowed me to share my research practices and experiences throughout the research process.

Training to become a counselor in a public school included being able to engage in active listening and observing clients. In addition, the training involved forming the skills needed for a nonjudgmental, unbiased, and open mind to client experiences. The development of competent interviewing skills, such as open-ended questions, was another crucial element in counseling (Prout & Wadkins, 2014). Other essential components included building rapport, demonstrating empathy, and respecting anonymity to access the client's thoughts and feelings (Prout & Wadkins, 2014). The skills mentioned were practiced daily and helped me efficiently interview participants and ethically collect information regarding their experiences. Additionally, it aided me in building rapport with the participants in a short time, promoting a trusting and open interview setting.

Methodology

Participant Selection Logic

To guide the participant selection process, vital research criteria was identified. First, prospective participants were identified as African American and a woman. Second, they had completed at least a bachelor's degree in an engineering program. The completed engineering programs could have been in various fields, including but not restricted to the following disciplines: electrical, civil, mechanical, computer, and chemical engineering. Third, the degree must have been obtained from an accredited educational institution in the United States. Finally, the prospective participant must have worked in the engineering profession full time for a minimum of 5 years and currently working in an engineering role. This minimum time allowed for the participants to have gained enough significant experience in the field to be discussed.

The sampling method was determined by what fit the purpose and goals of this study. Due to the study criteria and the population of African American women engineers being small, purposive sampling was used. Purposive sampling is widely used in qualitative research when resources are limited and information-rich cases are desired (Palinkas et al., 2015; Patton, 1990). The types of purposive sampling employed were criterion sampling and snowball sampling. The criterion sampling method aided in recruiting a small sample and allowed the sample related to the research criteria established to participate in the study (Creswell & Poth, 2016; Patton, 1990). The snowball method was beneficial because of the difficulty in accessing the population studied. The snowball sampling method helped to recruit information-rich cases

identified by individuals who had met the requirements to participate in the study and were familiar with the phenomena of interest the study investigated (Patton, 1990). Participants who agreed to partake in the research study were asked to pass along the recruitment letter to individuals they believed would be interested and qualified.

Criterion sampling was an appropriate method to recruit prospective participants who satisfied the specified study criteria using the LinkedIn social media website, African American professional engineering associations, and Walden University's participant pool (Creswell & Poth, 2016). In addition, the snowball sampling method was used to access the population being studied.

Prospective participants who expressed an interest in joining the study were sent a criteria form. This form included criteria questions that helped to make the correct selection of participants under the criteria guidelines produced for the research study. The criteria questions requested information confirming the prospective participant's race, age, citizenship status, years of experience in engineering, current job title, education level, degree obtained, and if they had attended an accredited educational institution in the United States.

Researchers differed in the opinion of the sample size suggested for qualitative research studies. Creswell (1998) and Polkinghorne (1989) recommended 5-25 participants be interviewed. Morse (2000) argued between 6-10 participants for phenomenological research studies. Bertaux (1981) provided a recommendation of at least 15 interviewed participants. Therefore, the number of anticipated African American women engineers recruited for this phenomenological study was 12-15 research

participants. Recruitment continued until data saturation was accomplished. This research

study employed purposive sampling; thus, the sample size relied on saturation (Guest et

al., 2006). Interviewing was the method used for data collection, which aided in the

pursuit of saturation (Fusch & Ness, 2015). When consistency was recognized between

the themes and no new information was observed, saturation was reached (Fusch & Ness,

2015; Guest et al., 2006).

Instrumentation

The instrumentation used was based on the qualitative nature of the study.

Establishing the instrumentation was determined by what would support conveying a

valuable understanding of the phenomenon. To investigate this phenomenon, an

exploration was made that included perspectives of African American women working in

the engineering profession. Phenomenology is a qualitative research method centered on

the commonality of a lived experience within a specific group of people (Chambers,

2013). Through the process of emphasizing a common phenomenon of interest, the

researcher can create a universal message and a better understanding of the event or

experience (Chambers, 2013). The descriptive phenomenological method aimed to obtain

definite descriptions given by individuals who had lived through the phenomenon of

interest (Giorgi, 2009). Phenomenological methods are successful at emphasizing the

views and experiences of individuals and therefore challenged structural and normative

assumptions (Lester, 1999).

The data collection instrument method used in this phenomenological qualitative

study was a researcher developed interview protocol (Appendix) which included semi

structured and open-ended questions for individual interviews. The purpose of the study

and the research questions were reviewed and considered when generating the interview

questions. The content validity was established through member checking (Creswell &

Miller, 2000). Participants were able to confirm the credibility of the information through

the researcher sharing a summary of the findings after the transcription and the initial

coding (Creswell & Miller, 2000). A personal epoché stating my personal biases and

beliefs was incorporated in this research process as a validity procedure (Creswell &

Miller, 2000). Reflecting on any personal bias throughout the process was completed

through journaling and bracketing (Creswell & Miller, 2000; Tufford & Newman, 2010).

Lastly, an audit trail was used to cross-check the research procedures and specifics

relating to the research study was described in rich detail to help increase the content

validity (Creswell & Miller, 2000).

Procedures for Recruitment, Participation, and Data Collection

In this study, before recruiting participants, approval was sought from Walden

University's Institutional Review Board (IRB). Purposive sampling methods were used to

recruit participants who met the selection criteria. Criterion sampling was the primary

method used in the recruitment process. Due to obstacles accessing the population being

studied, the contingency plan used the snowball sampling method. Criterion sampling

was implemented by sending a recruitment letter to African American professional

engineering associations and prospective participants in the United States using the

LinkedIn social media website. In addition, information about the study was posted to

Walden University's participant pool. The recruitment letter described the study's

purpose, procedures, criteria, and time obligation. Also, clarification concerning participation being voluntary was included. In addition, the recruitment letter asked interested individuals to email me at the given email address. The letter also included my phone number as an alternative way for individuals to reach me if interested or for any questions. The snowball sampling method was employed by asking willing and interested individuals to pass along the recruitment letter to known individuals who met the research study criteria. The interested individuals were advised that they had no obligation to share the information.

Once individuals contacted me expressing interest in the study, relevant contact information such as a telephone number and an email address was collected. An initial phone interview was scheduled to verify if the potential participant met the study criteria. A participant criteria form was used to determine if they met the study criteria and was based on the purpose of the research. Data for the criteria form was documented during the initial telephone interview.

Once eligibility was verified, the informed consent was disseminated to the potential participant via email. Interested individuals were asked to confirm their interest in participating in the research study by reading the informed consent and replying to the email with the statement 'I consent'. Interested participants had the ability to suggest dates and times convenient for them to participate in the interview. An interview schedule was coordinated and communicated with the interested participants. The option of conducting the interview over the telephone, Zoom video conferencing, or Microsoft Teams videoconferencing was given. The interviews were digitally voice recorded and

transcribed with permission from the participant. NVivo's transcription service was used. An interview protocol was followed, which included an explanation of the purpose of the interview, the informed consent form, and an elucidation that the interview was audio recorded with each participant's consent. Each participant was interviewed one time for approximately 24-60 minutes in length.

Participants were identified using only pseudonyms in each transcript, with a logbook to confirm the transcript and the interviewee's alignment. A debriefing form was provided to the participants at the end of the interview and an opportunity to ask questions. A copy of the debriefing form was emailed to the participant. A summary of the findings with my interpretations was shared with the participants and they had the opportunity to share feedback.

Data Analysis Plan

An inductive thematic data analysis was applied to uncover emerging themes to describe the phenomenon (Fereday & Muir-Cochrane, 2006; Suter, 2012). Using thematic data analysis was to understand patterns and meanings from the participants' descriptions of their experiences relating to the research questions. Themes linked to the research data were identified with an inductive approach (Braun & Clarke, 2006). NVivo qualitative analysis software was used to conduct the thematic analysis (QSR International, 2021). NVivo provided a transparent way to import, organize, and manage the data collected. The software analyzed the data by utilizing the tools provided to arrange information and identify themes and conclusive findings.

Braun and Clarke (2006) developed a thematic data analysis method to analyze the data. To conduct a thematic analysis the audio-recorded interviews were transcribed. The first step in the analysis was to get familiar with the data collected, mainly because a third party completed the transcription (Braun & Clarke, 2006). The process of getting acquainted with the data involved repeated and active reading (Braun & Clarke, 2006; Sundler et al., 2019). Through getting familiar with the data by exploring experiences, note-taking assisted in coding across data (Braun & Clarke, 2006). While reading the data in a thoughtful manner and in its entirety, the goal was to understand and develop meaning from the text (Sundler et al., 2019).

The highlighting of text conveying meanings corresponding to the purpose of the study occurred. The next stage of the analysis process involved constructing initial codes for the highlighted text (Braun & Clarke, 2006). These codes consisted of phrases or sentences used to describe the data in a meaningful way concerning the phenomenon. Finally, NVivo was used to create, compare, and contrast the codes to identify existing patterns (QSR International, 2021; Sundler et al., 2019).

Once patterns were identified, themes were generated. Themes uncovered patterns in the data responses and represented important data linked to the research questions (Braun & Clarke, 2006). At this stage, visuals were used to assist with organizing the codes into theme piles (Braun & Clarke, 2006). Once the themes were devised, the next step was reviewing and refining the themes (Braun & Clarke, 2006). During this stage, specific themes were removed and broken down (Braun & Clarke, 2006). Reviewing and refining the themes took continuous analysis to represent the data (Braun & Clarke, 2006;

Sundler et al., 2019). The next step was naming and explaining the themes. The last step

involved producing a summary of the data analysis. The summary included a detailed

summary of the data across and within the themes (Braun & Clarke, 2006).

<div align="center">**Issues of Trustworthiness**</div>

Credibility

Reflexivity is employed in qualitative studies to show credibility (Cope, 2014). It

is described as the researcher being aware of how their personal experience with the

phenomenon being studied, background, and values can affect the research study process

(Cope, 2014). To guarantee credibility, member checking and maintaining a reflective

journal was employed to prevent personal bias in the study. In addition, to collect

perceptions and subjectivity, a reflective journal was maintained to record viewpoints and

feelings throughout the data collection and analysis process (Cope, 2014).

Transferability

Transferability in research is referred to the ability to transfer the data results to

another similar research setting. This research study aimed to provide thick descriptions

of African American women engineers' experiences that could be used in future research.

The thick descriptions included sufficient information on the context, setting, methods

used, and data results to enhance transferability (Cope, 2014; Houghton et al., 2013).

Additionally, the criteria used in participant selection and participant characteristics

relevant to the study was described in detail (Elo et al., 2014). Finally, thick descriptions

could allow researchers to determine if the results could be applied to other situations and

be generalized to other groups of people (Cope, 2014).

Dependability

According to Cope (2014), dependability in qualitative research confirms the data findings are consistent and can be repeated in similar settings. Dependability is met when other researchers can come to the same conclusions when reviewing the data (Cope, 2014). Audit trails were implemented to establish dependability. An audit trail which included audio-recorded interviews, notes, and data analysis was used to cross-check the procedures used throughout the research study (Anney, 2014). In addition, remaining in communication with the committee chair and members throughout the research study process established dependability.

Confirmability

The study has confirmability when the results can be confirmed by other researchers (Anney, 2014). Confirmability is also confirmed when the research findings are derived from the data collected and represent the participant responses and the researcher's objectivity (Cope, 2014). An audit trail was conducted to establish confirmability of the qualitative findings (Anney, 2014). According to Anney (2014) and Cope (2014), an audit trail serves as evidence of the study procedures and processes leading to interpreting the findings. Another strategy used a reflexive journal detailing the research process and how the findings came into being (Anney, 2014). A reflexive journal allowed for personal reflection to reduce any bias (Anney, 2014).

Ethical Procedures

The Walden University IRB guidelines were followed to recruit participants to guarantee the ethical protection of the study participants. The research study included the standards in the IRB guidelines for studying and selecting human participants.

After receiving approval from the Walden University IRB, the recruitment of participants using purposive sampling methods began. Selecting a method coercive in nature is an ethical concern in recruitment. To address this, the plan was to implement a technique involving a low-pressure communication process to address this concern. Information about the study was posted to Walden University's participant pool. A recruitment letter was sent to prospective participants through African American professional engineering associations and by using the LinkedIn social media website. The letter was sent using a private and direct message to address ethical concerns related to protecting the privacy of the potential participant. No means of obligation or compensation were used to recruit participants. The decision to voluntarily participate was solely up to the participant. No consequence followed when potential participants decided to withdraw their participation. A replacement participant was recruited using the same purposive sampling methods.

Using a social media website to recruit participants presented added ethical concerns relating to privacy, trust, and respect. Deception and the fabrication of identities were not employed to gain access to potential participants, preserving the trust and respect of potential participants and the research process (Harvard Catalyst, 2017). Full transparency regarding the study's purpose was shared in the recruitment letter when

direct messaging potential participants using LinkedIn and when sent to African

American professional engineering associations. Public communication did not occur

online that may threaten or reveal information about them or their connection to the study

to protect the potential participants' privacy (see Harvard Catalyst, 2017).

After the potential participants expressed interest, relevant contact information

was collected, and an initial phone interview was scheduled to verify that they met the

criteria. After establishing they met the criteria, questions regarding the research process

were answered and an informed consent form was sent to them via email. Ethical

assurance was implemented in the informed consent by including the following: the

purpose of the study, procedures involved in the study, length of time of expected

participation, the voluntary nature of participation, the potential risks and benefits of

participation, payment, confidentiality, and privacy statement for protecting the

participants' identifiable information, the possibility of conducting follow up interviews,

and my contact information.

The participants' information was labeled with their corresponding pseudonym as

data was collected. A code sheet was used to link each participant. Electronic documents,

audio files, and journal notes that included participants' identifiable and pseudonym

information was secured on a password-protected device and cloud location. All codes

were maintained and accessible by only me. I am the only one who used the devices

throughout the study. Written documents, audio recordings, and hardcopies collected

were locked in a secured file cabinet, only accessible to me. Other known individuals

who had access to the research information on a need-to-know basis were authorized

Walden University faculty, such as the dissertation committee members and chairperson.

Data will be saved for a minimum of 5 years before being destroyed. The electronic files

will be deleted, and any physical data will be shredded after 5 years.

Summary

Chapter 3 presented a description of the research design and rationale for the

procedures used in this qualitative phenomenology study on the lived experiences of

African American women engineers' employee engagement, organizational support, and

organizational commitment. In addition, it provided an overview of the role and

responsibility of the researcher. The chapter included strategies that were implemented to

manage bias in recruitment and data analysis. Other ethical issues and how they were

managed was also discussed.

The methodology for the study was reviewed in detail. The population studied

was identified. Justification was given for the procedures used for participant recruitment,

contact, and selection. I expounded on the criterion to which participants were selected

and how they were known to meet the criteria. A rationale was given on the number of

participants recruited and saturation. A description of the data collection instrument and

how it helped to answer the research questions was presented. Information regarding the

frequency and duration of data collection was explained, including information on how

the data was recorded, the follow-up plan, and the participant exit strategy. The data

analysis plan, specifically the software used for the analysis and procedures for coding,

was discussed. Lastly, the approach to addressing trustworthiness issues and ethical

procedures were examined. Chapter 4 includes the research results from the data

collected.

Chapter 4: Results

The purpose of this descriptive qualitative phenomenological study was to understand how African American women engineers experience employee engagement, organizational support, and organizational commitment in the workplace. This study aimed to explore the lived experiences of African American women working in the engineering profession. There has been research focused on African American women and their identities, persistence, and their unique experiences as engineering students and in the engineering field (Alexander & Hermann, 2016; Beasley & Fischer, 2012; Brown et al., 2016; Etzkowitz et al., 2000; Gibson & Espino, 2016; Johnson, 2011; Johnson, 2016; Johnson et al., 2019; Kachchaf et al., 2015; Ong et al., 2011; Rice, 2011; Rice & Alfred, 2014; Tate & Linn, 2005). In addition, research has been completed focusing on women in STEM and women in the engineering field (Amon, 2017; Etzion, 1988; Fouad et al., 2020; Ghiasi et al., 2015; Gibson & Espino, 2016; Kachchaf et al., 2015; Kelley & Bryan, 2018; Rulifson & Bielefeldt, 2017). Previous research was related to gender differences, managing gender role expectations, identities, persistence in the field, support, and barriers. With this study, I intended to expand research on African American women's experiences in the engineering field. More specifically, I sought to simultaneously explore their experiences of employee engagement, organizational support, and organizational commitment. The study results were organized by themes and the research question for each theme was identified. The research questions that guided this study were the following:

RQ1: What is the experience of engagement by African American women in the engineering profession?

RQ2: What is the experience of organizational support for African American women in the engineering profession?

RQ3: What is the experience of commitment among African American women engineers?

This chapter provides the results of the data collected during interviews with the 11 participants. The setting where the study was conducted will be discussed. A description of the demographics of the participants will also be discussed. The data collection process and an explanation of the data analysis process will be explained. Lastly, this chapter includes a review of the evidence for trustworthiness before I present my research findings. I conclude with a summary of the chapter.

Setting

After consent was received, the study interviews were scheduled. Participants were able to choose a day and time of the interview and how they wanted to be interviewed. No in-person interviews took place. Participants had the option of choosing to be interviewed by phone, Zoom videoconferencing, or Microsoft Teams videoconferencing. Individual interviews were conducted with 10 research participants using Zoom videoconferencing and one by telephone call. Only four of the 10 participants who interviewed through Zoom videoconferencing had their cameras on during the interview. I did not have the opportunity to observe participants nonverbal cues such as body language and facial expressions of those who had their camera off

during the Zoom interviews and of the participant who elected to conduct the interview over the telephone. Having the camera off and interviewing over the telephone removed the opportunity for another means to engage between me and the participant. However, rich data was still collected from these participants. The participants were encouraged to conduct the interview in a quiet and private setting. My interview setting occurred in the privacy of my home with no other persons there while the interview was being conducted. All the study participants selected environments that allowed them to partake in their interviews in a private location.

Demographics

Of the 11 participants, three individuals were recruited from LinkedIn, one was recruited from an African American professional engineering association, and seven were recruited through the snowball method. Participants were diverse in their job titles in the engineering field as well as age, number of years of experience, and educational background. This information was collected from interested participants using the criteria form. All 11 participants reported to be African American women who had worked at least 5 years in the engineering profession. Participants' time working in the engineering field ranged from 5 to 30 years. The ages of participants ranged from 28 to 57 years old. All participants reportedly were legal citizens of the United States and possess a bachelor's or graduate degree from an accredited educational institution in the United States. The types of engineering degrees varied for each participant. However, most of the participants received a degree in industrial engineering. Table 1 shows an overview of the participant's demographic information.

Table 1

Participant Demographics

Participants	Gender	Race	Age	Legal Citizen	Accredited Institution	Degree Obtained	Job Title	Years in the Field
P1	F	AA	36	Y	Y	Bachelor of Industrial Engineering	Industrial Engineer	11
P2	F	AA	34	Y	Y	Bachelor of Industrial and Operations Engineering	Application Engineer/ Account Manager	9
P3	F	AA	30	Y	Y	Master of Civil Engineering	Assistant Civil Engineer	7
P4	F	AA	34	Y	Y	Bachelor of Physics and Civil Engineering	Transportation Engineer	10
P5	F	AA	32	Y	Y	Master of Engineering	Manufacturing Engineer	10
P6	F	AA	35	Y	Y	Master of Engineering Management	Craft Safety Engineer	10
P7	F	AA	28	Y	Y	Master of Chemical Engineering	Manufacturing Project Lead Engineer	5
P8	F	AA	36	Y	Y	Master of Industrial Engineering	Associate Consultant Engineer	12
P9	F	AA	57	Y	Y	Master of Electrical Engineering	Associate Consultant Engineer	30
P10	F	AA	45	Y	Y	Master of Industrial Engineering	New Model Programs Launch Engineer	21
P11	F	AA	41	Y	Y	Bachelor of Mechanical Engineering	Forward Model Manufacturing Quality Engineer	15

Data Collection

Before recruiting and collecting data, approval from Walden University's IRB was given on March 15, 2021, with an approval number of 03-15-21- 0992031. Once approval was given, I began the recruitment process. Participants were recruited by sending the recruitment letter to African American professional engineering associations, and individuals and groups using direct messaging on LinkedIn. The recruitment letter was also posted on Walden University's participant pool. In addition, snowball sampling was used. Snowball sampling refers to a technique where existing study subjects recruit future subjects from their acquaintances (Houghton et al., 2013).

A total of 17 individuals expressed interest in participating in the study. Two of the individuals who expressed interest were identified by the Walden participant pool as frauds. These individuals reached out expressing interest in participating in the study. However, when I replied to schedule a telephone interview to confirm they met the criteria, one did not respond, and the other scheduled a date but did not provide a phone number or time of availability upon request. I received an email from the Walden participant pool stating to beware of a possible scam and these two individuals' emails were listed as the identified frauds. Three other individuals who expressed interest in participating in the study never responded to my reply email regarding scheduling a phone interview to confirm they meet the criteria. One individual who expressed interest in participating in the study met the criteria and the consent form was sent to their email. However, they did not move forward with participating in the study because I did not receive consent.

Of the 17 individuals who expressed interest in participating in the study, 11 met the eligibility requirements and proceeded to participate in the study. These participants sent an email expressing interest in participating in the research study. Follow-up emails were sent to schedule a telephone interview to assess their eligibility and confirm they met the research criteria. They replied with their availability and an initial phone call was scheduled and conducted to ensure the interested participants met the research criteria and to collect demographic information based on questions from the criteria form. After the telephone interview occurred and it was determined that they met the criteria, I emailed an informed consent form to participate in the study. These 11 participants replied with the phrase "I consent" to participate in the study after reading the consent form. After consent was received, the study interviews were scheduled. Participants followed up with a date and time to be interviewed. They also included if they preferred to conduct the interview on Zoom videoconferencing, Microsoft Teams videoconferencing, or over the telephone. 10 participants choose to conduct the interview on Zoom and one participant choose to conduct the interview over the telephone.

Interviews guided the data collection method for this research study. An interview protocol (Appendix) was used to explore the lived experiences of the participants. After receiving consent, a one-time interview was scheduled and conducted at a time convenient for the participant. A private interview location was decided upon by the participant. Notes were also taken during the interviews to emphasize distinctive and common participant statements relevant to the research questions. At the end of each interview, I went over the debriefing form and I emailed each participant a copy of the

form. All study interviews were audio-recorded. Each of the interviews was transcribed using NVivo. The audio recordings and the transcriptions were saved as a file on my personal computer that has a password only accessible to me. In addition, each participant was assigned a personal identity code to protect their confidentiality and anonymity.

As per chapter 3, I anticipated interviewing 12-15 participants. However, data saturation in the study was reached at 11 participants. When enough data is collected to identify themes, draw conclusions, and no new information is observed, saturation has been reached (Fusch & Ness, 2015; Guest et al., 2006). In addition, I anticipated the interviews to last from 30-45 minutes. The duration of each participant interview lasted between 24 minutes to 60 minutes. The length of the interview depended upon how long the participant's responses were to each interview question. Interviews were not conducted face-to-face. Only four participants who interviewed through Zoom videoconferencing chose to keep their cameras on during the interview and one participant conducted their interview over the telephone. Therefore, an unusual circumstance encountered in the data collection process was not being able to view all participants' body language and other nonverbal cues. Even for those who opted to leave their cameras on, the view could had been limited thereby altering the ability to view the participant's body language effectively (Oliffe et al., 2021). For participants who did not have the camera on and interviewed over the telephone I did not have the opportunity to record their facial expressions and body language. The facial expressions and body language that could had been missed was smiling, nodding, and hand gestures.

Data Analysis

The origins of interpretative phenomenological analysis (IPA) were inspired by

pioneers in the phenomenological movement, Edmund Husserl (Horrigan-Kelly et al.,

2016) and Martin Heidegger (1927). Heidegger developed interpretive phenomenological

research methods to support understanding lived experiences (Horrigan-Kelly et al.,

2016). He suggested that because individuals were part of the world, we do not need to

study lived experiences through bracketing (Horrigan-Kelly et al., 2016). He proposed

that we make sense of our interactions in the world and originated the concept of

"Dasein" (Horrigan-Kelly et al., 2016; Smith, 2018; Wheeler, 2020). Dasein is when we

question and examine our being in the world (Horrigan-Kelly et al., 2016; Wheeler,

2020). The goal of Heidegger's philosophy was to discover the meaning of human

experiences (Horrigan-Kelly et al., 2016). It centered on the human experience as an

individual in the world and within their social setting in which they exist (Horrigan-Kelly

et al., 2016). The idea of interacting and being with others in the world was considered

when deriving meaning of individuals experiences (Horrigan-Kelly et al., 2016). With

participants engaging in everyday experiences, IPA was used to reveal meaning and

significance of these experiences from the perspective of these individuals (Horrigan-

Kelly et al., 2016). For the researcher to properly apply IPA, Heidegger believed that

reflexivity should be integrated throughout the research process, so the researcher is

aware of their preconceptions to accurately interpret the meaning of the phenomenon

being investigated (Horrigan-Kelly et al., 2016). The researcher must avoid bias by

engaging in reflexivity to maintain awareness of how their beliefs and experiences with the phenomenon can influence the research process (Cope, 2014).

The objective of IPA is to provide an opportunity for several participants who encounter the same phenomena to openly discuss their experiences (Horrigan-Kelly et al., 2016). This qualitative research design supported this study's goal of obtaining rich information about participants' lived experiences by using an interview protocol (Appendix) with open-ended questions. The data collected in this research study was analyzed using an IPA approach to obtain a better understanding of how African American women engineers experience employee engagement, organizational support, and organizational commitment. According to Creswell (2009), the purpose of the data analysis is to understand the information gathered during the interview process by peeling back the layers. IPA was used to analyze, categorize, and assign codes to statements collected to give meaning to the data (Moustakas, 1994). The qualitative software NVivo was used to assist with analyzing the data collected.

Using an inductive thematic analysis approach, the audio-recorded interviews were transcribed using NVivo. Each interview was transcribed and checked for accuracy by rereading and reviewing the audio as needed. The names of the participants were coded to protect their anonymity in the transcribed interviews. To discover themes from the interviews, I read each interview several times to familiarize myself with the interview and the participant's answers. Creswell (2013) distinguishes the need to constantly read over interviews to get acquainted with the participant responses and to begin seeing themes derived from the rich lived experiences of participants. Keywords

and phrases that referred to the participant's experiences emphasized within the research question were highlighted and key points were noted. Next, initial codes for the highlighted text were created (Braun & Clarke, 2006). These codes comprised phrases used to describe the data in a meaningful way concerning the phenomenon. The transcripts were examined again to generate and cluster common codes and meanings among participant responses so that themes were identified. NVivo was also used to create, compare, and contrast codes to distinguish existing patterns (QSR International, 2021; Sundler et al., 2019). A total of 95 codes were created.

Once patterns were identified, the themes were generated. The themes were developed by the patterns in the data responses and through the representation of the data associated with the research questions (Braun & Clarke, 2006). The themes were continuously reviewed and refined until left with the themes that best represented the data. To address the research questions, a total of 15 themes were derived from the data collected. The themes that addressed the first research question, on engagement, included (a) professional engineering group opportunities, (b) connections to colleagues, (c) teamwork, (d) doubting feedback and proving self, and (e) discrimination. The themes that addressed organizational support and the second research question included (f) empowerment and voice being heard, (g) public recognition and rewards, (h) mentoring and training, (i) software and request systems, (j) supervisor accessibility and support, and (k) diversity and inclusion initiatives. Last, the themes that addressed the final research question regarding organizational commitment included (l) commitment level, (m) organizational culture, (n) connecting to people, and (o) lack of diversity. The themes

are presented in Figure 1, Figure 2, and Figure 3 are categorized by research question,

RQ1: What is the experience of engagement by African American women in the

engineering profession? RQ2: What is the experience of organizational support for

African American women in the engineering profession? RQ3: What is the experience of

commitment among African American women engineers?
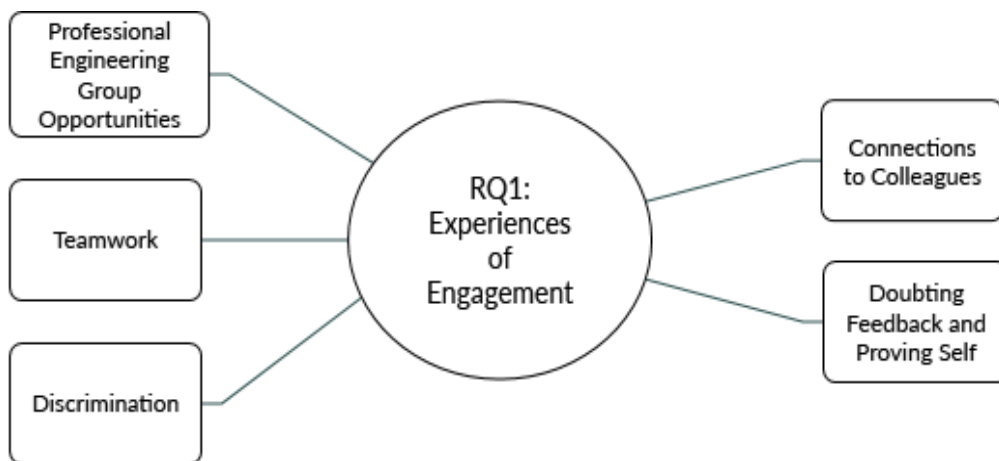
Figure 1

Experiences of Engagement

Figure 2

Experiences of Support

Figure 3

Experiences of Commitment

Evidence of Trustworthiness

Credibility

Credibility refers to the accuracy of the data results and how the data is interpreted (Cope, 2014). To maintain credibility, member checking was utilized to verify the findings. The participants, upon request, were given a copy of the summary of the findings to verify the conclusions were accurate. The participants were given an opportunity to give feedback and notify the researcher if any information was inaccurate. None of the participants reached out with any feedback or questions specific to the summary of the findings. Credibility is maintained when there are shared experiences among individuals (Cope, 2014). This study reached saturation due to consistency among the reported experiences of the participants. Reaching data saturation supported the credibility of the data collected. Lastly, credibility refers to the interpretation of the data by the researcher (Cope, 2014). A reflective journal was used to maintain awareness of

my personal experience with the phenomenon studied (Cope, 2014). Journaling allowed

me to write down my personal thoughts and feelings throughout the data collection

process. I recorded my feelings when I found myself relating to, agreeing, or disagreeing

with something the participant stated. Journaling provided an opportunity for me to be

aware and reduce any biases and reflect on how they could impact the study outcome (see

Creswell & Miller, 2000; Tufford & Newman, 2010). Notes were also taken during the

interviews to highlight specific statements relevant to the research questions and shared

perspectives among participants which helped to interpret and analyze the data. These

notes added to the collection of material that included the journaling, interview

transcripts, and the data analysis used in an audit trail which enhanced the credibility of

the study (see Cutcliffe & McKenna, 1999).

Transferability

Transferability has occurred when the findings can be transferred to other settings

(Cope, 2014). It has also occurred when the findings can be applied to other groups of

people (Cope, 2014). For the findings to be deemed transferable, information about the

research study was provided. In addition, adequate information from the participants

were presented. Details provided of the recruitment and data collection techniques and

the research study setting allowed for transferability to occur. Thick and rich descriptions

of African American women engineers' experiences were provided in the study to be able

to transfer to other settings and to determine if the findings could be applied to other

situations and groups (see Cope, 2014; Houghton et al., 2013). To increase

transferability, thick and rich descriptions were collected directly from the participants

which included sufficient information relating to their experiences of employee

engagement, organizational support, and organizational commitment (see Cope, 2014;

Houghton et al., 2013). The thick descriptions were collected by asking open-ended

interview questions (Appendix). Through the descriptions, themes were identified in the

experiences of African American women engineers. Direct quotations provided by the

participants of their lived experiences were detailed in the results for transferability. The

direct quotations allow other researchers who are interested in similar studies to become

familiar with the phenomenon and compare these experiences with others (Universal

Teacher, 2023).

Dependability

Dependability describes the process of tracking methods used throughout the

research process so that the research study can be repeated (Cope, 2014). If the study is

replicated under the viewership of another researcher and similar results emerge with

comparable participants and settings, then the study would be deemed dependable (Cope,

2014). Dependability was achieved by providing a detailed description of the research

study procedures. Specifically, by describing the purpose of the study, the recruitment

process, data collection methods, and the analysis process. Lastly, communicating with

the committee chair throughout the study and receiving feedback on the research

processes provided dependability.

Confirmability

Confirmability was assured by clarifying my bias. Clarifying my biases was noted

in chapter 3 through the discussion of the role of the researcher. I described any

experiences or biases that could shape my interpretation of the study. Doing this allowed me to become aware of how my experiences and background offered understanding going into the study. In addition, it provided me an opportunity to check any pre-convinced notions and expectations based on my personal experiences. This created a space for being objective before and during the data collection and data analysis process. Reflection was done accordingly through notetaking, journaling, and bracketing presumptions to reduce biases (Creswell & Miller, 2000; Tufford & Newman, 2010). I journaled through the data collection process. I also journaled my thoughts and feelings as the participants detailed their experiences during the interview. Additionally, journaling provided me the opportunity to reflect on my thoughts and reflections as I analyzed the data.

To establish confirmability, an audit trail was used as evidence of the study process by interpreting the results (Anney, 2014; Cope, 2014). The audit trail included providing a description of how the data was coded and themed. In addition, confirmability was demonstrated by indicating that the data represents the participant's perspective (see Cope, 2014). It involved describing how the interpretation of the findings was determined (see Cope, 2014). Confirmability was established in this manner by providing direct quotations from the participants (see Cope, 2014). Direct quotations demonstrated that the findings for each theme stemmed from the data (Cope, 2014).

Results

RQ1: What is the experience of engagement by African American women in the engineering profession?

The results of this analysis for the first research question identified five themes: (a) professional engineering group opportunities, (b) connections to colleagues, (c) teamwork, (d) doubting feedback and proving self, and (e) discrimination. The themes presented will be described in detail with direct quotes to expand on the participant's experiences of engagement in the workplace.

Theme 1: Professional Engineering Group Opportunities

Most participants mentioned being connected to a professional engineering group. The most common group mentioned was the National Society of Black Engineers (NSBE). P1 explained how they still had connections with professional groups although the company does not promote professional engineering groups:

Well, the company I'm at now it's definitely not well-communicated. At least I haven't been invited or heard of any engineering groups. Outside of work I've connected with NSBE, and I received some communications here and there from alumni chapters.

P7 elaborated on how she has been connected to NSBE while attending college and while working in the field of engineering as a professional:

So, I have been a member of Women in Science, Technology, Engineering and Mathematics (W- STEM) since joining the workforce, and then recently in the

last year I did attend NSBE as a professional to recruit candidates for openings

within the company and then also attended professional development workshops.

P9 mentioned,

But having said that I just recently signed up to be a recruiter at the NSBE fairs.

So, I'm looking forward to getting back engaged and I've updated my membership

and things like that just to try to be a little bit more involved.

P10 described how being connected to professional engineering groups such as NSBE

provided different opportunities, "They provided opportunities for scholarships. They

provided opportunities for networking. And probably my first corporate experience in

networking suites with companies was with NSBE, and those were all positive coming to

work professionally."

Theme 2: Connections to colleagues

Several participants mentioned they connected with their colleagues through

engaging in face-to-face interactions, whether that was through interaction in the office or

after-work activities. P5 stated, "So we used to have a different like associates like happy

hours." P7 described how she also connected informally with her colleagues through

after-work activities, "I've also connected informally. So, whether that's lunch, happy

hours, or team building kind of outings like that as well." P8 and P9 went into detail

about how they found it more productive to engage with and connect with their

colleagues face-to-face versus using online methods. P9 stated,

But now I just prefer to actually walk to a person's desk or meet them in the break

room or over coffee just to discuss different issues or processes that we have

because I feel like that's a clearer way of getting the information versus sending

emails and WebEx messages back and forth.

P8 mentioned how COVID affected her connecting to her colleagues face-to-face as she

preferred:

Before COVID, I'm a fan of face-to-face interaction. I'm just wanting to read

body language and, you know read cues. For me, I would just go straight to the

person, you know. During COVID, of course, it was mostly online over zoom or

teams, but I would still connect directly. For me it was just easier to connect

directly.

In dialogue about engaging and connecting to colleagues, some participants did

share how they felt disconnected from their colleagues. The reasons why they felt a

disconnect ranged from race and age to personality traits such as not being easygoing. P1

described feeling excluded when it came to connecting to her colleagues; "Oh, I find it

very difficult to connect with other employees. It's predominantly White men and I find,

especially socially, anything else outside of work conversations I'm typically excluded."

In describing disconnections to their colleagues, P3 mentioned the differences between

colleagues who worked in the office and personality traits of not being easygoing

possibly playing a role:

I get along less well with people, I notice at least, who work in the office, who

primarily work the office. It's just kind of like a, I don't know, it's almost like a

personality trait that they all seem to carry, or maybe even I carry it, I don't know.

But I tend to just get along better with people who don't sit behind a computer... I

guess I didn't think about it with the people in the field. They just tend to be more

easygoing...

P6 discussed how in her experiences connecting to colleagues, she tended to gravitate towards colleagues that looked like her in race and age. At the same time, a disconnection was maintained with colleagues due to her feeling as though she could not be her true self in fear that she would be stereotyped:

I tend to gravitate to employees that look like me, but they're not in the

engineering department. And I'll probably, I gravitate also to other millennials.

But it is awkward that I'm not 100% my true self. And I can't be my true self

because then you'll get put into a stereotype.

Theme 3: Teamwork

When asked about their experiences working on a team, some participants shared how they encountered doubts, being questioned, and feelings of exclusion from team members. Some even emphasized experiences from early in their career and past work experiences. P1 shared,

You need to go above in the end often and in a team atmosphere. I can't leave

room for any holes. There is a ton of questions and people doubting my words.

So, I feel like I'm constantly on the defense, or I constantly have to be over-

prepared to deal with those scenarios. And with dealing with other teams because

with engineering, especially in industrial engineering a lot of the time I work

with safety or for quality work, work with operations maintenance. So, I find

there's a lack of respect even with my role. And even in my own team, with me

being a Black woman and I'm younger it's especially difficult with team

members and I think it takes a lot more effort.

In recounting her teamwork experiences, P4 expressed her challenges at a previous job:

It was interesting only because like I said I knew I was qualified more qualified

than a lot of the people that I was working with. And it would be frustrating

unless they like pair me with one of the systems I was talking about earlier, and

then we'll just go and do the work and knock it out and get it done. But I think it

was more so not the day-to-day with the actual my actual coworkers, but more so

the management and I think management knew that I was running circles around

some of my other employees.

P5 and P10 mentioned experiences early in their career when sharing the challenges of

being questioned by team members and feeling competition with their team members. P5

stated,

And you know, of course, people see you as a Black woman. I feel like they

always want to question you know what you have to say initially, and so I feel

like once I get over the point and the habits of growing hopeful in myself,

teamwork has become a lot easier. But it's always initially just kind of you know

establishing who I am and what I can do and accomplish first in order to be fully

respected.

P10 revealed,

Working with a team so early on in my career, working with the team still felt like

a competition. I explicitly worked with a person, we were on the same, we

worked for the same supervisor and publicly he had one face, and privately he had

something else. And I had to kind of tell him, I don't really want your position. I

just want to be here living my best life. I never said I wanted to ascend the

management chain. And it went so far as we were supposed to be working

together, and he wanted to split our work out into two separate idea streams,

which was stupid. Okay, fine if that makes you happy. But most of my experience

in teams, I'm very, I think, blunt with my wits, with my teams. Maybe early on, I

would say in that same group, I felt like, the team shared information where I

could never really be seen as the same member of the team. They were all friends.

They were all White. They hung out outside of work and they would have

conversations that I wasn't privy to or share information.

Theme 4: Doubting Feedback and Proving Self

When discussing how feedback and opinions were received, most participants

described facing resistance from colleagues and the need to prove themselves to their

colleagues. It was also mentioned by participants that the most challenging part of being

an engineer was convincing people they were competent in what they said and did in

their role. In describing the resistance to feedback or opinion, most participants stated

that openness did depend on the situation. Situations such as time in their role, project

assignment, site location, and who was receiving the feedback. Also, some participants

mentioned how colleagues who had been in their role for a lengthy amount of time were

more resistant to receiving feedback. P2 described how when she began her role in the

organization, her opinion was met with uncertainty, "In the beginning, there was a lot of

hesitancy and almost uncertainty from my colleagues on my opinion. But now they've

grown to understand that I'm capable, I guess is a valid word to use." She also discussed

convincing others as being a challenge in her role:

> I hate to keep going back to this point but it's initially getting people to respect
>
> and understand that you have the credentials, too. So, I think that's most
>
> challenging because it's not only within my company because I'm the face of my
>
> company to our customers. Now I also have to convince them.

Regarding how her opinion and feedback was received P3 stated:

> If I'm dealing with engineers who, once again, are in office and have been doing
>
> it a really long time, they're not that open actually to it. They're like this is how
>
> we've been doing it so we're going to continue doing it and I'm smarter than you.

P4 described,

> I found that when I when I'm working with White males that are better managers,
>
> they don't really, I don't want to say don't care too much about my opinion. I don't
>
> know what that complex is but I've come to the state where if I'm in a meeting I
>
> just will say nothing unless someone actually asked for my opinion. But I found
>
> that when I worked with women that are project managers or just other people
>
> that are on the same or as noble as me I feel like my opinions get heard. and
>
> people are willing to share and discuss all of our opinions.

P7 described how building her reputation contributed to the reception to feedback but that

was not always the case:

It depends on the space of the site that I've worked on and the project that I've worked on. I would say in my most recent role, it has been heard and people have been receptive to my feedback. I do think now that I have more experience that has come with a certain weight and I've built a reputation at the site, but I don't necessarily know that that has always been the case. But I think in my current role, I do think that my voice is heard.

Being questioned and doubted when participants did share their feedback or opinion was a common experience. Most participants referred to having to prove themselves and gain respect from colleagues in order for them to begin being open to receiving their feedback and opinions. P1 stated,

My feedback, my opinion is definitely always scrutinized like I said, I can't just give an opinion. Okay give an opinion, and then I have to follow it up with facts, examples graphs, and data, which is normal in engineering. But compared to my peers, I have to do it even more. Like I have a presentation template that everybody else has, but plus I have a binder full of all the data just in case they state their doubts. When it comes to opinion, I don't think there's a whole lot of room for opinions when it comes down to certain or most projects. But with me, like I said, I come over prepared. I've fought and earned respect.

P5 mentioned how feedback was sometimes taken into consideration but only after being questioned:

I have some points where my feedback is just taken and held in high regard, and I feel like that only comes after, like I mentioned, a lot of other questions after I

quote unquote proved myself and what I can do. It's at that point my opinion is

taken in high regard. In other instances, I feel like I have to kind of be loud or you

know kind of bully my way in to make my voice heard. You know sometimes I'm

speaking, and you know I say one thing and it's questioned, or someone has to go

back and double-check just to see if what I say if it's accurate or not.

P9 described how her feedback and opinion was received was dependent on certain

factors:

It depends. It depends on the group; it depends on the persons in the group. So

sometimes it's welcomed and other times I've been in hard manufacturing where

it's questioned every time. So, it just depends on the different, the different work

groups that I'm in.

She also reported her biggest challenge was with having to prove herself, "I would say

most challenging through the years is just trying to convince people that you know what

you're saying and it's true." Similarly, P1 stated in discussing one of the most challenging

parts of being an engineer, "And on top of that, being a Black woman, you know there's

more layers to how you have to communicate or convey yourself in order to get things

done and convince people you know what you're doing. Unfortunately." P11 stated that

the most challenging part of her role was proving that she was not a whiny woman:

Having to prove that women aren't just whiny or the B word. Yeah. So, it's as if,

um, if you're in a room, for me, if I'm in a room and one woman is less invasive or

in your head or says something crazy or off the wall, or isn't paying attention, it's

almost as if they think birds of a feather flock together. So, I struggle with that.

Like if a woman is in a place, a victim mentality, I have always found that the rest

of the room just assumes that all of the women in here are that way, and I have a

hard time. That's a struggle trying to fight that mentality.

Theme 5: Discrimination

More than half of the participants mentioned race, age, and sex when they

discussed the barriers they had experienced in the engineering profession. The idea of not

being treated as knowledgeable because of their race, age, or sex was mentioned. Also,

starting in engineering young was discussed as somewhat of a barrier. P3 stated,

The first barrier, I think, would be my age. When I first came a lot of people kept

asking me what high school I went to. They thought I was an intern and then so

there's that barrier as far as my age and just not being knowledgeable.

Similarly, P8 described a barrier involving ageism and how age, race, and sex was used

to keep the status quo:

I feel culturally I've been in situations where I've had to work with members of

other cultures so that was sort of a barrier. It could have been a language barrier

there. Being a woman, you know that it was some type of barrier there because in

certain cultures there are no women in India or Indian women in that field.

Ageism I've had, I've heard remarks about my age. I will say overall, it's just

people creating obstacles because you're different and they lack that

understanding. Your coming into a situation and people feel like you're going to

switch things up. I feel like they will use things like age, race, and sex to keep the

status quo.

P5 expounded on how dealing with all the isms and colleagues' unconscious biases was a barrier for her in the engineering profession:

> I would say it's just really having people seeing you are Black, people seeing you are woman and then you know I'm still pretty young. And was even younger when I started off engineering. So, one of the barriers was just, I feel like all isms, just dealing with people's unconscious biases and having to prove myself before I even got work done.

P6 explained how she had not experienced too many barriers but has had situations where she was the only African American woman in the group and wondered what others thought of her:

> I would say like in general, I think it can be kind of intimidating personally, sometimes when you just see you're the only Black female, which I've been in a few different times where I've been the only Black in my group. And feeling like, okay, am I being looked at a certain way? I feel like, am I being seen at my highest potential?

P7 mentioned the barriers she has experienced was pushback from colleagues but could not pinpoint if it was due to her age, race, or sex:

> I have worked at multiple sites at this point, and when you look at some of the demographics of the different sites, some of them have skewed to have older employees. So, I feel like on the sites where more of the employees skew older, I have in some cases received pushback in terms of people not thinking I have enough experience, or I might not be knowledgeable about the task or potentially

not capable. Or see me, as you know, being more aligned to do a different type of task. And I think that it is hard to tell and that I don't know if I'm receiving some pushback because I'm young, because I'm female, or because I'm Black. But there have been instances where I don't think people have taken me seriously or given me opportunities and in different situations.

Lastly, P9 reported a barrier she experienced in the engineering profession involved being an African American woman and needing to convince people you were competent:

I would say in terms of different barriers, in terms of a project, sometimes it's just being an African American female. Sometimes it's difficult to convince people that you know exactly what you're talking about the first time. So, a lot of times I just try to be more prepared with data and things like that so that when I do speak or speak on something I've done, the preparation to know what I'm speaking on is true.

RQ2: What is the experience of organizational support for African American women in the engineering profession?

The results of this analysis for the second research question identified six themes: (a) empowerment and voice being heard, (b) public recognition and rewards, (c) mentoring and training, (d) software and request systems, (e) supervisor accessibility and support, and (f) diversity and inclusion initiatives. The themes presented for this research question will be described in detail with direct quotes to expand on the experiences of support in the workplace.

Theme 1: Empowerment and Voice Being Heard

More than half of the participants reported feeling empowered by their voices being heard. Specifically, being heard through leading or making decisions. P1 stated that empowerment was felt during coaching others, "I do feel like I've had moments where I feel empowered at work. The most empowering experiences for me have been when I'm put in the position to coach or teach others. That's empowering." P2 stated that empowerment happened while taking the lead on a project, "Because I handle three or four programs, I take the lead on all of the activities for that particular validation. So, if I had to say something that's empowering, then let's go with that route." P6 experienced empowerment when her voice was heard through the opportunity to lead meetings:

> I like the fact that he (people leader) gives us the space we need and the floor sometimes to just take over and say what needs to be said and if we need help, he jumps in and helps us. But definitely, he gives us the opportunity, in what we call skip level meetings, where we skip a level, go to his boss or another boss, a lot of times we'll lead those meetings. We'll present or talk because actually, that's how it should be. We're the ones doing the work, there as a support. But he's not just there taking over the meeting if you get what I'm saying. He allows us that space and opportunity to speak and just to be at the forefront.

P5, P8, and P9 described how making decisions made them feel empowered the most. P5 shared when she felt most empowered:

> I feel most empowered when my voice is heard. So, when people are really listening to my ideas and taking my ideas and you know we implement them I feel empowered. I also feel really empowered, too, when my manager gives me

the opportunity to make decisions, especially decisions I feel like he should be

making or he should make.

In addition, regarding making decisions P9 mentioned, "I think I'm empowered to…make

reasonable decisions." P8 reported, "When I have my own autonomy to, you know, make

my own decisions within reason of course, but when I'm able to kind of stand out and do

my own thing."

Theme 2: Public Recognition and Rewards

More than half of the participants acknowledged that they were shown by the

organization and peers that they were valued and recognized publicly through verbal

acknowledgment and through receiving some sort of reward. P2 described her

organization showed that they valued her contributions through a standard system,

When you're three years in service with the company they'll provide you a plaque,

with a package where you can order a gift for yourself, 5 years in service, I think

it's ten, and fifteen. So, because I'm six years, seven years in, I've already

received two awards from the company to show that they value my service to

them.

Some participants identified team meetings as a meaningful place where they received

public acknowledgment and verbal recognition from organizational leaders and peers. P5

described how weekly meetings and team meetings were a space where her

organizational manager verbally acknowledged her contributions:

I have weekly meetings with my manager, and so that's usually a place where you

know he can express that recognition. We also have weekly team meetings.

They're virtual but team meetings is also a place where you know you get a

shout-out and are also recognized for your contributions.

P6 also mentioned how her organizational supervisor verbally acknowledged her

contributions during one-on-one and team meetings. Additionally, she also mentioned

how she has received rewards in the form of gift certificates as an acknowledgment:

I know at the level that I'm working at with my immediate supervisor, he just

says thank you. He just said in a meeting today, he stopped at the beginning of

the meeting, everyone wasn't in there yet or the person who needed to be there,

but he was just like, team, I want to take this time and let you know I really

appreciate your work and everything you're doing and the hard work you put

into this. And he does that a lot. He does that every so often he'll just say, you

know, thank you so much. So, that may be simple, but that's one thing, I guess

one way he shows. Oh, I know, for different contributions, different awards. I

got an award last year from an engineering organization. They knew about that,

and they gifted me a virtual gift certificate, a $100 gift certificate to buy from

those online stores where you can pick different gifts.

P5 also mentioned receiving rewards in the form of certificates from her teammates was a

form of recognition, "I've mentioned we have peer-to-peer recognition. So, I've gathered

certificates from teammates or even emails. They say great job, or you know things like

that. Just verbal recognition for my accomplishments." Several participants also

described how peers showed recognition to them publicly through verbal means and in

meetings. P6 reported, "If there's a contribution or something that you've done, they'll

just verbally recognize you and maybe say congratulations. If it is mentioned in one of our group meetings, someone will say something and then everybody will congratulate you." P8 shared,

> I've gotten compliments through emails of appreciation and over team meetings.
> We have a bulletin board at work where if someone wants to leave something on
> there, I forget what it's called, but it's like an appreciation type thing. So, I've seen
> where people have left sticky notes with my name saying they appreciate
> something that I did.

Lastly, P11 recalled ways her peers had recognized her accomplishments, "They give these adorable certificates and they're like virtual thank you cards. And then you get like shout-outs in meetings, which I think is really nice."

Theme 3: Mentoring and Training

> More than half of the participants reported that mentoring and training opportunities supported their career advancement inside their organization. P3 stated,

> I think the people who have been doing it a long time are my biggest resource.
> But as far as what the organization provides is probably like tuition
> reimbursement. If you want to take classes or get a certificate or get your license.

In addition, when asked what resources they had that supported their career advancement inside of the organization P8 reported, "Mentorships. They have really good mentor programs." P11 mentioned how mentoring groups assisted her with searching for jobs and understanding her skill set:

I mean, there are quite a few groups that do mentoring. So, the mentoring is what I participate in most, and that definitely has going to help me or how to look for a job. Understand what skill sets you need to get to the next level and how to develop the mentoring.

P6 revealed how she utilized the financial seminar training when offered:

I'm a big finance person and a money person. So I'm making sure I'm saving and I'm investing and doing certain things to curate the type of life that I want to have. And whenever I see those groups, when they are holding any type of financial seminar or meeting or whatever I make sure I tune into that.

She also described how mentors had supported her advancement in the organization:

Mentors. I have a couple of people that I try to connect with on a regular basis, and they've given me good advice since I've been at my organization. It's a few different ones. I've been a part also of mentoring circles, whereas a few of us that are learning from one particular leader.

P5 and P7 mentioned how training supported their career advancement in the organization. P5 reported,

We have a lot of training and competencies, training for competencies that we can do online as well. We do have online tools and online training that you can do in the background. As well just to help, you know, build up that skill set. And I think those are probably the biggest ones just like more online training. The employee resource groups, they sometimes have professional development events. You know to help build certain skill sets as well.

P7 shared, "So I have access to numerous trainings, whether they're in-person or virtual through various platforms whether they're internal or external. I have opportunities to attend conferences whether that is to recruit or for professional development."

Theme 4: Software and Request Systems

Software and the ability to make requests were the top two resources mentioned when the participants discussed the tools and materials the organization provided them with to do their job. Most of the participants mentioned having a formal system in place to make requests for resources. Some discussed the formal system being an online portal where they could make requests whereas others mentioned going to specific individuals to make requests. The software was a common resource that was provided to the participants to help them do their job. P4 reported,

> I have all types of software that I use from CAD to auto CAD, to micro station to
> project the scheduling. And if I do have questions I can go to that person and ask,
> and if we don't have the resources, let's say I needed a design standard manual,
> they'll either say, "Just use this one. This is from last year, but it'll be okay
> nothing much has changed." Or if we really needed and the whole office can
> benefit from it, they'll probably just buy it.

P6 mentioned how the organization provided her with a free software store, "Well, I use a lot of different types of software, so the cool part is they have a software store that's free. You go there and type in what software you need and just download it." P7's organization has an IT team who was beneficial in making sure she had the software she needed to do her job:

I would say that they do the best to provide everything that I need. I have a laptop,

we have an I.T. team that is able to put various software or access to databases on

my computer. So, having everything that I need digitally.

P5 described how making requests was possible, but sometimes it is easier to get the

material she needed on her own:

The company does give you the standard things I feel that any company does. So,

for any software that we need we can just get approved through our manager to

set up to accomplish tasks when it comes to software and hardware as well. But

like, I said it's so much bureaucracy and things you have to do to just get that

approval. Sometimes it's easier just to take the alternative path, unfortunately.

 P2 and P11 detailed their organization's request process. P2 described,

If there's something that we can't complete our job with we can go to this portal

and make a request for whatever it is. So, I think that that resource alone is very

beneficial. There's also just like a standard ticket that you can put in. That'll allow

you to request things that do help you or benefit, you know, doing your job.

Lastly, P11 mentioned, "If it's the software that you need, you just really fill out a

software request, state your need, and then generally it's approved. They're pretty good."

Theme 5: Supervisor Accessibility and Support

Most of the participants mentioned that their supervisor helped them to succeed in

their position and invested in their success through being accessible, meetings, giving

feedback, and showing support in different ways. P5 and P10 discussed how their last

supervisors contributed to them being successful in their position through feedback and

meetings. P5 stated, "You know my last manager has been really good at expressing when something's working, or not working, and just getting his opinion in terms of what he thinks I should and should not be doing." Additionally, P5 stated that feedback and providing moral support was a way their supervisor invested in their success:

So, like I said feedback in terms of you know constantly letting me know what's working and what's not working in terms of how I'm getting my job done. Also, we have like an organizational-type resume called an employee profile. So, he took the time to actually look at my profile with me and understand where I want to be long term in my career and try to give me assignments that would help you know, with the goals that I have long-term and short-term as well. As well as looking at my competencies and giving me tasks and assignments that will help build on some of the competencies. As well as I will say just moral support. I feel like that's something that is overlooked a little bit in terms of getting help from your supervisor. Moral support and being understood in terms of just personal things that comes into my personal life.

P10 shared,

So, my last supervisor was very direct when he had, his staff meeting, you pull up your work and go, "So, this and this" and it was weekly. So, you always knew what he wanted. And then in meetings for the key stuff, he was there and would interject what he thought, and he gave negative feedback immediately and not necessarily in front of people.

P6 and P11 expressed how supportive their supervisor was. P6 described,

He's been supportive. Like he's written me a recommendation letter, for example, before when I asked him to. He's super supportive of work-life balance. I think that's the thing I like about him the most is that if something personal comes up and I need to take some time off or go away for a few days, take a day or whatever, he's always been supportive of that.

P11 stated,

Extremely supportive. Oh, my supervisor will fight to the death for us. She just wants to know what it is that you need. So, it's almost as if you got an issue and you take it to her, she wants to understand the whole issue. She wants to understand what the position is. If she's got questions or if she disagrees you talk about it amongst the two of you and she goes around and fights. It is the most beautiful thing ever. She is supportive in every way.

P7 and P8 mentioned how one-on-one meetings helped them to succeed in their position. P7 reported, "So I think that my supervisor has been pretty accessible, I have a weekly meeting with him where we talk about my projects, and I can ask him a question." Similarly, P8 described,

Oh, again, we have our one-on-one. So, during that time if there's anything that I need to tighten up on or if there is any insight that she can give me it happens there. She'll let me know if there's an opportunity that I need to get on to you know, help.

Theme 6: Diversity and Inclusion Initiatives

Participants discussed how their organization fostered diversity and inclusion. Most reported that their organizations had different groups, programs, and events available for people to join and attend. Although these were available and took place, some participants also mentioned that more action needed to be taken. P1 stated,

From my experiences and from what I know they do have programs available, but after discussions about how we should be inclusive. But I do not believe they take enough action in order to show that they themselves support diversity. For example, in hiring or even setting up university and community relationships. And you may have people that do events but that's like there's more that could be done.

P5's perspective is that her organization does a great job of implementing diversity and inclusion groups and events. She stated,

I feel like they're really dedicated. So, we have a diversity and inclusion week at the company. Once again, we got employee resource groups for all types of people. So, like there's a Chinese group, there's an African American group, there's a group for women, a group for the LGBT community. There's all types of groups where you can, you know, find your people I guess for lack of better words. The company also recognizes the different months, like pride month and Black history month, there's a whole series of programming dedicated to Black history. There's a big day for international women's day.

P6 and P8 mirrored similar sentiments. P6 reported,

Well, there's an entire DEI office that's dedicated to fostering initiatives and

efforts in all of the things related to that for DEI. So, I've actually worked directly

with that office through the employee resource groups that I'm in for different

workshops, activities, Black history month program, and various programs

throughout the year where I work directly with some of those people and I will

say that the person, one of the head people that are in that office, she does have a

true passion for DEI initiatives.

P8 described,

We have a whole diversity and inclusion department with a VP and everything.

They hold monthly diverse, we call them DNI activities, virtually. Depending on,

I guess, what that theme is that month, I've been to a DNI seminar, it was during

pride month and I can't remember the title of it but basically, the whole point of

the seminar was talking about the pronoun he/she, all of that and what is

appropriate and not appropriate if you were to have a coworker that's a

transgender and how to go about that. So, this is an example of what that

department does. They put on different events every month and if you want to

sign up you can. And then our department we get credit for attending the diversity

and inclusion events.

P10 went into detail about the various support groups and events at her organization.

However, she was not sure if the events helped to foster diversity and inclusion. She

shared,

A lot of teams will host events where we would go off-site and go pick one of those projects and work together. I don't necessarily know if the diversity and inclusion, I don't know if I feel like they work. I'm not likely to go to the Chinese associations, the year of the dragon, I'm making that up, event but we have had a lot of discussions. I would probably say the LGBT group, I would say they have the most visibility. But we have a group for almost everything. There's a Hispanic association, a Chinese association, an LGBT group, the Black people have a group, women have a group, and veterans have a group. So, they do have a lot of support groups. That's the way I would say that we do have the flexibility to have a lot of support groups and the executive team tries to fairly support those groups. I would say it's a little harder for groups to intermingle if that makes sense.

P3 and P4 mentioned how their organizations attempted to implement initiatives but it did not seem genuine and important to the organizational leaders. P3 detailed,

But we are all encouraged to take a survey about diversity which was asking some questions that were similar to what you're asking me now and I guess they are evaluating that information and figuring out how to implement it. But I haven't really seen anything. In my organization, we do have infinity groups. So, we have like Black Employee Network, Asian Pacific Islander, they just came out with a new one that's for disabled people, and they have the Reigning Pride, and they have for people who are Latinx and so they have that and they allow each group to put events on. You still have to get permission from your supervisor to attend those events. I never really expressed I was part of the Black Employee Network

to my supervisor, except for my last supervisor, because I don't know, I always
got this weird look like, "Why are you doing extracurricular stuff? This is not
important." So, I never really expressed that. I have noticed at work some groups
because we have this directory where you could look at people's pictures, some
groups are not diverse at all. It's actually pretty, I think it's funny because, I don't
know why actually. It's just so obviously not diverse and nobody seems to care.

P4 mentioned how the attempt to implement initiatives, such as giving employees
Juneteenth as a holiday, did not seem genuine, "It's not visible to me how dedicated they
actually are. It seems like they're just checking boxes just to say that they didn't. It looks
good on paper. That's how it feels for me to me right now." P9 described diversity and
inclusion when it came to positions within the company and how the concept of diversity
and inclusion was going to take a while to reach everyone from the top down:

It's just a matter of the company may see that there's a lot to do with diversity and
equity and inclusion and things like that and you do see a lot more African
Americans outside of H.R.-type roles in leadership positions. But I think it still
has a lot, there's still a lot of room for improvement.

Participants had the opportunity to add any information they wanted about their
engineering experiences. More than half of the participants referenced their race. In
addition, participants added how more work needed to be done regarding increasing
representation, open-mindedness, diversity, equity, and inclusion initiatives. P1 stated,

I do feel like as African American woman my experiences all together with
engineering has been positive. It's given me a lot of opportunities to learn things,

network with different people, and travel to different places. By me being African

American, and different from a lot of my colleagues it has been very difficult. I do

know that over the years I have seen diverse groups grow, even my own. So, as a

Black woman, I've seen more women in the field, but even myself, I'm looking

forward to doing more in order to increase that representation. I feel like that has

been difficult. It has created a lot of barriers for me in the workplace. I'm looking

forward to more actions by companies in order to I guess increase representation

hire more African American women, and also for those that are already working

in the company to create a place where they feel included. So, looking forward to

more diversity in the workplace.

P5 reported,

I feel like you kind of just accept that as the norm as well as just dealing with you

know, folks' unconscious biases. So, I know there's definitely a lot more work to

be done in terms of diversity, equity, and inclusion initiatives. But I would say in

the last few years, you know, it's been a heavy focus on making sure that people

feel included even though I feel like you know it really hasn't trickled down to the

peer level its more so on a still kind of on a corporate and high-level, manager

level where you know it's really pushed.

P2 described that after the barrier was broken down, things were fine, but you must show

people how to treat you. However, there was still work to be done:

So overall like, I said, after people actually got to know me, they allow me to kind

of do my thing. So, the one negative point that I have for engineering, in general,

is trying to break down that barrier. But once that happens things are okay.

P4 said that there were still things that needed to change, but when she thought about

African American women engineers from as early as the sixties, they have come a long

way:

I was going to say overall like I always try to reflect on other Black women in

engineering that we're like doing this in the sixties and like the fifties and

seventies and what not and I know they had it like 100 times harder and like

worse and everything that I have probably gone through they probably went

through it like 100 times worse. So, a part of me feels like it's still like work to

do, but at the same time, I feel like the industry in general has somewhat come a

ways. And a part of me feels like me just simply being a Black woman in

engineering it's kind of that in and of itself is a part of the movement and every

time I'm like maybe it's time for me to leave engineering I remember that.

P10 tries to have a personal impact on children so that they can see that African

Americans can be engineers:

So that part was sad, but whenever there's a chance for me to give my voice to

those who were breaking in or what we're doing, I try to volunteer in those areas.

The volunteer activities that I picked even were to help develop me, but also so

that children see Black people can be, you know, an engineer. So, I'm usually

very tied to things where I think I can have a personal impact so that maybe the

next person doesn't feel isolated or unsure and not have a space.

RQ3: What is the experience of commitment among African American women

engineers?

The results of this analysis for the third research question identified four themes:

(a) commitment level, (b) organizational culture, (c) connecting to people, and (d) lack of

diversity. The themes presented will be described in detail with direct quotes to expand

on the experiences of commitment in the workplace.

Theme 1: Commitment Level

Out of the 11 participants, five stated it was likely they would stay at their

organization. P2 stated,

It's highly likely like I said because I've grown and they've come to accept me.

I'm comfortable with working with my colleagues now and I mean I've invited

them to my home. They've invited me to their home, so it feels more like a family

not just, you know, coworkers.

P3 reported, "I would like to retire there." P4 shared that she is okay right now and would

stay but would leave if any issues occur in the future, "Right now I don't feel the reason

to leave so right now I would stay for however long." P4 described, "I don't see myself

like retiring there but a part of the I feel like the grass isn't greener at any other company I

go to. I've already built relationships and whatnot so like right now I'm okay." P7

mentioned, "At this point, I'm pretty likely to stay with the organization." P9 was likely

to stay, "Oh, very likely. As long as they'd have me, I'd stay." P10 reported she would

stay at her organization for at least another 5 years, "Now I have a personal loan out of my pension plan, so until I pay that off, I'm probably going to stay at least another 5 years."

Four participants did not see themselves staying at their organization. P1 mentioned, "I will not stay. I've fought hard to get the experience and really stack my resume. I do look forward to a place that we work at where I'm treated more fairly." P5 reported, "Not highly likely". Similarly, P8 stated, "I would say less likely because in that no part of the organization, but I just need some variety in my life." P10 described how her health benefits had driven her to look for other positions:

> Took my daughter for her physical and her school requires an eye exam. Okay, give her an eye exam. I got charged separately just for the eye exam. That's not a part of the physical. I get a bill and didn't even know I was going to get them. So, that part has been a driver in me. I've not really interviewed, but I looked. I said I had to have a side job somewhere to say they cover vision, medical, and dental.

Two participants reported feeling unsure if they were likely to stay or go. P6 described,

> Yes. A great question because I have been thinking a lot about that recently. Unfortunately, my organization has not been in the best light recently with some layoffs that's been happening around the company, so I don't have a definite answer for that.

Similarly, P11 reported,

> Um. So, before yesterday, I found a resume writer that will help get me together so I can get out of here. Now, I was in a meeting yesterday when my boss's boss

was like I met you on Friday, and she's amazing, and I'm looking forward to talking to her more. And so, it kind of made me feel like I wouldn't be stuck in a rut forever. So, on one hand, I'm ready to go. On the other hand, I'm interested because somebody on a higher leadership level is intrigued and interested in me.

Theme 2: Organizational Culture

When discussing what would increase each participant's commitment to their organization, most participants mentioned reasons involving organizational culture. These reasons included factors affecting the work environment, hiring processes, training offered, and organizational customs. P1 explained,

Equal pay first. And we definitely need a lot more training on racial biases and treatment in the workplace. This particular place needs a culture change. But even other places. I've worked at, as I mentioned before, I worked in consultants. I bounced around to quite a bit of companies, over 15, and I would say everywhere we definitely need more racial bias training.

P2 talked about how planning activities to increase the connections among the staff could increase her commitment:

I think to increase connections in the workspace. You probably need to have activities outside of work, some team bonding activities. Maybe you do a happy hour together, or you know, maybe baseball, or basketball game, something to allow people to get to know each other outside of the work environment.

P6 and P7 mentioned increased representation and a diverse culture. P6 stated,

You know, I want to be at a company where I see people who look like me in

high positions in powerful positions to be an inspiration and encouragement, like,

hey, maybe I can do that or that's something I might like to do, possibly. So, that's

super important. You know, representation as well.

P7 described,

I think that they could be doing more to foster a more diverse culture and bring in

more underrepresented minority engineering groups. Candidates that fall under

those underrepresented groups, whether it's Black or Latino, or even in a lot of

cases women. I think I'm in a unique situation right now, um. And then I think

supporting those people once they come in, because I think there have been

multiple cases where they bring people in, but they can't retain them.

P10 mentioned the culture of the organization in terms of the practices changing could

increase her commitment:

My health care is definitely one, but I would like more transparency. And my pay.

The other thing that I know that's not going to change, that's cultural. And my

group is the idea that the higher-ups like you get all these extra perks, like a

bathroom or parking space. If we dismantle some of that.

Theme 3: Connecting to People

Connecting to people was a common theme amongst seven of the participants

when it came to what excited them about going to work and the work tasks that they

enjoyed. Some participants mentioned connecting to customers. P2 stated, "So when

we're in the vehicle on-site or we're dealing with an actual customer, I think that's most

rewarding because we can solve the problem and can see the satisfaction on the customer's face." Similarly, P6 described getting letters from customers as something that excited her about going to work:

> So, a lot of times where a few staff, we've actually gotten letters from customers who they were in maybe some type of a car accident, or something happened, and their airbags engaged or their safety features engaged. And you know, maybe the car was totaled, but they were okay. Send us back letters like, "Hey, thank you so much and the safety team for the work you're doing, you know, the work that you put in. I came out with minimal injury or no injury because my airbags were coming out right. My seat will work properly. Everything worked like it was supposed to work. And because of that, you know, my life was saved." So, I think that's always a great thing to see and hear those testimonies and people come back just to say thank you.

P11 shared that it excited her to see her product on the road and speak with people who were driving the Mustangs that were made around the time she was in the Mustang program:

> One of the other things that actually is exciting to me is when you see your private life on the road or you talk to somebody who, for instance, I was in a twenty-eighteen Mustang program. And so when you talk to people who are driving twenty-eighteen Mustangs and love them, that excites me.

Others talked about connecting with their colleagues was a task they enjoyed. P7 mentioned, "I also do really like working with people, so I like training operators to new

processes. I like getting feedback." P8 stated, "I enjoy research and data mining the data portion of my job. I also enjoy when I have to do my client interview that I enjoy though talking and then people meeting new people." P11 mentioned enjoying learning about her colleagues, "I actually enjoy talking to people about the things that they do, especially when they're excited and they're excited and invested. So, I enjoy that." P9 and P10 reported that they enjoyed interacting with their team. P9 stated, "I enjoy communicating with my team. I enjoy working with my team." P10 mentioned,

> So, I've been on the front end of newer technologies that we've launched. And at the beginning, it was really uncomfortable because the team has been stretched in ways that they're not used to being stretched. But you are interacting with people, probably it's definitely the highlight, and then being connected to what I work on.

Theme 4: Lack of Diversity

When asked what the participants did not like about their work environment, the lack of diversity was a theme revealed by most participants. P1 stated, "It's not very inclusive, it's not that diverse. I'll say I think I would enjoy my work a lot better if there was more diversity. People were more accepting. If I didn't have to fight so hard." P4 described her dislike of being the only African American woman at her organization and dealing with being questioned:

> Back to being the only Black woman there and being told that there's really not that many out there to hire frustrates me and now I would have to take it upon myself to go do the work, somebody else's work, in order to see more color. I would say that's the biggest. Every now and then I'll get ignorant comments, like

ignorant questions asking what I feel is dumb stuff that you learn in high school

like "Do you know how to do this?" and "Do you know how to do that?" That

frustrates me and for me I'm curious, do you ask so-and-so questions like that? Or

is it just me? So then again, I start questioning, do they think I'm not qualified to

be here, or do they ask everybody those questions? Like, my gears get to rolling.

And I had a couple of comments or questions like that at this company. At the

prior company, I would get dumb questions like, "Did you like you stick your

hair…" because before I locked my hair it was just natural and they're like, "Oh,

did you stick your fork in an outlet?"

P8 reported being the only woman in the office and what it was like working with men:

In my previous environment where I was in manufacturing, I did not like I was

the only woman in my office. So, I stayed a lot to myself. It wasn't a lot of, I just

felt like the mood changed when I walked in the room sometimes. Because when

it's all men, some men would have to, or they would feel like they would have to

censor themselves because there's a woman in the room. And I, you know,

appreciated that to a certain extent, but a lot of times it kind of rolled over into

work. So, you know, you have guys who have locker room conversations, it may

be inappropriate for work, and I'll come in and all of that would stop. But…

sometimes it seemed like this same action will roll over if you were talking about

work and something that may need to know about because, you know, it may be a

little bit of an inappropriate conversation mixed in with the work.

Summary

In this chapter, the results of this analysis for the first research question described five themes: (a) professional engineering group opportunities, (b) connections to colleagues, (c) teamwork, (d) doubting feedback and proving self, and (e) discrimination. The second research question described six themes: (f) empowerment and voice being heard, (g) public recognition and rewards, (h) mentoring and training, (i) software and request systems, (j) supervisor accessibility and support, and (k) diversity and inclusion initiatives. The third research question described four themes: (l) commitment level, (m) organizational culture, (n) connecting to people, and (o) lack of diversity.

This chapter detailed how participants experienced engagement in the workplace. Most participants were connected to or had been connected to a professional engineering group. The most common group mentioned was NSBE. They reported being a part of professional engineering groups to participate in additional opportunities and connect with similar individuals. Participants in general felt most connected with their colleagues by engaging in face-to-face interactions or events. The engagement ranged from interacting in the office through projects or engaging with colleagues in after-work activities. The results indicated that when it came to engaging with their colleagues some participants felt disconnected due to race, age, and personality differences. Several participants experienced feeling in competition with their team members, being doubted and questioned, and feeling excluded while working on a team. Some emphasized these situations stemmed early in their career and from other work experiences. When discussing how participants' feedback and opinions were received most participants

experienced resistance from colleagues and feeling the need to prove themselves. A common experience was being questioned and doubted or feeling the need to prove themselves to gain respect before colleagues were receptive. Additionally, some participants identified the most challenging part of being an engineer is convincing people that they were knowledgeable. The resistance to participants' feedback or opinion was dependent on factors such as time in their role, site location, project assignment, and who was receiving the feedback. Furthermore, some participants reported that the colleagues who had been in their role a long time were most resistant to their feedback. More than half of the participants mentioned race, age, and sex as a factor in the barriers they experienced in the engineering profession. The barriers encountered included participants' perception of not being treated as competent and receiving pushback because of their differences. Participants also described colleagues had created obstacles and loss of opportunities due to their race, age, or sex. Furthermore, the experiences of being the only African American woman in work groups caused increased self-consciousness of others' thoughts and feeling the need to convince their colleagues they belong.

In this chapter participants also shared how they experienced support in the workplace through how they were empowered. Most participants felt empowered by their voices being heard through leading or making decisions. They were empowered by leading a project, team, or meeting. Most participants experienced support and acknowledgment from peers and the organization through public recognition, verbal acknowledgment, and by receiving rewards. Meetings were a commonplace for public

acknowledgment and verbal recognition from organizational leaders and peers. The most common rewards received came in the form of certificates. Most participants believed mentoring and training opportunities supported their career advancement within their organization. The most common tools and materials provided to help participants do their job were software and a formal system to make requests for resources. Many of the participants mentioned that their supervisor helped them to succeed in their position and invested in their success by being accessible, holding team and one-on-one meetings, giving feedback, and showing support in different ways. Most of the participants reported that their organizations had different groups, programs, and events available to help foster diversity and inclusion within the organization. However, some participants mentioned that more action needed to be taken and the efforts did not always seem genuine. Overall, the stance of most of the participants was that although the engineering field has made some forward progression more work needed to be done in increasing representation, open-mindedness, diversity, equity, and inclusion initiatives.

Lastly, this chapter also detailed participants' experiences with commitment in the workplace. The commitment level to their organizations varied among the participants. The results showed out of 11 participants, five participants reported a likelihood of staying at their organization, four participants did not see themselves staying at their organization, and two participants reported feeling unsure if they were likely to stay or leave their organization. When discussing what would increase their commitment level, most participants mentioned reasons involving organizational culture which included the hiring processes, diversity, training, organizational customs, and equal pay. What excited

most participants about going to work and the work tasks was connecting to people. These people included customers and colleagues. When asked what the participants did not like about their work environment, the lack of diversity was reported by most participants.

This study gave an opportunity for the African American women engineer participants who are a part of an underrepresented group in their industry to speak about their experiences in the engineering profession. It provided an opportunity for others to learn and acknowledge the unique experiences of African American women engineers. This was accomplished by exploring three unique areas encountered by the 11 participants who were African American women presently in the engineering profession. Through the use of open-ended interviews, the results of the study were able to answer the three main research questions. The study themes included some of the positive and challenging experiences of employee engagement, organizational support, and organizational commitment. In addition, the findings gave awareness of the common experiences shared among African American women engineers that could be used to provide insight into ways to better support this group.

Chapter 4 included the results of the data collected, the setting in which the study took place, and a description of the demographics of the participants. Furthermore, an explanation of the data collection and data analysis process was provided. Lastly, this chapter included a review of the evidence for trustworthiness and closed with a summary of the chapter. In chapter 5, I will discuss the nature of the study and why it was conducted. The purpose of the study and an interpretation of the findings will be

expounded on. The recommendations for further research that are grounded in the

strengths and limitations of the study will also be discussed. Lastly, chapter 5 includes a

discussion on the potential impact of positive social change and the conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this descriptive qualitative phenomenological study was to explore African American women engineers' experience in employee engagement, organizational support, and organizational commitment in the workplace. Exploring this population aligns with diversifying the engineering profession of African American women. The extant body of peer-reviewed literature revealed a lack of understanding of the unique and simultaneous experience of engagement, support, and commitment of African American women engineers in the engineering field. Thus, this study's research design was used to explore the lived experiences of 11 participants and addressed these gaps in the literature.

The key findings were categorized into the following themes organized by the research questions. The first research question was addressed by five themes: (a) professional engineering group opportunities, (b) connections to colleagues, (c) teamwork, (d) doubting feedback and proving self, and (e) discrimination. The second research question described six themes: (f) empowerment and voice being heard, (g) public recognition and rewards, (h) mentoring and training, (i) software and request systems, (j) supervisor accessibility and support, and (k) diversity and inclusion initiatives. The third research question described four themes: (l) commitment level, (m) organizational culture, (n) connecting to people, and (o) lack of diversity.

Findings relating to engagement revealed that most participants were engaged with or had been connected to a professional engineering group. In general, participants felt most connected with their colleagues by engaging in face-to-face interactions or

participating in events. However, some participants felt disconnected due to racial, age, and personality differences. Feeling as though they were in competition with their team members, being doubted and questioned, and feeling excluded while working on a team was reported by several participants. In addition, findings related to engagement revealed that most participants had experienced resistance to their feedback and opinions.

When it came to organizational support, findings revealed that most participants felt empowered through their voices being heard and through leading or making decisions. The results showed that most participants experienced support and acknowledgment from peers and the organization through public recognition, verbal acknowledgment, and receiving rewards. Mentoring and training opportunities were identified as things that supported most participants' career advancement within their organization. Most participants felt supported in the work they did through their organization providing software and having an existing system to make requests for materials. Most of the participants mentioned that their supervisor helped them to succeed by being accessible, holding meetings, and providing them with feedback. Most of the participants reported that their organizations had various resources available to help foster diversity and inclusion within their organization. However, some participants mentioned that more action needed to be taken in this area. Additionally, findings uncovered that most participants mentioned race, age, and sex as a factor in the barriers they have experienced in the engineering profession.

Lastly, findings revealed that the commitment level to the participant's organizations varied. To increase their commitment level to their organization, most

participants mentioned reasons involving organizational culture. In addition, results showed that what excited most of the participants about going to work and their tasks was connecting to people. The remainder of this chapter includes a summary of the results. Included will be a discussion of the findings, limitations, recommendations for future research, and the implications of the study. Finally, the conclusion will be presented.

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Interpretation of Findings

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Research Question 1

The first research question this study intended to answer was: What is the experience of engagement by African American women in the engineering profession? Findings from this research on how African American women experience engagement while in the engineering profession confirmed and extended previous literature (see Beasley & Fischer, 2012; Brown et al., 2016; Etzkowitz et al., 2000; Gibson & Espino, 2016; Gill et al., 2008; Johnson, 2011; Johnson et al., 2019; Jorgenson, 2002; Ong et al., 2011; Rice, 2011; Wilkins-Yel et al., 2019; Williams et al., 2016). Each of the participants were open about their lived experiences and most stated that they connected with their colleagues mostly during face-to-face interactions or after-work events. In addition, participants mentioned connecting with colleagues through work projects. Despite being candid about how they connected with their colleagues, some participants did share that they felt disconnected from their colleagues due to differences in race, age, and personality traits. Furthermore, more than half of the participants mentioned race, age, and sex as a factor in the barriers they have experienced in the engineering profession. These findings were tied to similar findings by Beasley and Fischer (2012)

and Gibson and Espino (2016) who found that African American women engineering students described their gender identity and detailed how their racial identity made their experiences more complicated. From their perspective, how they were treated by peers and faculty related to them being a woman and being African American (Gibson & Espino, 2016). In my study, the barriers participants stated they were confronted with included pushback from colleagues and not being viewed as competent because of their race, age, and sex. However, most participants still reported times they felt acknowledged and supported. These findings aligned with previous research findings which reported that the treatment of African American women engineer students varied from feeling valuable to the academic community to concurrently encountering the double threat of sexism and racism (see Beasley & Fischer, 2012; Gibson & Espino, 2016; Ong et al., 2011).

Gibson and Espino (2016) found that African American women in STEM programs tended to attribute overall negative experiences in the educational setting to being African American and a woman. This aligned with the results of this study where most of the participants reported a lack of diversity as something they did not like about their work environment. Additionally, most reported their race, age, or sex as being a barrier for them within the engineering profession. Being the only African American woman in work groups was identified as a barrier due to wondering what other people were thinking of them and believing they needed to convince their colleagues that they belonged. In general, several participants experienced feeling as though they were in

competition with their team members, being doubted and questioned, and feeling excluded while working on a team at some point in their engineering career.

According to Johnson et al. (2019), African American women in STEM tended to worry that they would be belittled and trivialized due to being a part of a group of negatively stereotyped people. When discussing how participants' feedback and opinions were received most participants experienced resistance from colleagues and felt the need to prove themselves to their colleagues. One of the biggest challenges mentioned among participants when it came to how open their colleagues were to receiving feedback or opinions from them was that they were often questioned and doubted. Due to this, participants reported feeling the need to prove themselves to gain respect from their colleagues. Moreover, some participants identified the most challenging part of being an engineer was convincing their colleagues that they were knowledgeable.

When asked about their experiences working on a team and their feedback and opinion being received, participants shared how they encountered doubts, being questioned, and feelings of exclusion from team members. These results were like the findings of Gibson & Espino (2016) who found that when African American women engineering students were part of group projects, they reported feeling that their ideas were ignored. In addition, previous research has found that African American women engineer students reported feelings of exclusion and lack of belonging in academic environments when interacting and establishing connections with their peers and had trouble being involved in workgroups (Brown et al., 2016; Etzkowitz et al., 2000; Johnson, 2011; Rice, 2011; Wilkins-Yel et al., 2019). Participants in this study reported

that being the only African American woman in work groups was identified as a barrier

due to wondering what other people were thinking of them and believing they needed to

convince their colleagues that they belonged and were competent. Previous researchers

found that women often take on a distinctive positioning to appear qualified in

engineering environments that were male-dominated or had an organizational culture

where gender stereotypes existed (Gill et al., 2008; Williams et al., 2016). To seem

competent, women engineers reported displaying several self-identifications such as

exhibiting the ability to deal with a male-dominated, nonfeminist culture and

unwillingness in being recognized as part of a singular group (Jorgenson, 2002).

Similarly, many participants in this study reported having to do more to prove themselves

competent. These results aligned with some of the findings of Gibson and Espino (2016)

where participants described feelings of frustration because of constantly discrediting

stereotypes and attempting to show that they belonged.

Research Question 2

The second research question this study intended to answer was, what is the

experience of organizational support for African American women in the engineering

profession? Findings from this research on how African American women experience

organizational support while in the engineering field extend previous literature. Previous

literature indicated that receiving support in and outside of the academic environment

influenced women to pursue and persist in the engineering field (Green & Sanderson,

2018; Schaefers et al., 1997; Smith & Gayles, 2018). In this study, most participants

reported feeling empowered through having the opportunity to lead and make decisions.

Previous findings reported by Gill et al. (2008) stated that women engineers experienced a lack of recognition in the workplace due to gender issues. When discussing how others had provided them with recognition for their accomplishments at work, most participants in this study indicated that they received recognition from peers and their organizations through public acknowledgment, verbal acknowledgment, and receiving rewards.

Previous literature on African American women in STEM programs found that supportive academic environments influenced persistence in STEM programs (Gibson & Espino, 2016; Johnson et al., 2019; Rice, 2011). Previous research also reported a common experience shared among African American women in STEM programs was feeling that the faculty was not concerned with their academic success and accomplishments as a student (Johnson et al., 2019; Rice, 2011). The findings in this study on supervisor support extended knowledge of the support of African American women in STEM programs. In this study, many of the participants revealed their supervisor helped them to succeed in their position and invested in their success by being available, holding team and one-on-one meetings, providing them with feedback, and showing support in different ways. Lastly, participants in this study indicated that mentoring and training opportunities supported their career advancement within their organization. These findings extended previous research findings which revealed that low mentoring availability for women engineers influenced obstacles to advancement opportunities (Fouad et al., 2017; Maskell-Pretz & Hopkins, 1997; San Miguel & Kim, 2015).

Research Question 3

The third research question this study intended to answer was, what is the experience of commitment among African American women engineers? Findings from this research on how African American women experience commitment while in the engineering profession confirm and extend previous literature (Buse et al., 2013; Fouad et al., 2016; Gibson & Espino, 2016; Johnson, 2011; Johnson et al., 2019; Rice, 2011; Tate & Linn, 2005). When asked if the participants would stay at their organizations, the commitment levels reported varied among the participants. Reportedly five participants would stay, four participants would not stay at their organization, and two participants reported feeling unsure if they were likely to stay or leave. These findings confirmed similar findings by Fouad et al. (2016) who found that women who continued versus those who left the field of engineering differed in their levels of occupational commitment.

Participants shared that their commitment level to their organization would increase if specific areas relating to organizational culture changed. The areas relating to organizational culture included the hiring processes, increasing diversity, training availability, organizational customs, and equal pay. Their commitment levels being attached to organizational culture extended the literature on why women decided to leave engineering. Previous literature reported that organizational culture and organizational factors such as gender bias, lack of recognition, scarce work support, role stressors, micro-aggressions, and absence of advancement opportunities in the engineering field were named factors in why women decided to leave engineering (Buse et al., 2013;

Fouad et al., 2016). Additionally, access to role models, having a sense of belonging, and support had an impact on the persistence and success of African American women in STEM (Gibson & Espino, 2016; Johnson et al., 2019; Rice, 2011).

Connecting to people excited most of the participants about going to work and their work tasks. However, what most participants reported that they did not like about their work environment was the lack of diversity. This supports the research done by Buse et al. (2013) who found that one factor contributing to women continuing in engineering was their ability to adapt to a male-dominated environment and endure an organizational culture that displayed discrimination.

Findings and Theoretical Frameworks

Findings in the Context of the Relational Cultural Theory

The RCT emphasized understanding the psychology of women and how humans grow and develop through relationships and connections (Comstock et al., 2008; Jordan, 2010). Positive relationships between the participants and their supervisors and colleagues were reportedly beneficial to the participants in their roles and for their organization. The foundations of the RCT were that the relationships must be mutually empowering, increase a personal sense of worth, increase enthusiasm or personal zest, create the ability to better understand oneself and others, and create the drive to connect with other people (Comstock et al., 2008). Most of the participants' relationships with their supervisors and colleagues had positive elements as seen in the RCT. The participants who discussed challenging situations in relationships with working in teams for example still made mention of other positive relationships. The findings of this study

showed that most participants felt at some point in their engineering profession that they had supportive relationships with their supervisors, their organizations had systems in place to show they valued their contributions, and their colleagues recognized their accomplishments.

The findings assumed these relationships involved some elements of the RCT because it supported the concept of RCT that stated being connected and having growth-fostering relationships produces the ability to perform and increases motivation to connect with others (Comstock et al., 2008). Results supported this concept as participants reported that connecting to people was something that excited them about work tasks and going to work. Participants reported interacting with their team, doing client interviews, meeting new people, and getting letters from customers as some of the things they enjoyed and how they connected with others. Connecting with colleagues through engaging in face-to-face interactions, whether that was through interaction in the office or through after-work activities, was also described.

When analyzed from an RCT lens, the results supported the concept of RCT stating that mutual empathy and empowerment was the core of growth-fostering relationships (Jordan et al., 1991). Most of the participants stated that they feel most empowered when their supervisor gave them the opportunity to coach or teach others, taking the lead on a project or meeting, making decisions, and when people listened to and implemented their ideas. Additionally, participants felt their supervisor helped them to succeed when the relationship was supportive, when their supervisor made time for

them, when they were given feedback, when their supervisor had their back, and when moral support was provided.

Although experiences of connection and empowerment were reported, some experiences participants shared involved some but not all elements of RCT depending on the situations and the time in their career. Some reported they had experienced disconnections and shared that their relationships were short of zest and were not always mutually empowering (Comstock et al., 2008). In dialogue about engaging and connecting to colleagues, some participants did share how they felt disconnected from their colleagues. The reasons why they felt a disconnect ranged from race, age, gender, and personality trait, such as not being easy going. Participants discussed how they faced doubts from colleagues while working on a team. They reported being questioned about their feedback and opinions and expressed feelings of exclusion from team members. Although participants reported the lack of mutual empowerment and disconnection in these experiences, personal growth was still achieved. Experiencing these forms of disconnections with their colleagues seemed to push them to increase their performance to prove themselves. It also seemed to move them towards increasing their personal self-worth. Recognizing that the push back was due to age, race, or gender motivated them to put in more effort compared to their peers.

Findings in the Context of the Feminist Theory

The feminist theory was another theory that provided the framework for this phenomenological study and identified inequalities within the experiences of African American women engineers' employee engagement, organizational support, and

organizational commitment. Beliefs of the feminist theory were that women experience oppression which was displayed and faced in similar and different circumstances (Allen, 2018). Views of feminists were that in the workplace, women experience bias and gender discrimination in their interactions with men (Ferguson, 2017). African American women maintained that discrimination focusing only on gender should not have been separated from the socio-economic class and racial aspects but should have been addressed collectively for feminism to include their experiences (Disch & Hawkesworth, 2018). The findings in this study supported this viewpoint. Participants reported barriers they had experienced in the engineering profession that were rooted in issues of feminist theory. When analyzed from a feminist theory lens, the findings were that participants faced challenges related to gender, race, and age discrimination. Participants described their competency, opinions, and job roles being questioned due to their race, age, or gender which impacted how they experienced engagement, commitment, and support in their engineering workplace. Results showed participants dealt with bias, exclusion, and being treated differently which related to the concepts of the feminist theory. Equal pay and racial bias training was reported as some of the organizational culture and systems issues that needed to be addressed for African American women engineers to feel more supported and to increase their commitment. Additionally, most participants expressed how their organization and the engineering profession overall needed to put additional effort into increasing representation, diversity, equity, and inclusion initiatives. In summary, analyzing the results of this research study using the feminist theory

framework allowed for participants to discuss organizational inequalities in their experiences of engagement, support, and commitment.

Limitations of the Study

This study was not without limitations. The findings of this study focused on African American women engineers' experience in employee engagement, organizational support, and organizational commitment. However, the findings were only limited to the participants and their experiences. Generalizability could not be made to all African American women engineers and to individuals of other gender and racial backgrounds. Additionally, the participant demographics cause limited transferability. The demographics focused on African American women who worked in engineering for at least 5 years and were open to all types of engineering backgrounds. Therefore, the experiences were unique to this group. A second limitation was due to the limited number of African American women in the engineering field, availability and access to participants were difficult. Snowball sampling supported the recruitment of additional participants.

A third limitation of this study was the potential for research bias. I used techniques to acknowledge any biases. Reflection was completed through journaling and bracketing to capture and reduce biases and maintain reflexivity (Tufford & Newman, 2010). My personal epoché in chapter three assisted in increasing validity by setting aside any preconceived ideas related to the phenomena (Moustakas, 1994; Tufford & Newman, 2010). This approach allowed me to set aside my own views so I could focus on the participants' interpretations concerning the phenomena (Moustakas, 1994).

Contemplating my personal and work experiences, and racial and gender background

related to the phenomena brought transparency and mindfulness to the possible

unconscious influences. Furthermore, due to journaling throughout the process, I was

able to review the research data with an open mind and without misconceptions that

could have created barriers to accepting the data.

Lastly, a possible fourth limitation was that participants might not have accurately

recollected specific experiences relating to employee engagement, organizational support,

and organizational commitment. The inability to confirm the participant's accuracy in

their reported experiences was a drawback. The study interview questions were open-

ended which provided participants with the opportunity to speak openly and in their own

words about their lived experiences. This way of asking questions allowed the

participants to speak about their lived experiences in their own words. Also, the open-

ended questions permitted participants to respond in a detailed way other than one-word

answers. It also reinforced the ability to anticipate and gather a variety of responses and

views from the participants.

Recommendations

Several recommendations for future research are offered to study significant gaps

in the literature regarding the population in this research study. The first recommendation

is that further research should be expanded across the United States with the potential of

discovering similarities and differences in the experiences of African American women

engineers on a wider geographical range to support transferability. Furthermore, although

this study focused on African American women engineers, future research should focus

on other underrepresented populations and how they experience organizational

engagement, support, and commitment. The findings of their experiences could be

compared to African American women engineers to identify similarities and differences.

The intersections of race and gender should also be examined in future research. Future

research should be completed with African American men and the results should be

compared to African American women engineers. Comparing the two groups will

determine the similarities and differences in their experiences within the engineering

profession. Doing so may clear any assumptions that all African American engineers had

identical experiences. Furthermore, this research can provide an examination of the

elements that encourage and deter them in the engineering field prompting dialogue about

how to support both. This can lead to increased knowledge and understanding of both

underrepresented groups in the engineering field. In addition, comparable research could

be done by researching White men engineers and White women engineers and comparing

the results to the experiences of African American women engineers. Comparing these

groups will identify any existing racial disparities in the experiences of these groups.

     Using the qualitative approach, a recommendation for further research would be

to have the interviews in person. Conducting the interviews through videoconferencing

can restrict the view of the participant. In-person interviews can help with the ability to

efficiently document participants' body language during the interview (Oliffe et al.,

2021). Future research could explore more of the experiences of African American

women engineers such as researching the variations of experiences in each engineering

discipline that fall under the six divisions of engineering: Electrical, Civil, Geotechnical,

Management, Mechanical, and Chemical (Types of Engineering Degrees, 2019). Another possibility might be to focus on comparing the experiences of African American women engineers in a particular engineering field to note the comparisons within one discipline. Another possibility of further research on African American women engineers is to compare the experiences of those who participate in professional engineering groups with those who do not participate in professional engineering groups. The goal of this could be to determine if these factors influence the way African American women engineers experience engagement, support, and commitment.

Additionally, a recommendation for further research is to investigate the experiences of engagement, support, and commitment of African American women engineers based on age groups. This will aid in comparing the experiences of younger African American women engineers and more senior African American women engineers. Focusing on differences in age groups may support addressing issues related to recruitment and retention. Lastly, further research on the experiences of African American women engineers could focus on gathering information from leadership in engineering organizations to learn what initiatives and resources are implemented to support African American women engineers' engagement, support, and commitment.

Implications

This study offered insight into African American women engineers' experiences with organizational engagement, support, and commitment. A way to bring positive social change is to address the unique challenges African American women engineer's encounter. The findings from this study may help to influence positive social

contributions to the discipline of industrial and organizational psychology. The research study evaluated different dynamics experienced in the workplace by African American women engineers. Through examining dynamics such as commitment levels, barriers, engagement with colleagues and work tasks, support structures, and support from leadership and colleagues, issues were identified. Solutions could be created to improve employee well-being and performance, which has positive effects at the individual and organizational levels (see Bakker & Demerouti, 2018; Wood & Ogbonnaya, 2018). The insights from the findings can inform organizational policies designed to improve workforce diversity, organizational culture, and employee well-being. When engineering organizations address the issues of organizational culture and diversity by applying initiatives for improvement, this can lead to closing the gender and disproportional racial gap in the engineering profession, thus creating positive social change.

These findings present implications of positive social change for African American women engineers on an individual level. The change that can occur at an organizational level can trickle down to influencing African American women engineers on a personal level by creating a more appealing environment that makes them feel equal, appreciated, and supported. This can also allow African American women engineers to feel an increased sense of belonging and commitment. African American women engineers can also use these findings to reflect on their own experiences in the engineering profession and adopt habits, such as being connected to a professional organization, that may improve their experiences in the male-dominated profession.

The findings of this study may also contribute to the current body of literature on African American women engineers' experiences in the workplace (see Buse et al., 2013; Fouad et al., 2016; Maskell-Pretz & Hopkins, 1997; McKinnon & O'Connell, 2020; San Miguel & Kim, 2015; Williams et al., 2016). Furthermore, the findings of the study regarding how African American women engineers experienced support, what could increase their commitment, and detailed experiences on how they connect with their colleagues may promote further research. Lastly, it may support creating or continuing structures in the engineering field that encourage positive engagement, support, and increased commitment levels of African American women engineers.

Conclusions

This chapter presented a summary of the research study and conclusions derived from the data presented. The data provided an interpretation of the findings connected to the research questions and the theoretical frameworks, limitations of the study, recommendations for future research, and implications for social change and practice. This descriptive qualitative phenomenological study was an exploration of how African American women engineers experienced employee engagement, organizational support, and organizational commitment in the workplace. The RCT and feminist theory served as the study's theoretical framework. The theories provided a foundation for understanding African American women's workplace relationships and inequities through their experiences of organizational engagement, support, and commitment. The key findings were categorized into the following themes by research question. The first research question was addressed by five themes: (a) professional engineering group opportunities,

(b) connections to colleagues, (c) teamwork, (d) doubting feedback and proving self, and (e) discrimination. The second research question described six themes: (f) empowerment and voice being heard, (g) public recognition and rewards, (h) mentoring and training, (i) software and request systems, (j) supervisor accessibility and support, and (k) diversity and inclusion initiatives. The third research question described four themes: (l) commitment level, (m) organizational culture, (n) connecting to people, and (o) lack of diversity.

This study consisted of 11 African American women with a bachelor's or master's degree in an engineering program from an accredited educational institution and who were legal citizens of the United States. The age range of the participants was 28–57, all of whom were currently working as engineers and had been in the profession for at least 5 years. Individual interviews were used to understand the participants' lived experiences in the engineering profession. An inductive thematic data analysis approach produced 15 themes to answer the study's three research questions.

The shared experiences of the participants in this research study were that throughout both the positive and challenging situations endured throughout their engineering career, they are happy being in their role as an engineer. However, that does not take away from the work that needed to be done within the profession to address the barriers and challenges faced by African American women engineers. The findings focusing on the barriers and challenges revealed that some experiences of engagement and support involved the existence of stereotypes and race, age, and gender bias. The findings emphasized that inclusive opportunities for engagement offered inside and

outside of the workplace were recognized and important for a positive outlook on engagement and connections to occur. Organizations that offer African American women engineer's opportunities for their ideas and opinions to be heard and a chance to lead in different ways created a sense of empowerment and support. In addition, acknowledgment by supervisors and colleagues promoted feelings of support and value. The role of the supervisor demonstrated to be essential in the success and experiences of support in African American women engineers. Engaging in professional engineering groups was shown to provide African American women engineers an opportunity to be involved and offered additional support and career-related opportunities. The findings concluded that an organizational culture that is equitable offered opportunities for connections and diversity increases the commitment levels for African American women engineers. In addition, increased and continuous effort on behalf of engineering organizations to implement diversity and inclusion initiatives is needed.

Overall, these conclusive findings could be used to support the movement towards recruiting more African American women into the engineering profession and increasing the retainment of this group by using the findings from this study to implement ways to support positive experiences of engagement, support, and commitment.

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Appendix: Interview Protocol

I. Introduce myself in a way that will build rapport.

II. Verify receipt of the consent form and answer any participant questions/ concerns to build rapport and trust.

III. Get confirmation and acknowledgement that the interview will be recorded.

IV. Briefly state the purpose of the study and interview.

V. Start the interview with question number one and follow through to the final question.

VI. On the participant's request, paraphrase the interview questions as needed.

VII. Ask follow-up probing questions as needed.

VIII. End interview and discuss follow-up member checking with the participant.

IX. Thank the participant for participating in the study.

X. Confirm the participant has contact information for follow-up questions and concerns.

XI. End interview.

Interview Questions

1. Tell me about your experiences, if any, in professional engineer groups.

2. How do you connect with other employees?

3. Tell me about your experiences working with a team.

4. What are some of the barriers you've experienced in the engineering profession?

5. How is your opinion/ feedback received?

6. Tell me some things you don't like about your work environment.

7. Tell me in what ways do you feel connected to your colleagues.

8. How likely are to you stay with your organization?

    a. For how long?

    b. What influences this decision?

    c. What could your organization offer that would increase your commitment?

9. What excites you about going to work if anything?

10. In what ways are you empowered at work?

11. What tasks do you enjoy at work?

12. Tell me what has been most challenging in your role as an engineer.

13. What resources do you have that support your career advancement inside of the organization?

14. How does your organization show they value your contributions and care about your well-being?

15. How has your supervisor helped you to succeed in your position?

16. How have others provided you with recognition for your accomplishments at work?

17. How has your supervisor invested in your success?

18. How does the company provide you with all the tools and materials you need to do your job?

19. How is your organization dedicated to fostering diversity and inclusion?

    Is there anything else you would like to add about your engineering experiences?