A Phenomenological Case Study Exploring The In-Home Experiences Of African Americans Pursuing Stem Degrees At A Historically Black College

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A PHENOMENOLOGICAL CASE STUDY EXPLORING THE IN-HOME EXPERIENCES OF AFRICAN AMERICANS PURSUING STEM DEGREES AT A HISTORICALLY BLACK COLLEGE

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Dedication

This dissertation is dedicated to my family, friends, and UTEP faculty members who have been an instrumental part of this journey.
A PHENOMENOLOGICAL CASE STUDY EXPLORING THE IN-HOME EXPERIENCES OF AFRICAN AMERICANS PURSUING STEM DEGREES AT A HISTORICALLY BLACK COLLEGE

by

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DISSERTATION

Presented to the Faculty of the Graduate School of The University of Texas at El Paso

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Acknowledgments

Seven years ago, when this journey began, I had no idea about the task I was undertaking nor the depth of knowledge I would gain as a result of this process. I would not be where I am today without the nudges, encouragement, love, and support from so many people. First, I would like to thank the five participants in this study to openly reach into their personal lives and share their experiences with me that was vital to the study. Hearing and learning about your in-home experiences and how those experiences helped shape your thinking and desire to pursue STEM degrees is inspirational. You all have accomplished a tremendous milestone, whether you know it or not. The ability to overcome social, economic, and psychological barriers in life is something not everyone can do; the fact that you all have done that speaks volumes about each of you and your capabilities. You all are proving to the critics with determination and hard work, anything is possible. You are also showing the African American community that pursuing a STEM degree is well within reach. There is no doubt in my mind you will have everything your heart desires and accomplish everything.

I would like to express my appreciation and utmost gratitude to my doctoral committee members Dr. David Carrejo, Dr. Ronald Wagler, Dr. Rodolfo Rincones. Dr. Carrejo, thank you for stretching my mind and encouraging me to be an abstract thinker; your love for math and Geogebra is inspiring. Dr. Wagler, thank you for opening my eyes to the endless possibilities of Science; because of you, I have a much greater appreciation for Arthropods. Dr. Rincones, thank you. Your perspectives have not only challenged but have helped reshape my thinking. I would especially like to thank my mentor, coach, and committee chair, Dr. Timothy Cashman. Dr. Cashman, you have been one of the most incredible mentors I have ever had. Over the years, you have played an instrumental role in my growth and development. Your
depth of knowledge and understanding of pedagogy continues to amaze me; thank you for pushing me to and beyond my limits.

To my mother, Ruth Lewis, and my father, Clarence Lewis, thank you for the work ethic you all instilled in me and for encouraging me to strive for excellence. Your constant reminders that I could do anything I put my mind to is the reason I am where I am today. And mom, while you are no longer here with me, I will forever be grateful for your daily talks reminding me to think before I act. To my grandmother, Gladys Barclift, thank you for being firm in your beliefs and reminding me that nothing in this world was given. To my sisters, Anjelica Lewis and Michelle Lewis, thank you all for being great role models. I never told you all, but both of you have always been my role models; thank you for believing in me.

Last but not least, to my wife Eva Lewis, you have been with me every step of the way. Thank you for loving me, believing in me, supporting me, and for being there during this long and arduous journey. Your love for learning inspires me to want to learn more every day, and without you, this journey would not have been nearly as enjoyable as it has been. I love all of you more than my words will ever be able to express.
Abstract

*Exploring the In-Home Experiences of African American Students Pursuing STEM Degrees* is a Phenomenological Case study that examines the experiences of five African American students at a Historically Black College. This study explores the internal (within oneself) and external (interactions with parents and siblings) attributes of the in-home experiences; Focusing on how the internal and external experiences impacted African American students’ decisions to pursue STEM degrees. Data was collected over a period of nine months, notes were transcribed, and analyzed for themes. The themes that emerged were (1) Conflict Experienced Early on Improves Character Development. (2) Your Focus Influences Who You Become, (3) The Power of Parental Persuasion in Student Achievement, and (4) A Positive Mindset Creates a Positive Self-Image. Findings from this study reveal that while African American students experience barriers that contribute to the underrepresentation of African Americans in STEM, these barriers can be overcome. However, to overcome these barriers, students need a supportive home environment that fosters creativity, exploration, and patience. All of which contribute to a positive mindset that creates a positive self-image. Equally important is the awareness that conflict and focus play just as important a role in student's growth and development.
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Chapter 1: Introduction

Science, technology, engineering, and mathematics have helped reshape the world in which we live. Science has provided us with agriculture, endless scientific discoveries, and medical breakthroughs. The learning of science begins with a sense of wonder that is a common characteristic among all human beings (Esler & Esler, 2001). Our cognitive systems have been altered by the advent of technological inventions such as primitive tools, spoken language, writing, and arithmetic systems (Loh, 2016). Engineering has provided us with architects, bridges, tunnels, skyscrapers, and roads to meet human needs. Without Math, there would be no system to measure socioeconomic status or classifications for poverty levels. There would be no way to tell if the economy is growing and no counting systems. STEM is vital to our everyday lives and has traditionally been dominated by Caucasians and Asians and largely underrepresented by other minority groups, including African Americans, women, and LatinX.

The desire to pursue this research stems from my experiences as an African American male and my experiences working with minority students of color over the past 15 years. Last year while working at a largely minority-serving institution as an academic advisor, an African American father and mother accompanied their son into my office for his first academic advising session. The student (son) had not done as well as he could have in high school and had a cumulative GPA of 1.84 when he graduated. When asked what he was interested in studying in college, he said he wanted to be an engineer. Like any other academic advising session, the requirements for the engineering program associated with the school he wanted to transfer to were reviewed. I also reviewed the pre-major requirements and prerequisites he would need to complete before being able to declare engineering as his major. During our conversation about the requirements for engineering, he was advised he would need to take pre-calculus algebra,
pre-calculus trigonometry, calculus one, calculus two, calculus three. I went on to tell him that he would also need chemistry and physics. He was seemingly excited about beginning his new arduous journey of becoming an engineer.

Once we finished talking about course requirements for engineering, we began planning out his first semester of college. The student decided he was going to take English, Math, and Introduction to Engineering. His father said, “excuse me, Mr. Lewis doesn’t engineering require students to complete calculus, physics, and chemistry. I replied, yes, sir. He looked at his son and said, “Son, let me tell you something if you are going to be an engineer, you are going to have to do calculus, chemistry, physics, all that stuff. I took it and struggled because math, chemistry, and physics are hard; those classes ain’t no joke.” The son replied, “Dad, I know,” and the father said, “Yeah, but you didn’t do anything in high school the whole time you were in there.” “All you did was waste your time and hanging out with your friends you blew your chance at and education.” The father then looked at me and said, “Mr. Lewis, let's be real. I know my son, and he isn’t smart enough to be an engineer.” “He isn’t cut out for it, and he is never going to be an engineer because he will never make it through calculus, physics, and chemistry. The other stuff like English and Economics maybe. The mother sat quietly and didn’t say a word; she chuckled to herself but never said a word. The father then said, “This is my son, and I know him, and since we are paying for his education, he is going to study something else cause we are not wasting money for him to try to be an engineer. I know he is never going to be that.”

The mother, still silent, nodded her head in agreement with the father. The son was visibly disappointed by the decision and said he would like to study something like criminal justice or business. After several minutes of talking over different programs with the student,
they decided they needed more time to discuss their son's future as a family. The father said, “Mr. Lewis, we need to talk about this because it might just be better for him not to pursue college and just get a job and go to work; at least he can make some money.” The father's interaction with his son changed his son’s plan for life and created doubt in his abilities altering his mental state of mind. It has been over two years, and I haven’t seen the young man nor the family since our initial meeting.

The decision to discourage a student from pursuing a major in science, technology, engineering, and mathematics (STEM) has the potential to alter that individual's life forever. Learning about the in-home student experiences and the internal thinking of students, and the external influences students’ experiences at home will provide valuable insight into crucial interactions that shape growth, development, and desire. This growth and development can either be fostered or stifled. Both of which are crucial to the internal psyche of students and their decision on where to place emphasis as it relates to their education and how those interactions shape interest to pursue STEM degrees in college.

Problem

The President’s Council of Advisors on Science and Technology in 2010 states, “to meet our needs for a STEM-Capable citizenry, a STEM-Proficient workforce, and future STEM experts, the nation must focus on two complementary goals. We must prepare all students, including girls and minorities who are underrepresented in these fields, to be proficient in STEM subjects. And we must inspire all students to learn STEM and, in the process, motivate many of them to pursue STEM careers (p.2).” Employment opportunity projections indicate that the fastest-growing jobs will be in STEM fields over the next ten years (Bureau of Labor Statistics, 2009). Along with this, occupations within STEM fields have grown 8% in the last ten years and
are expected to continue at this rapid rate over the next ten years (Economic and Statistics Association, 2011).

To promote STEM diversity, the United States should work towards gaining a competitive edge in STEM fields. Significant changes should be made to overcome the challenges faced by minorities in STEM. At the same time, some of these challenges for minority students pursuing STEM degrees like No Child Left Behind were addressed by President Obama’s Educate to Innovate campaign. There are other challenges, some of which are seen and some unseen that still need to be addressed to have a STEM workforce just as diverse as the United States. EPM (2018) states the issue of under-representation is thought to be predominantly associated with access routes. EPM (2018) adds even from a young age, African-American and Hispanic students do not have the same access to higher-level STEM classes throughout their education. Inadequate access and opportunities in STEM are just part of the broader issue. Minority students who do make it into STEM degrees face far more obstacles in the form of unconscious bias.

By addressing the challenges faced by minorities, the United States will be able to rely on the talented individuals in other countries to fulfill opportunities and rely on talented, diverse individuals here in the United States. In an article published by McKinsey and Company (2009), closing the gaps in achievement and increasing the performance of minorities also increases the gross domestic product, individual wage-earning and increases taxpayer benefits substantially. In comparison to their peers, African Americans are grossly underrepresented in STEM professions. Historically, African Americans earn degrees in STEM fields at a much lower rate than their peers. Combine the underrepresentation with low levels of achievement and meager
high school graduation rates, and what you have is a melting pot for disaster. One thing is clear, and that is there is a definite need for minorities in STEM fields.

Freeman Hrabowski III believed the minds and talents of underrepresented minorities are a great, untapped resource that the nation can no longer afford to squander. The diversity that other ethnicities bring to the STEM field could provide different perspectives on issues, outlooks on problems and pandemics, and a fresh set of eyes to the complexity of STEM. The National Academy of Sciences (2017) maintains a more diverse team is more likely to outperform a more homogenous team even when the homogenous team is considered to have a relatively greater ability as individuals than the more diverse group. A study conducted by the NAS (2017) revealed diversity in STEM was needed because people with different backgrounds have different experiences and perspectives. For this reason, they approach problems differently, ask different questions, and develop more innovative solutions. By being more inclusive, the likelihood of scientific success is higher, promoting economic growth and competitiveness.

Improving the diversification of our STEM population and education of our diverse citizenry will strengthen science, technology, engineering, and mathematics, the workforce, and boost the U.S. economy. The role of minorities is vital to the longevity of STEM; not only do minorities bring a diverse background with them into the classroom. Minorities also bring a wealth of knowledge and opportunities that are new, fresh, insightful, and beneficial to STEM. By accessing the minority population and increasing their involvement in STEM, we are creating endless growth opportunities. In terms of economic growth by increasing minority involvement, we (United States) put ourselves in a position to move from being economically disadvantaged to having an advantage in advancement opportunities in science, technology, engineering, and
mathematics. It is long overdue for these needs to be addressed and for these issues plaguing minorities interested in STEM to be brought to light.

Pew Research (1990) reported 83% of STEM workers were white, 6% were Asian, 7% were Black, and 4% were Hispanic. Pew Research (2018) further revealed the majority of STEM workers in the U.S. were white (69%), followed by Asians (15%), Hispanic (9%), and Black (7%), as shown in table 1.

Table 1

<table>
<thead>
<tr>
<th>Race</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Caucasian</td>
<td>70%</td>
</tr>
<tr>
<td>Asian</td>
<td>15%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9%</td>
</tr>
<tr>
<td>African American</td>
<td>7%</td>
</tr>
</tbody>
</table>

STEM Workers in the United States
Studies conducted by the National Center for Educational Statistics (2017) revealed that 58% of White students who declared a STEM major earned a degree in the field. The study also reveals 50% of Asian students who declared a STEM major earned a degree in the field earned. While other ethnicities have made substantial gains in pursuing STEM degrees, African Americans have made minimal gains, only seeing marginal increases in male and female students pursuing STEM degrees. One could assume the marginal increase is connected to race discrimination, socioeconomic status, stereotype threat, and a host of other factors working against the student. The argument becomes more difficult to make when other marginalized minority groups see substantial gains in students pursuing STEM degrees and increased graduation rates. A study conducted by the National Center for Education Statistics (2017) reveals the percentage of Hispanics enrolled in STEM degrees increased by 33 percent, Asians enrolled in STEM degrees increased by 38 percent. The study conducted by the National Center for Education Statistics (2017) also reveals White students enrolled in STEM degrees increased by 32 percent.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>African American STEM Graduates across the United States</th>
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<tbody>
<tr>
<td></td>
<td>African American STEM Graduates 2009</td>
</tr>
<tr>
<td>Bachelor's</td>
<td>10%</td>
</tr>
<tr>
<td>Master's</td>
<td>8%</td>
</tr>
<tr>
<td>Doctorate</td>
<td>6%</td>
</tr>
</tbody>
</table>

African American STEM Graduates across the United States
The National Center for Education Statistics (2009) reported seven percent of African Americans attending a four-year college received a bachelor’s degree in STEM. Four percent of African Americans who graduated with a master’s degree were in a STEM-related field. Three percent of African Americans received a Ph.D. in a STEM-related field. Over the past ten years, these numbers have grown slightly with new reports from the National Center for Education Statistics (2018), revealing 9 percent of African Americans attending a 4-year college or university received a bachelor’s degree in STEM. The National Center for Education Statistics (2018) further reveals that 5 percent of African Americans graduated with a master’s degree in a STEM-related field, and 3 percent of African Americans received a Ph.D. in STEM, as shown in Table 2.

These numbers are staggering and disturbing; a group of people who were once influential in STEM fields now make up less than ten percent in an area vital to the growth and success of this nation. The contributions of African Americans in STEM predate the 1700’s but did not have a lot of public attention until the movie hidden figures were released in 2016. *Hidden Figures* told the story of a team of female African American mathematicians who served a vital role in NASA during the early years of the U.S. space program. Before the movie *Hidden Figures* and the depiction of women like Dorothy Johnson Vaughn, there were influential women in STEM like Madame C.J. Walker and men like George Washington Carver and Percy Julian. Their groundbreaking contributions to STEM helped pave the way for people of all ethnicities. The underrepresentation of African Americans in STEM fields and the minimal increase in the number of students that receive STEM degrees is an unsettling problem that continues to plague the United States. This research does not explain why there are a minimal
number of African Americans that graduate from high school and go on to pursue STEM degrees.

This study is meant to examine the in-home experiences of African American students and shed some light on internal (within oneself) and external factors (interactions with parents and siblings) that contribute to the decision to pursue STEM. Marjoriebanks (2017) states homelife has a significant impact on student academic success. Marjoriebanks (2017) further adds several factors exist in the homelife that contribute to children’s success: family environments, siblings, and social status. Many African American students are often encouraged to pursue careers in entertainment instead of academics because it provides quick income with very little academic knowledge required. While there is nothing wrong with pursuing careers in the entertainment industry (athletics and music), this shouldn’t be the main career path African American students are encouraged to pursue. Exploring the in-home experiences will allow students to describe in their own words their environment and the impact that environment has had on their success in STEM-related classes, and the decision to pursue STEM in college.

**Purpose of the Study**

The purpose of this phenomenological research study is to describe the in-home experiences of African American undergraduate students pursuing STEM degrees enrolled at Historically Black Colleges and Universities. Previous research and statistics shed light on the poor performance of African Americans pursuing STEM degrees and the need to seek out undergraduate students in those degrees. Although every educational experience from birth helped define them academically, indicators such as GPA and SAT/ACT scores earned while in high school are what students need to gain admission into colleges and universities and ultimately major in STEM fields. Through the unique pairing of attribution theory as a
theoretical framework and descriptive phenomenology as a methodology, this study seeks to reveal the essence of the phenomenon of the home experiences of African Americas who are currently pursuing STEM in higher education. The discovery of the essence of the phenomenon of African Americas pursuing STEM degrees as undergraduates will contribute to existing research and provide much-needed insight on elements from the home environment that can be attributed to their interest in pursuing STEM. Information relating to the in-home experiences of African Americans in STEM can encourage other students to persist through obstacles faced in their pursuit of STEM degrees.

By using attribution theory as a theoretical framework, I was able to identify internal and external events that led participants to pursue STEM degrees as undergraduates. By applying descriptive phenomenology as a methodology, I was able to uncover the true essence of the in-home experiences of the participants. Focusing not only on where the emphasis was placed on parental encouragement but also what those conversations looked like and how those conversations impacted students’ decisions to pursue STEM. This will help influence the African American community by providing a valuable look at what motivates African American students. But also inspire other students to pursue a field that they may avoid because of critical race theory, stereotype threat, and second-guessing their abilities and whether they are capable of competing in an area that traditionally has been dominated by other ethnicities. This study’s implications will influence individuals, communities, and institutions of higher education.

**Research Questions and Overview of the Methodology**

The two questions guiding this study were: What are the in-home experiences of undergraduate African Americans pursuing STEM degrees at a Historically Black College? What impact did the in-home experiences have on the student’s decision to pursue STEM? These
questions seek to examine the lived experiences of participants; thus, the design of this study is qualitative and will use phenomenology as a methodology. Moustakas (1994) states that phenomenology as a method occurs in three phases: preparation, data collection, and organizing and analyzing data.

Preparation includes a clear and precise research question where phenomenology is appropriate, and an initial literature review is conducted (Chapter 2). Data collection is done through long and in-depth semi-structured interviews (Chapter 3), and the organization and analysis of data are done through specific coding techniques (McMillan & Schumacher, 2006). The phenomenon this study examines is the attributes to include internal (within one’s self) and external (interactions with parents and siblings) of the in-home experiences of African American students pursuing STEM attending an HBCU. Examining the internal and external attributes will help understand how and why the participants think, feel, react, and behave in the way they do. Qualitative research allows you to ask questions that cannot be easily put into numbers to understand human experience (Cleland, 2017).

Descriptive phenomenology employs a case study as a method that focuses on a small number of participants to promote prolonged and intense engagement between researcher and participants to develop patterns among the participants (Creswell, 2003). For my study, an appropriate paring is to use descriptive phenomenology and attribution theory. Descriptive phenomenology increases the understanding of lived experiences, and case studies promote a better understanding of a phenomenon to make informed decisions (McMillan & Schumacher, 2006).

Using descriptive phenomenology, I can understand the human experience and understand the essence and underlying structure of the phenomenon I am examining. The
phenomenon for this study is the internal (within oneself) and external attributes (interactions with family) that put African Americans in a position to thrive in STEM. A large majority of African American students attending an HBCU are first-generation, low-income, marginalized youth. The environment these students come from is one that, due to race, socioeconomic status, stereotype threat, critical race theory, lack of background knowledge, creates barriers that make it more difficult to succeed. These students have persisted through this environment that traditionally creates barriers that hold students back and see themselves as more than, versus not enough. Descriptive phenomenology increases the understanding of lived experiences (McMillan & Schumacher, 2006). The use of phenomenology increased the understanding of the lived experiences of the participants.

Definition of Terms

At-risk - defined as a student who is likely to drop out or fail at school (Kaufman, 1992).

Attribution theory - a theory that supposes that one attempts to understand the behavior of others by attributing feelings, beliefs, and intentions to them (Weiner, 1985).

Coding - The process of labeling and organizing your qualitative data to identify different themes and the relationships between them (Gibbs, 2007).

Criterion sampling - selecting cases that meet some predetermined criterion of importance (Patton, 2002).

Historically Black Colleges and University (HBCU) - a college or university founded to educate students of African American descent (Higher Education Act, 1965).

Interpersonal theory - a theory of personality based on the belief that people's interactions with others, especially significant others, determine their sense of security, sense of self, and the dynamism that motivates their behavior (Sullivan, 1953).
Intrapersonal theory – a theory that a person’s perceptions are influenced by knowledge, attitudes, beliefs, motivation, self-concept, developmental history, post-experience, and skills (Weiner, 2000).

Level of expectancy - is the belief that one's effort will result in attaining desired performance goals. It is usually based on an individual's experience, self-confidence (self-efficacy), and the perceived difficulty of the performance standard or goal (Vroom, 1964).

Marginalization - Marginalization is both a condition and a process that prevents individuals and groups from full participation in social, economic, and political life enjoyed by the wider society (Kurtz, 2008).

Motivation - the reason or reasons one has for acting or behaving in a particular way (Maslow, 1943).

Negativity bias - is our tendency not only to register negative stimuli more readily but also to dwell on these events.

Phenomenology - the study of structures of consciousness as experienced from the first-person point of view. The central structure of an experience is its intentionality; it is directed toward something, as it is an experience of or about some object. An experience is directed toward an object by its content or meaning (which represents the object) together with appropriate enabling conditions (Moustakas, 1994).

Purposive sampling - is a non-probability sample selected based on the characteristics of a population and the study's objective (Ames, 2019).

Reflexive journal - is a technique used to describe the researcher's experiences from his/her perspective, reactions to situations and reflections on the research process, and the consolidation
of ideas about data collection and the study's interpretive framework (Barry & O'Callaghan, 2008; Smith & Noblit, 1989).

**Socioeconomic status** - is the social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation (Bradley, 2002).

**Theme** – the process by which the researcher closely examines the data to identify common themes – topics, ideas, and patterns of meaning that come up repeatedly (Connelly, 2016).

**Tracking** - a method used by secondary schools to group students based on their perceived ability, IQ, or achievement levels (Loveless, 1999).

**Underrepresented population** - describes a subset of a population that holds a smaller percentage within a significant subgroup than the subset has in the general population. Specific characteristics of an underrepresented group vary depending on the subgroup being considered (Callahan, 2005).
Chapter 2: Conceptual Framework and Literature Review

Kerlinger (1979) defines theory as “a set of interrelated constructs (variables), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables” (p. 64). Anfara and Mertz (2006) defined theoretical frameworks as any empirical or quasi-empirical theory of social and psychological processes applied to understanding phenomena. The purpose or usefulness of theory can either 1) have little impact on the research, 2) is related to the study’s methodology, or 3) have a significant impact on the research (Anfara & Mertz, 2006). Creswell (2006) notes theoretical frameworks may be integrated into philosophical assumptions. Scholars that ascribe to the notion that theory is essential to feel the combination of methodology and theory work in conjunction with one another to focus the entire study from the onset (Anfara & Mertz, 2006).

Attribution theory is used as the theoretical framework to examine the home experiences of African Americans currently pursuing STEM degrees at an HBCU. Attribution theory also provided a framework for participants to identify those experiences accurately and has been the dominant concept in motivation, social psychology, and educational psychology (Weiner, 2000). Simply put, when correctly used, attribution theory is the process by which individuals explain their success (Martinko, Harvey, & Dasborough, 2011). Attribution theory began as drive theory in its infancy stage, whose creators were Clark Hull and Kenneth Spence (Weiner, 2010). At that time, motivation was thought to depend on human need multiplied by applicable behaviors strengthened by rewards (Weiner, 2010). During the same period, Edward Tolman, Julian Rotter, and John Atkinson developed a competing theory: expectancy/value theory (Weiner, 2010).
In contrast, to drive theory, expectancy/value theory suggested a person begins with the expectancy of success rather than a need. The level of expectancy is intensified by the likelihood of actually attaining what is expected. Value is attributed to the emotion evoked from success or failure (Weiner, 2000). Weiner’s work was based on Atkinson’s view of expectancy/value theory, which diverted from Tolman and Rotter (Weiner, 2010).

Figure 1

Process of Expectancy

Note: Adapted from Atkinson, J. 1957 Expectancy Theory of Motivation.
Atkinson (1957) suggests expectancy was based on three underlying principles 1) motivation begins with individual motives, 2) value has a broader sense than simply pleasure and pain, and 3) value is inversely related to expectancy of success, as shown in Figure 1. This and all previous iterations did not satisfy Weiner’s conception of what attribution theory could and should be due to its lack of predictability. Weiner took what was known from previous studies and those of others and analyzed two theories of motivation: interpersonal and intrapersonal theory. Self-directed thoughts like self-esteem, guilt, and shame were intrapersonal (internal to oneself), whereas being judged by others was interpersonal (external to the individual). Focus, stability, and controllability are components of interpersonal theory (Weiner, 1985, 2000, 2010). Focus is either internal (within one's self) or external (external to the individual), stability is the expected length of time the cause will act upon the subject, and controllability is the degree the subject has to affect the outcome (Weiner, 2000). Behavioral outcomes are dependent on independent emotions and expectancy of success (Weiner, 2000). Attributing causality in intrapersonal theory, external persons such as parents assign causes in interpersonal theory that inadvertently have the propensity to adversely affect children positively and negatively (Weiner, 2000).

Steele (1997) suggests attribution theory is a general theory of domain identification that assumes sustained school success requires identification with school and its subdomains. Stressing that societal pressures on these groups (e.g., economic disadvantage, gender roles) can frustrate this identification; and in school domains where these groups are negatively stereotyped. Those who have become domain identified face the further barrier of stereotype threat, the threat that others' judgments or their actions will negatively stereotype them in the domain. Weiner (2000) maintains that feelings of anger arise when a person feels capable and is
not successful due to a perceived lack of effort. Depending on a person’s internal drive, the internal factors (to include but not limited to behavioral outcomes and emotions and the expectancy of success) played a more significant role in students' motivation.

Attribution theory was selected to provide a canvas for the participants in my research study to describe their experiences at home accurately and their role in their desire in college to pursue a STEM-related degree. This study is focused on the in-home experiences and the role those experiences have played in their interest in STEM degrees. Harper (2010) notes there are a plethora of studies that focus on the lack of achievement of African Americans in science, technology, engineering, and mathematics, but very little has been written about those who persist. Harper (2010) used phenomenology as a theoretical framework when looking nationally at undergraduate African Americans who persist through negative statistics and attain STEM-related degrees across various campuses. Furthermore, Harper divided the STEM pipeline into three intervals: pre-college readiness, college achievement, and post-college persistence in STEM.

Critical race theory inherently recognizes the role racism played in schooling (Berry, 2005). There is no denying that racial tension existed and still exists in the education system, negatively impacting African Americans. The premise of my research is focused on the in-home experiences and the internal and external attributes that affect students’ decisions to pursue STEM. While my focus is not specifically on Critical Race Theory, there are links between CRT and the in-home experiences that emerged. Critical Race Theory attempts to understand how victims of systemic racism are affected by cultural perceptions of race and how they can represent themselves to counter prejudice.
One of the major tenets of CRT is storytelling; the idea of storytelling comes from its powerful, persuasive, and explanatory ability to unlearn beliefs commonly believed to be true. This dichotomy of storytelling is predicated upon the belief that schools are neutral spaces that treat everyone justly. Close examination of the educational systems refutes this: simply evaluating graduation rates and disparities between races prove this inaccurate. School curricula continue to be structured around mainstream white, middle-class values. By doing a phenomenological study, the voices of my participants were heard, allowing the reader to listen to the unbiased stories of how African American students describe their in-home experiences and the role these experiences played in STEM degree selection.

My review of literature examines some of the causes for the underrepresentation of African Americans in STEM. During my study of literature six, themes emerged that have proved to contribute to the underrepresentation of African Americans in STEM.

![Figure 2](image)

*Factors contributing to the underrepresentation of African Americans in STEM*
Figure 2 provides a graphic representation of themes related to the underrepresentation of African Americans in STEM that emerged during my literature review. While each of the themes is unique, each theme is part of a multi-layered problem that builds on the following problem. The six themes that play a critical role in the underrepresentation of African Americans in STEM are as follows. (1) inadequate funding, (2) lack of preparation and access due to socioeconomic status, (3) tracking in K-12, (4) psychological barriers to involvement in STEM, (5) lack of support in higher education (6) first-generation college student. The social, psychological, and emotional oppression that each of these creates presents a set of problems that African American students must overcome if they will be successful in STEM or outright avoid altogether.

**Article Selection**

In determining the selection of articles for my study, several factors were taken into consideration. The first was whether the article was related to science, technology, engineering, and math; the second thing considered was whether the article related to African Americans in STEM. The third thing considered was the article’s content and whether the information found in the article related to African Americans in STEM. Articles used in this study date back to 1957.

Initial database searches were conducted using EBSCO and ProQuest and reveal hundreds of articles related to STEM. After modifying the keywords, searches for this topic returned five articles about African Americans in STEM fields. This caused some degree of difficulty in finding scholarly articles about understanding the experiences of African Americans in STEM degrees. This is because articles relating to African Americans in STEM dates back approximately 20 years, with the large majority focusing on the underachievement of African
Americans and the vast gaps between minorities, Caucasians, and Asians in the workforce. There are not many scholarly peer-reviewed research articles regarding why there is a lack of minorities in these fields and why there is an underrepresentation of African Americans pursuing STEM degrees in college. Thus, my research combines approximately 70 scholarly articles and approximately 40 news articles and reports published over the past 30 years.

This research review of literature contains articles on African Americans in STEM from 1995 to 2020. Research articles on other minority groups (i.e., Latino, Women, and Native American) were excluded from the search. Other minority groups were excluded because, based on reports from the National Center for Educational Statistics, other minority groups, while underrepresented in STEM, have a higher success rate than African Americans. Articles containing relevant information on Caucasians’ performance and Asians in STEM fields were included because these groups have the highest success rate in STEM fields. No data from articles was used with information on how African Americans in the United States compare to other minority groups in other countries. This was excluded from the search criteria and literature review because much of the existing research has been conducted in the United States.

The above selection criteria provided the best overall parameters for finding scholarly articles related to my research study on the in-home experiences of African Americans and articles related to the underrepresentation of African Americans in STEM. This article selection criterion eliminates the possibility for other minority groups besides African Americans to be included in this research. This does not mean other minority groups will be excluded from future research studies other minority groups that are underrepresented in STEM can benefit from future studies. This particular study focuses on the group that historically has performed lower in STEM subjects and has lower graduation rates and employment rates related to STEM.
Inadequate Funding

The first theme that emerged from the literature review was Inadequate Funding for African Americans in K-12 Education. Disparities in funding, quality of teachers hired, and the quality of teaching in the classroom, lack of course offerings, technology, and resources have negatively affected African American students eliminating opportunities that are supposed to prepare students to enter into STEM degrees STEM fields. Regardless of the student’s background, race, ethnicity, upbringing, community, each student should have the same access, opportunity, and preparation for quality education. This has not been the case for most African American students. A large majority of African American students come from disadvantaged homes, live in underprivileged communities, and as a result, do not have the same access and opportunities for growth as students from higher-income families.

In Savage Inequalities, Kozol (1991) states funding schools receive substantially less in low-income school areas versus high-income or wealthy areas. Some school districts in Texas, Illinois, New York, New Jersey, and California in low-income areas reported receiving $30.00 to 50.00 per student. In contrast, other school districts in high-income areas received $1,000 to 12,000 per student. Disparities in funding leave schools without the necessities needed to ensure students receive a basic education. The result of these disparities is teachers are forced to go without the necessary supplies and resources in their classrooms. Or spend the money earned from their paycheck that they would typically use to support their family with necessities, i.e., paying bills, buying food and clothes to purchase supplies and materials for their classroom instead. Making this type of decision forces teachers to decide whether providing for their families is more important or providing for their students. Regardless of the decision, someone will be without it; if the teacher does not spend the money on supplies for the classroom, they
cannot adequately or effectively do their job. It is worth noting without supplies; students lack the necessities needed to perform the daily required tasks in school. If the teacher spends the money on supplies for the classroom, the likelihood exists, they may not be able to support their family and meet their financial obligations.

NSF (2008); Kozol (1991) states teachers in low-income areas have fewer qualifications and less experience and are likely to be substitute teachers rotating in and out daily or likely to be long-term substitute teachers. In high poverty, areas over 25 percent of math classes are taught by individuals who are not certified to teach or have a degree in something other than their teaching. The educational expectation should be that qualified individuals are teaching children. What often happens in low income-communities is the individual teaching the subject is not a specialist in the subject they are teaching, nor do they have a strong background in the subject to effectively teach the material. This learning environment is gambling with students' success because teachers without experience and prior knowledge may not be differentiating instruction which impacts how and what students learn.

According to EdTrust (2010), in areas with high-income low poverty, less than 11 percent of teachers lack the necessary qualifications to teach students effectively. In a large majority of the low-income regions, substitute teachers get pushed into long-term teaching jobs. The result is under-qualified individuals with a basic understanding of the content they are teaching in full-time positions. Ladson-Billings (1997) furthered this statement by asserting that schools with a large population of African Americans are plagued with less rigorous mathematics programs, limiting students’ exposure to high-level college preparation courses. Oakes (1990) declared that these same schools possess fewer highly qualified teachers. The result is a lack of engagement from teachers who either do not know how to teach or give up
trying to teach to a group of students they do not think can learn. Teachers in high-poverty areas reported science labs were inadequate, lacking the resources they need to teach; teachers also said they received little or no support-assessing student learning. Because of the lack of funding, they could not do school science initiatives (Kozol, 1991).

Lack of Preparation and Access Due to Socioeconomic Status

The second theme that emerged during my literature review for this study was Lack of Preparation and Access Due to Socioeconomic Status. Moses & Howe, & Niesz (1999), maintain a lack of preparation stems from the fact that many African American students possess low socioeconomic statuses and go to schools that do not have to resources to prepare them for STEM fields effectively. What makes science fun for students is not the endless hours they spend in the classroom listening to the teacher lecture; it is the science experiments and laboratories they get to participate in that make learning come alive. Science labs are designed to take what students have learned in the classroom and make it come alive in the laboratory. Compared to their peer’s African American students have less access to computers and internet-connected classrooms. When students are allowed access to computers, they are most used for remedial skills (SECSE, 2000). This creates a negative bias in the minds where subconsciously, students think computers are only used for remedial purposes, which causes the student to want to avoid computers altogether.

Receiving a quality education means having the same opportunity as everyone else (Obama, 2009). Suppose we can expose African American students to using technology for reasons other than simply for remedial classes. In that case, we might spark their interest and create a desire for them to want to enter into the field of STEM. Schools in low-income, high-poverty areas have fewer high-level math, science, engineering, and technology classes (NCES,
2010; Stein, 2011; Paul, 2005). This issue echoes the previous point that deals with funding. Schools in high affluent areas are generally the schools with the most money. As a result, they can afford to invest in better-educated teachers categorized as highly qualified, offer higher-level classes, more options for electives, and state-of-the-art technology. Schools that do not receive large amounts of funding have to make do with what they have, not offer, or cut programs previously provided. These issues create problems that limit access and opportunity to higher-level classes that are supposed to stimulate students’ interest in a specific subject area.

**Tracking in K-12**

The third theme that revealed itself during my literature review for this study is Tracking in K-12, an issue with a long history of impact on African American students in K-12. Tracking in K-12 is where students are grouped based on ability as early as elementary school. Students of color are more likely to be formally and informally tracked into lower-level math and science courses regardless of their actual ability. Once African American students are identified as low achievers, they are tracked from primary education to secondary education and placed in lower-level courses that prevent academic growth (DeSena & Ansalone, 2009; “Teaching Inequity,” 1989). Students are not knowingly placed into ability groups; this placement happens unbeknownst to the student as early as elementary school. Placement is based on how a student performs in the classroom and or a teacher’s observations on how a particular student performs. The issue with this is that for African Americans, once they are tracked into low ability groups, they are rarely ever placed into a higher ability group even if their scores or achievement for a subject improves. In the early grades, the academic achievement of students of color such as African Americans, LatinX, and American Indians is close compared to the achievement of
White mainstream students (Steele, 2003). According to Banks (2013), the longer students of color remain in school, the more their achievement lags behind White mainstream students.

The ramification of tracking in K-12 is that it takes students working hard to improve their academic performance. Regardless of how well they do, they are labeled as underachievers. Once a student is tracked, they are continually placed in that particular group of low achieving students as they progress from elementary to middle and into high school. As a result, African American students seldom get the opportunity to take Advanced Placement (AP) or Honors classes in high school. Solorzano (2004, Whiting (2009) reveal that African American students are typically underrepresented in these high-level advanced placement courses. Given the opportunity, the belief is that African American students would be just as successful as Caucasians, Asians, and Latino students. Van Lagen & Dekkers (2005) puts forth through AP (advanced placement) courses by definition offer a higher degree of rigor; not all high schools provide AP courses at a higher, academically challenging level.

It is not until African American students graduate from high school that they are no longer tracked. This is because college has a different set of admission standards used to accept students just coming out of high school. While individual tracking information from K-12 is not used for college admission, students are typically grouped based on their high school GPA for tracking purposes. There is an initiative called the Texas Success Initiative in Texas where colleges use students, unweighted GPAs. If the student's GPA is below 2.1, students are placed into developmental math and English classes.

In North Carolina, there is a state initiative called Reinforced Instruction for Student Excellence (RISE). With RISE, students with an unweighted grade point average above 2.8 can take their college-level English and math classes. If a student's grade point average is between
2.2 and 2.79, students can take their college-level English and math but must take them with a co-requisite support class. Students must enroll in developmental English and math if a student's unweighted high school grade point average is below 2.2. The effects of tracking in high school have likely created psychological and emotional barriers African American students face daily in an academic setting. The result of these barriers is students may begin to doubt their abilities which significantly impacts their academic performance. Resulting in students saving the perceived more challenging classes like science and math as the last two classes they attempt before earning their bachelor’s degree. To keep education meaningful for students and ensure students are getting the most out of the classes, if a student’s ability says they should be in a high-level course, we owe it to the student regardless of race or ethnicity.

**Psychological Barriers to Involvement in STEM**

The fourth theme that revealed itself during my literature review for this research study was Psychological Barriers to Involvement in STEM. Psychological barriers unknowingly create a lack of interest in African Americans interested in pursuing math and science (Riegle-Crumb et al., 2010). This argument could be made about African Americans, Caucasians, Asians, and LatinX students, virtually any student out there. The traditional depiction of scientists has been and continues to be stereotypical. When one considers a portrait of a scientist, an intellectual, nerdy image of a man wearing a lab coat with bifocals arched over the brim of his nose as he constructs experiments in his laboratory is formed (Ladson-Billings, 1997; Van Langen & Dekkers, 2005; Powell, 1990; Riegle-Crumb et al., 2010).

The numerous contributions African Americans have made to the STEM field are often not the focus of history classes. Resulting in the misconception that STEM contributions only came from a small group of individuals of the same gender and ethnicity. There have been
significant contributions to STEM by African Americans; not allowing students to learn about the contributions and advancements African Americans have made in STEM has adversely affected the psyche. Creating an image or barrier in the minds of African American students that scientists are only supposed to be of a certain race, ethnicity, or gender—subsequently creating the idea that these careers are only reserved for a specific group of people. This was echoed by (NSF 2011; Oakes 2005) when research showed underrepresented groups in STEM also face challenges identifying with STEM professions and may perceive STEM subjects as difficult despite their demonstrated abilities.

A lack of depictions of people of color in STEM could inadvertently create stereotype threats within students’ psyche, making it less likely they would pursue a career in STEM because they do not fit that particular norm. This may not be the intent. The lack of images of African Americans in STEM combined with the lack of educating students about contributions that African Americans have made in STEM and society assumes that African American scientists do not exist. The absence of the portrayal of African American scientists in classrooms and history books has likely hurt the career aspirations of young African Americans who aspire to be scientists, technologists, engineers, or mathematicians.

**Inadequate Support by Colleges and Universities**

The fifth theme that emerged during my literature review for this study was Inadequate Support by Colleges and Universities. Nationwide substantially lower success rates were found for African American students admitted to four-year colleges and universities, and these findings are attributed to barriers at the higher education level. According to the Higher Education Research Institution (2010), the influence of the learning environment and classroom climate on the outcomes of students of color were perceived as negative climate and reported experiences of
negative racial interactions to reduce completion in science, technology, engineering, and math. The learning environment and the collegiate level have just as much outcome on learning as they did in elementary, middle, or high school (Eagan, 2010; Chang 2009; Higher Education Research Institution, 2010). African American students need a welcoming environment where they are not judged based on their appearance. An environment where they feel safe and have just as much opportunity to show how much they have learned. Environments that foster racial discrimination or negative racial interactions will leave a bad taste in any student’s mouth, and because of their experiences, students lose interest. When you have STEM classes dominated by one race, and a different race begins to show a new interest, those who are expressing what can be deemed as a new interest can be viewed as a threat. The individuals who dominate that class or those areas can intentionally or unintentionally create a hostile environment that deters students’ interest and hinders academic preparation.

Academic preparation in high school, including advanced coursework and rigorous high school curriculum, is one of the most important predictors of earning an undergraduate STEM degree (Chang, 2009; McKinsey, 2009). To offer students advanced coursework schools, must receive adequate funding regardless of whether the school is in a high-income or low-income area. Students should be afforded the same opportunity for an education. Teachers teaching these courses should be highly qualified in these subjects. They should also be allowed some freedom in terms of creativity to draw their students into the material so they will want to continue studying the subject matter. Suppose students are not exposed to rigorous coursework in high school and do not know what to expect from the workload or difficulty of subject matter when students attempt these subjects in college. In that case, they are less likely to be successful.
Environmental factors at predominantly white institutions are negative predictors of STEM degree completion for underrepresented students of color. Students of color have much higher graduation rates from minority-serving institutions because students are provided with a more supportive learning environment; this causes increased engagement between students and faculty (Eagan, 2010; Paul 2009). Predominately white institutions have an open-door policy for the most part and say they do not discriminate based on race, gender, or ethnicity. Often, African American students who attend these institutions of higher education are interested in STEM fields and, upon entering the classroom and campus, are deterred by their experiences. When African American students attend an HBCU, they are surrounded by students who look like them with an equally diverse professor pool. Students can relate to the professors the material they are learning becomes meaningful, and students form strong bonds between themselves, their peers, and the professors teaching the classes.

**First-Generation College Student**

The sixth theme that emerged during my literature review for this study was a First-Generation College Student. A first-generation college student is a term used to identify students whose parents never attended college. A second-generation college student is a term used to identify students who are not the first in their family to go to college. According to the U.S. Department of Education (2012), White Americans were 49 percent of first-generation college students, but 70 percent of the college students had at least one parent enrolled in college. African Americans were 14 percent of all first-generation students but 11 percent of continuing generation students. Hispanics were 27 percent of all first-generation students but only 9 percent of continuing generation students, with only 20 percent of first-generation students earning a
bachelor’s degree compared to 42 percent of those students who were not the first in their family to go to college.

First-generation college students are considered at risk of being successful in their first year in college due to a lack of preparation and low socioeconomic status. Over half come from families with annual household incomes under $20,000. First-generation college students face disadvantages compared to their peers whose parents attend college (Choy, 2001). Choy (2001) further states students whose parents do not attend college are less likely to attend college, with less than half entering college the year after high school compared to 85% of their continuing-generation peers (Engle, 2006). First-generation students who do begin college are twice as likely as their peers to leave college without a degree (Nunez & Carroll, 1998).

The first-generation status is a significant predictor of dropping out of college before the start of the second year (Horn, 1998). According to Choy (2001), only 26% of first-generation students who graduate from high school will earn a degree within eight years, compared to 68% of second-generation college students. This is because first-generation college students come from marginalized low socioeconomic status families, most likely African American or Latino (Chen, 2005). As a result, they are more likely to have more dependents and less income to support their families. Because of these contributing factors, once a first-generation college student drops out of a four-year academic institution of higher education, they are less likely to return than a second-generation college student (Horn, 1998).

“Successful African American high school graduates, regardless of the educational attainment of the parents and siblings, often begin two or four-year colleges with significant racial battle fatigue” (Solorzano & Yosso, 2002. Pg 34). This is due primarily to racial discrimination, marginalization, and students feeling invalidated by high school teachers and
guidance counselors (Cholewa et al., 2018). Research conducted by Hellman (1996) reveals that first-generation college students lack some of the key personal traits known to enhance student success and persistence in higher education. One trait identified by Hellman in African American students was a low sense of self-efficacy, hindering their ability to adjust to college life.

First-generation African American students also report a lower level of self-esteem than their first-generation and second-generation white peers (Inman & Mayes, 1999). Students of color also express more worry about financial aid than their peers (Bui, 2002) and are often less prepared for college rigors. Tinto (1993) found that African American students tend not to persist if they lack adequate emotional, intellectual, and social preparation. This preparation begins at home, where the child is raised and continues as they progress through growth and development and develop through K-12. Success in college requires a mental commitment as well as an academic commitment. For students to be successful, they must master the academic and social efficacy demands (Collier & Morgan, 2007).

Hodgkinson (1993) found the level of parent’s education and whether they were able to complete college is also a good predictor of the eventual educational achievement of students. In a similar study, Horn and Bobbitt (2000) found that children of parents with a high school diploma or equivalent are less likely to aspire to postsecondary education. Pratt and Skaggs (1998) found that college was less important to first-generation students than parents of second-generation college students. Equally as important is the finding of Ishitani (2006), that reveal first-generation college students that came from homes where the parent had some college even if they never finished (graduated) were more likely to persist than those whose parents had never attended college.
Research conducted by Bryan and Simmons (2009) found that first-generation African American students expressed feelings of loneliness, sadness, and anxiety because of a lost connection with their parents, family members, and friends after beginning their college journey. This was attributed mainly to the lack of knowledge about college, which created gaps of familiarity with their relatives and friends who did not attend college because they could not relate to or understand what the student was feeling and going through. Hartig and Steigerwald (2007) further solidified this finding that parents who have not attended college lack the knowledge to provide adequate support and have the propensity to create situations where African American first-generation college students experience conflict between their culture, home, and college, forcing students to choose between one or the other. Parents' ability to relate to what the child is going through as they progress through college creates an environment where at-risk students are more likely to persist (Bryan & Simmons, 2009).

The importance of parental persuasion and influence takes center stage in deciding whether or not first-generation students will stick with the path they have selected and stay in college or drop out and end their educational goals. Research conducted by Mattanah, Brand, and Hancock (2004) found several factors contributed to persistence among African American students in college. Those factors were the ability to successfully connect to the college environment and a strong relationship with their parent(s) and support their pursuit of a degree in higher education. Mattanah, Brand, and Hancock (2004) also found the absence of a secure relationship or the lack of parental support for pursuing a college degree hindered students' growth and development significantly, and the likelihood of success decreases. Without the support from the parent in a single-family home or both parents and without the ability to connect to the environment and feel welcomed African American students are less likely to
persist through college. Being a first-generation college student is a huge challenge for African American students is only one of the many obstacles faced by this marginalized group.

First-generation students’ African American students receive significantly less support from their parents than their White and Asian peers who are second-generation college students related to their desire to attend college (Fallon, 1997). Meaning parents in African American families who do not attend college are less likely to provide their children with the necessary support and encouragement to go to college. Once in college, they are less likely to support their child’s endeavors. White and Asian students exhibit higher levels of self-esteem and confidence due to their parents providing them with valuable information on how to deal with stress, what to expect once they are on their own in college, and obstacles they will likely face in college (Mcgregor, Mayleben, Buzzanga, Davis & Becker, 1991). Taub (2008) suggests parents play a vital role in developing students' social and cultural identity. Parental influence is even more significant within ethnic groups, specifically African Americans and Latino communities. First-generation students who attempt to separate or distance themselves from their parents who do not support their academic endeavors often face isolation and ridicule (Piorkpwski, 1983). Both London (1989) and Piorkpwski (1983) found that first-generation students can suffer from a form of survivor guilt when they observe their families continuing to struggle while their situation is improving.

Impact of Gender Normalization and Stereotypes

For African American women, aside from biased images that do not accurately reflect the field, traditional stereotypes that STEM fields are for men have contributed to the socialization of African American female students. Socialization is defined as the process of learning to behave in a way that is acceptable to society. Altermatt and Kim; Tindall, and Hamil (2004)
states that societal gender stereotypes characterize women as emotionally driven, irrational, yet articulate, cooperative, dependent followers. In contrast, men, who are supposedly more suited for math and science fields, are logical, rational, competitive, problem-solving, independent explorers and producers. Tindall and Hamil (2004) maintain that stereotypes emphasizing gender roles do not just live within society but have also found their way into American households.

Tindall and Hamil (2004) also add gender roles imply that fathers are more likely than mothers to manage the family’s finances or be the breadwinner. Within this household dynamic, young females are expected to play house, reinforcing their presence in the domestic sphere and furthering their emotional development. In contrast, little boys are expected to play sports and construct, manipulate, and dismantle toy figures (Tindall & Hamil, 2004). This mentality that society had ingrained in us teaches us that men should be the breadwinners, and women should stay at home, cook, clean, and have children, and work should only be a last resort.

Moses (1999) points out socially assigned activities and stereotypes teach boys and girls early on their appropriate gender roles, possibly affecting future course enrollment and career aspirations. Households are no longer traditional, and more single parents raise children because fathers are absent in the family. If gender norms and stereotypes were still relevant, women would be expected to take care of children, husbands, and the homes. STEM professions, which, in most cases, are full-time careers, are characterized as demanding and inflexible, qualities that oppose the requirements of motherhood (Van Langen & Dekkers, 2005; Moses et al., 1999)

Sadly, stereotypes and gender roles affect student involvement, engagement, and performance concerning pursuing STEM degrees. Stereotypes about which racial/gender groups can succeed in STEM decrease students’ academic performance who are negatively stereotyped
within a domain and can decrease their identification and engagement (Aronson, 1995; Price 2010). Aronson said that what is commonly heard in schools concerning stereotyping is Caucasians and Asians perform better in math and science and are more suited for these fields. For some African American students interested in STEM fields, hearing this will deter their interest and hurt them emotionally.

Lang (2015), Dishman (2015), Maxwell (2015) maintain African American students avoid STEM fields because of fear. These authors focus on the fact that the socially awkward child that enjoys reading books is the stereotype of future engineers or scientists. Out of the fear of being picked on, African American children avoid STEM from being picked on and peer pressure. Lang (2015), Dishman (2015), Maxwell (2015) put forth children are influenced at an early age and are shaped by peer pressure. It is not uncommon for children enrolled in school to be picked on for doing well. It is not unusual for students to say they did not do their assignments or tell their friends they will not do them to avoid being bullied. Students also act like they are not interested in the subject or do not do their assignments because they do not want to be stereotyped by their peers as nerds.

Freire (2000), in Pedagogy of the Oppressed, states, “The oppressed suffer from the duality which has established itself in their innermost being (pg. 4).” They discover that without freedom, they cannot exist authentically. Yet, although they desire authentic existence, they fear it. They are at the same time themselves and the oppressor whose consciousness they have internalized. The child that gets straight A’s on math and science tests are treated negatively in school by their peers, while their classmates often idolize the star athlete. All individuals actively, although by no means always in a conscious way, selectively incorporate many elements of mediated experience into their day-to-day conduct (Giddens, 1991). This literature
review is designed to provide an in-depth background to the emerging themes that relate to African Americans in STEM and address the study’s research question: How do undergraduate African Americans pursuing STEM degrees describe their in-home experiences? Moreover, how those experiences impacted their decision to pursue stem-related degrees.

Gaps in the Literature

While my review of the literature revealed themes relating to inadequate preparation, tracking in K-12, psychological barriers to involvement in STEM, inadequate access due to socioeconomic status, lack of support, and first-generation college status, and the impact these problems present for African Americans pursuing STEM degrees. What was missing from the literature is the in-home experiences of African American students and the role those experiences have had on their decision to pursue STEM-related degrees. Studies by Lang (2015), Dishman (2015), Maxwell (2015) reveal that society rewards people financially and emotionally if they are pursuing entertainment or sports. As a result, many African Americans want to participate in sports with the hopes of turning professional.

Along with this, a lack of understanding about what engineers, technologists, scientists, and mathematicians do may prevent parents from steering their children toward degrees in these fields. Society acknowledges the importance of engineers and scientists and the active role they play in society. This importance is often showcased through the mainstream media; Depending on the culture and environment, emphasis on what is important can be placed in some areas more than others. In some households, students are encouraged to pursue sports as a career because it provides large sums of income in a short amount of time, and little education is required. Holland (1998) states people have the propensity to be drawn to, recruited for, and formed by worlds and become active in and passionate about those worlds. Children will place their
attention where their interest lies; if it is in reading, they will spend their time in sports that they will also spend their time. Unfortunately, there is a lot more emphasis placed on entertainers, athletes, and their lavish lifestyles in the African American community.

According to Lang (2015), Dishman (2015), Maxwell (2015), you are more likely to pursue a career that you see people similar to you pursuing. The constant portrayal of Caucasians and Asians’ in STEM and the lack thereof of African American contributions has created a lack of knowledge about the contributions of African Americans in STEM within the African American community. If you were to ask the average African American student to name a famous physicist, chemist, or engineer, who has made advances or strides in STEM that is African American, they would not be able to do it. On the same note, if you ask an African American child or student to name a famous African American singer or athlete, almost all of them would be able to.

Society highlights easy money and lavish lifestyles for African Americans, and becoming an athlete or entertainer doesn’t require years of school. Many minorities do not see depictions of people that look like them in STEM fields regularly. On television, African American engineers and scientists are rarely seen talking about the importance of what they do and why they do it. At any time, you can flip through the channels and see a commercial with a Black athlete. The constant depiction of African Americas in sports and entertainment can create the idea that this is the best option for you if you are African American. This is significant because research has been done on Black undergraduate women and their sense of belonging in STEM at Predominately White Institutions, and predictors of timely baccalaureate attainment for underrepresented minority community college transfer students, and troubled success of Black
women in STEM. Little research exists about the in-home experiences of African American students that are successful in pursuing STEM degrees.

**Literature Review Conclusion**

Science, technology, engineering, and mathematics (STEM) have changed the world we live in and the economy. Providing us with rapidly growing jobs, a stable job market, and above-average salaries that have rapidly grown over the past ten years and are expected to continue to increase in growth by another 20 percent over the next five years. While Asians have largely dominated STEM fields and Caucasians, there is a lack of minority representation in these fields. One could argue that minorities have the same opportunities to persist in these fields. The argument can also be made that minorities do not have the same chance; however, the opportunity would prove to be a considerable asset to STEM fields if provided.

In the early 1900s, African Americans were influential in STEM fields. In the field of science, Daniel Hale Williams provided us with medical breakthroughs like open-heart surgery. In the field of engineering in early 1900, John Lewis William Jr. was recognized for designing numerous structures in New York. In technology, Jerry Lawson, a black engineer, developed the first ROM gaming consoles. In math, Banyaga Augustin was responsible for diffeomorphisms and symplectomorphisms.

The rapid growth of STEM fields over the past ten years and the anticipated continued growth of STEM fields create a greater need for minorities in STEM careers. There must be an interest in pursuing STEM degrees to move from college into a STEM-related career. According to the National Center for Education Statistics (2009), 7 percent of African Americans attending a 4-year college or university received a bachelor’s degree in STEM. Only 4 percent of African Americans who graduated with a master’s degree were in a STEM-related field, and only 2
percent of African Americans received a Ph.D. in STEM. Over the past ten years, these numbers have grown slightly with new reports from the National Center for Education Statistics (2018), revealing 9 percent of African Americans attending a 4-year college or university received a bachelor’s degree in STEM. Five percent of African Americans graduated with a master’s degree in a STEM-related field, and 3 percent of African Americans received a Ph.D. in STEM. While there has been a slight growth in minorities pursuing STEM degrees, more research is needed to understand the Underrepresentation of African Americans in STEM degrees fully.
Chapter 3: Methodology

Strauss and Corbin (1998) define methodology as “a way of thinking about and studying social reality” (p. 3), while a method is “a set of procedures and techniques for gathering and analyzing data” (p. 3). Phenomenological inquiry “is an attempt to deal with inner experiences unprobed in everyday life” (Merriam, 2002, p. 7). I chose this method to help identify the meaning behind the human experiences related to a phenomenon. Creswell (2009) emphasizes descriptive phenomenology allows the researcher to identify the meaning of notable collective occurrence of the phenomenon.

Phenomenology is both a philosophy and a research paradigm. As a philosophy, “phenomenology can be divided into three significant branches, descriptive, interpretive, and existential; German philosopher Edmund Husserl founded descriptive phenomenology (Reiners, 2012. Pg. 41).” Husserl’s descriptive phenomenological viewpoint was a reaction against positivist views of the late 1800s. Husserl defined individuals as connected meaningfully with everything else in the world (Vagle, 2014). Husserl’s descriptive phenomenology aimed to identify the meaning of an individual’s lived experiences or extract meaning from their everyday lives. Husserl rejected the assumption that objects existed independently from the subject. While a phenomenon is defined by its meaning for its subject, anything outside of the immediate experience must be disregarded (Fouche, 1993).

Phenomenological data is the participant’s description and perspective related to the phenomenon to be researched (Groenewald, 2004). Gorgi (2009) modified Husserl’s descriptive phenomenological philosophy for use in conducting social science research (Vagle, 2004). Gorgi (2009) states the term “description” refers to the narrative data collected from participants about the phenomenon under investigation. The term also refers to how the researcher analyzes and
crafts narrative data. Descriptive phenomenology allows participants to offer raw data in the form of everyday stories, natural conversations, and reflections about their lived experiences. Descriptive phenomenology involves the researcher reducing the lived-experience information into the phenomenological essences through bracketing, reflection, and data analysis (Vagle, 2004). Swanson-Kauffman and Schonwald (1988) asserted that descriptive phenomenology is the best phenomenological methodology when an inquiry seeks to identify universal qualities of a phenomenon not completely conceptualized in prior research.

Although there are multiple methods to include but not limited to ethnography and critical race theory, I believe the most appropriate method for this research is descriptive phenomenology. I selected descriptive phenomenology as the research paradigm for my proposed study because my research questions were concerned with gaining insight into the lived experiences of African American students pursuing STEM degrees. Given a long history of cognitive and negativity bias and misunderstanding in African Americans and STEM, a descriptive phenomenological inquiry was appropriate to make sense of those experiences as they existed without external meaning, bias, or preconceptions. Implementation of this method allowed me to focus on the experiences of the student and highlight their voices. This approach also provided an empirical study of the students’ experiences at home and the impact in selecting a major. The phenomenological foundation of my research was aimed at attaining a profound understanding of the nature or meaning of our daily experiences (Crotty, 1998).

Husserl’s work titled Logical Investigations was republished in 1970 and is considered the primary doctrine for the movement (Crotty, 1998). Vandenberg (1997) suggests the effort of Sartre and Merleau-Ponty significantly popularized Husserl’s early influence. Descriptive phenomenology is used extensively in research emanating from sociology, psychology, health
sciences, and education (Creswell, 1998). Through this method, I was able to show how complex meanings are built out of simple units of direct experience. Descriptive phenomenology is used to provide a comprehensive account of lived experiences from which “general or universal meanings are derived” (Creswell, 1998, p. 53). After determining a descriptive phenomenological approach was appropriate for this study.

Classical phenomenology was developed over 100 years ago by Edmund Husserl (Grbich, 2007; Schram, 2006). Husserl, a mathematician, found scientific procedures inappropriate when studying humans due to unstable attributes such as values and morals (McPhail, 1995; Lindseth & Norberg, 2004). Descriptive phenomenology attempts to go beyond the “life-world” or “one’s ordinary conscious experience “(Schram, 2006, p. 99) to the “hidden meaning and essence” (Grbich, 2007, p 84) of the experience. Lindseth (2004) and Norberg (2004) explained making meaning of our lived experiences in the world reveals the essence of our lived experiences.

According to Lindseth (2004), descriptive phenomenology seeks to understand how individuals make sense of their lived experiences through the world's central concept. Lindseth (2004) maintains the main idea is also referred to as the lived experiences and historical and social contexts, and our minds are all interwoven. Standing (2019) notes that the best way to capture a person’s lived experiences was by allowing them to describe and derive the meaning of a phenomenon. As a result, descriptive phenomenological studies are told to give a platform for the participants' voices to be heard and not the researchers (Schram, 2006). The researcher's goal is to find commonalities or themes among participants and discover what was essential to the phenomenon regardless of the individual (Lindseth & Norberg, 2004; Schram, 2006). When
using phenomenology, it is critical, to begin with, the individual perception of a significant lived experience (Standing, 2009).

As outlined by Creswell (2007) and derived from Moustakas (1994), the following suggestions were included in my study. To present a clear, unbiased picture, I bracketed my position. Phenomenologists were required to bracket their understanding of the phenomenon so the voice of the participants is heard without bias (Creswell, 2003; Lindseth & Norberg, 2004; Moustakas, 1994). The process of bracketing to preserve the essence of the phenomenon one’s worldview as not to distort the true essence of the phenomenon being examined was called phenomenological reduction (Grbich, 2007). Grbich (2007) offered four steps for phenomenological reduction: 1) identify the phenomenon, 2) identify a recent experience of your own related to the experience, 3) take certain varied features of the experience and delete it, and 4) continue until arrived at the essence see Figure 3. Lindseth and Norberg (2004) states this is best done by the narration of the lived experience to refrain from concluding hearing participants. For this study, I used Grbich’s method of phenomenological reduction; I identified the phenomenon, my own experiences, removed my biases and preconceptions to arrive at the essence.
Bracketing my Position

Bracketing is a method used by some researchers to mitigate the potentially harmful effects of unacknowledged preconceptions related to the research and thereby increase the rigor of the project, given the sometimes-close relationship between the researcher and the research topic that may both precede and develop during the process of qualitative research. Bracketing is also a method to protect the researcher from the cumulative effects of examining what may be emotionally challenging material.

The lack of a uniform definition of bracketing has led many authors to speculate on its constitutive essence. Drew (2004) posits bracketing as “the task of sorting out the qualities that belong to the researcher’s experience of the phenomenon” (p. 215). Gearing (2004) explains bracketing as a “scientific process in which a researcher suspends or holds in abeyance his or her
presuppositions, biases, assumptions, theories, or previous experiences to see and describe the phenomenon” (p. 1430). Starks and Trinidad (2007) note that the researcher must be honest and vigilant about their perspective, pre-existing thoughts and beliefs, and developing hypotheses. Stressing the importance of researchers engaging in the self-reflective process of bracketing, whereby they recognize and set aside (but do not abandon) their prior knowledge and assumptions, with the analytical goal of attending to the participants’ accounts with an open mind.

Researchers have identified three bracketing methods. The first bracketing method is writing memos throughout data collection and analysis to examine and reflect upon the researcher’s engagement with the data (Cutcliffe, 2003). Memos can be theoretical notes which highlight the cognitive process of conducting research. They can also be methodological notes that highlight the procedural aspects of the study and the observational comments that allow the researcher to explore feelings about the research endeavor. Glaser (1998) describes the memo-writing process in bracketing as one of freedom, which may lead to important insights on the researcher's part. These insights may include acknowledging and foregrounding one’s preconceptions.

The second bracketing method is engaging in interviews with an outside source to uncover and bring into awareness preconceptions and biases (Rolls & Relf, 2006). Bracketing interviews conducted before, during, and following data collection can uncover themes that may stifle the researcher’s ability to effectively listen to respondents or trigger emotional responses in the researcher that may foreclose further exploration (Rolls & Relf, 2006). Bracketing interviews can also increase the researcher’s clarity and improve engagement with participants’ experiences by unearthing forgotten personal experiences; it also can protect researchers and participants in
emotionally charged research topics and simultaneously develop the researcher’s capacity to understand the phenomena in question (Rolls & Relf, 2006).

The third method of bracketing is a reflexive journal begun before defining the research question, in which preconceptions are then identified throughout the research process (Ahern, 1999). The maintenance of a journal can enhance researchers’ ability to sustain a reflexive stance. Aspects to explore in qualitative research using reflexive journaling include the researchers’ reasons for undertaking the research; assumptions regarding gender, sexual orientation, race/ethnicity, socioeconomic status; the researcher’s place in the power hierarchy of the research; the researcher’s value system (Hanson, 1994); potential role conflicts with research participants; feelings such as blame or disengagement indicate presuppositions (Paterson & Groening, 1996); and whether the researcher chooses to write in the first or third person (Porter, 1993). For this study, I bracketed my position using the third method, reflexive journaling, by documenting my preconceptions and biases to maintain a reflexive stance on the various topics. Doing so allowed me to identify my preconceptions and biases while also relating and differentiating my experiences from my participants.

Case Study

Creswell (2003) emphasizes a case study is an in-depth research method in which the researcher collects details from an individual or group of individuals over some time. David (2007) describes a case study as the analysis of a single event or multiple events over some time. Yin (2002) notes researchers should use common case protocol. Common case protocol is an organizational structure that allows the entire set of procedures to be used to be captured. The benefit of doing this is it will enable the research to be accurately recreated. Echoing this, Mohd Noor (2008) found case studies are not necessarily an analysis of a program, individual, or group
of individuals but rather a focus on a particular facet. To focus on a specific aspect or facet, Creswell (2003), McMillan & Schumacher (2006), Schram (2006) maintain bounding a phenomenon by the time and event was most effective. According to Yin (1981), bounding a phenomenon was essential to avoid analysis of too many variables that could negatively impact the validity of the research.

Schram (2006) put forth a case study that was a very practical method in qualitative research mainly for the following reasons: intrinsic, instrumental, and collective. Intrinsic implies that the case itself is of interest; instrumental case studies helped to understand something else. Collective case studies extended multiple instrumental case studies to understand a phenomenon better. Yin (1984) defined this in his three types of qualitative research as exploratory, descriptive, and explanatory. Exploratory studies are studies that are used to research a problem that is not clearly defined or understood.

In comparison, descriptive research is research that describes the characteristics of a phenomenon. Case studies are empirical inquiries that investigate a phenomenon using multiple methods of data collection (Mohd Noor, 2008). Yin (1981) found the diversity of case studies applicable to quantitative and qualitative research. Yin (1984) further points out a case study was the “implicit companion” of qualitative analysis, which allows case studies to be used in conjunction with other qualitative inquiry strategies such as ethnography, narrative, grounded theory, and phenomenology. Methods for data collection for case studies vary from fieldwork, archival records, interviews, or observations (Creswell, 2003; McMillan & Schumacher, 2006; Yin, 1981).

Case studies provide rich, in-depth, developed anecdotes and descriptions and the potential to transfer knowledge and understanding of the phenomenon to others. When readers
encounter cases through narration or participants’ stories, they can learn from the encounter vicariously (Stake, 2005). In acquiring new knowledge and understandings, relatively new hypotheses and new research questions can be developed for future research. Employing a case study method also allows the researcher to understand better what causes a phenomenon and then provide a link between those causes and the outcomes in the research. Case studies focus on a phenomenon examined through several lenses. This methodology lends itself to examining the in-home experiences of African American students. Through case studies, I was able to gain an in-depth understanding of the participants’ personal, social, and cultural experiences. The advantage of using the case study methodology allowed me to collect and assemble the stories of the in-home student experiences of African American students to gain a deeper understanding of the internal and external attributes by in-depth accounts that could have been lost or not shared.

While case study offers “a means of investigating complex social units consisting of multiple variables of potential importance in understanding the phenomenon” (Merriam, 2009 p. 50). Several disadvantages should be explored and considered before researchers commit to a case study research method. Creswell (2013) states that a disadvantage of a case study is simply identifying the cause(s), or bounded system(s), to study and determine if the selected case is worthy of examination. Another limitation is that the investigator of a case study serves as the primary instrument in collecting and analyzing data. This potentially leads to the integrity and reliability of the research being questioned by readers. Creswell (2013) also maintains the intensive amount of time and resources required in qualitative data collection and analysis; while the results and implications of findings lead us to greater understandings, the rigorous process does serve as a limitation in the case study methodology.
Phenomenological Case Study

Descriptive phenomenologists aim to examine the lived experiences of a group of people to best capture and describe their perceived realities within a specific context (Moustakas, 1994). By using descriptive phenomenological research, I provided readers with the opportunity to understand the essence of the in-home experiences fully; to gain a rich understanding of not only where the emphasis is placed in terms of what being successful means but also support systems that have played an essential role from the perspective of the participant(s). These participants’ personal, firsthand knowledge provides descriptive data, which provides the researcher a firmer understanding of the “lived experience” for a particular event (Patton, 2002, p. 104). By using a descriptive phenomenological approach, combined with the case study method, will allow me to come to understand or make sense of intricate human experiences and “the essence and the underlying structure of a phenomenon” (Merriam, 2009, p. 23).

Criteria for Participant Selection

For this research, the sample for this study was recruited from Historically Black College or a Minority-Serving Institution. To identify participants, a purposive sampling procedure was used to identify participants appropriate for this study. Purposive sampling aims to select cases that would provide rich information related to the proposed study (Gall, & Borg, 1996). Identifying participants who can provide rich data is especially important in qualitative studies (Gall, & Borg, 1996) and equally important.

While there are multiple types of purposive sampling, to select the type most appropriate to use for my study, I referred to my research question. I identified which sampling procedure would best be suited. For this study, I used criterion sampling. During criterion sampling, participants are selected that meet a specific set of vital criteria (Gall, & Borg, 1996). For this
research, the proposed sample is African American students. The criteria for sampling participants in this phenomenological study include 1) Students who identify as African American and are enrolled as undergraduate students. 2) In good standing and willing to participate in individual interviews. 3) Enrolled at an HBCU or Minority-Serving Institution.

**Sources and Recruitment of Participants**

When this study began in 2020, we were in a pandemic. The World Health Organization (2020) states coronavirus (COVID-19) was an infectious disease caused by a newly discovered coronavirus. COVID-19 spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes (WHO, 2020). To ensure the protection and safety of participants, students in STEM were targeted using a nontraditional method of virtual recruitment. Virtual recruitment flyers were emailed to STEM faculty, staff, and student organizations. Recruitment emails were also sent to STEM adjunct faculty, associate professors, assistant professors, and professors to recruit participants for this study. Participants were informed about the purpose and length of the study and their option to participate. Creswell (2013) states to understand the essence of an experience, case studies should have no more than four to five participants, and phenomenology should have between three to ten participants. From the nine interested participants, five participants were randomly selected for the study.

Prior to participants being randomly selected for the study, interested participants had to meet certain criteria. The criteria participants were supposed to meet were as follows:

1. Self-Identify as African American.
2. Be enrolled at an HBCU in a STEM major
3. Be in good academic standing
Nine participants responded as meeting the criteria set forth and expressed interest in the study. According to Mitra and Pathak (1984), before a sample can be chosen randomly, it is necessary to have a complete list of the population from which to select. Since my maximum number of participants for this study was limited to five, and I had nine interested participants, I compiled a list of the participants that included name, age, major, and classification. Participants were also assigned a number based on how they responded to the study. The first person to respond was assigned the number one, and the last person that expressed interest that met the criteria was assigned a number of nine. Once the list was compiled, the numbers one through nine were written on little squares of paper and put in a container. The container was shaken repeatedly, and one number was selected from the container. After the first number was drawn by myself, the container was shaken, and another number was drawn. This process was repeated until five numbers had been drawn. The other numbers that were not selected as part of the initial five were kept if one or multiple participants did not respond to the email sent. Participants were notified they had been randomly selected to participate in the study and were asked to respond within five days; all of the initial participants randomly selected responded via email within 72 hours.

Samples in qualitative research tend to be small to support the depth of case-oriented analysis fundamental to this mode of inquiry (Sandelowski, 1996). Additionally, qualitative samples are purposive, selected by their capacity to provide richly textured information relevant to the phenomenon under investigation. As a result, purposive sampling, as opposed to probability sampling employed in quantitative research – selects ‘information-rich cases' (Patton, 1990). Recent research demonstrates the greater efficiency of purposive sampling than random
sampling in qualitative studies supporting related assertions long put forward by qualitative methodologists (Van Rijnsoever, 2017).

Method

A method in qualitative research is defined as “the working vocabulary of research procedure” (Gubrium & Golstein, 1997, p. 3). Moustakas (1994) notes that phenomenology as a methodology occurs in three phases: preparation, data collection, and organizing and analyzing data. Preparation for me began with a clear understanding of the research questions with social and personal significance. This was done in chapter 1 with the development of the research question: How do undergraduate African Americans who are pursuing STEM degrees describe their in-home experiences growing up that impacted their decision to pursue stem-related degrees? Another component of preparation was completing an initial phenomenological literature review; this was done in chapter 2. The following is a detailed explanation of the second phase of phenomenological methodology: data collection.

Data Collection

Throughout the research process, I conducted the interviews; this helped ensure the interview consistency. The transferability, which is the extent to which the findings and results of a study can be applied to other contexts or groups (Social Research Methods, 2006), also increased because the same individual conducted each interview. The researcher conducted a professionally structured interview with preconceived questions directed toward exploring the in-home experiences of African American students pursuing STEM degrees. The interviews were performed using a pre-constructed set of instructions and prompts that were followed with each participant. An appropriate time with the participant to conduct the interview was scheduled. The researcher logged into Zoom (the designated location) 15 minutes before the agreed-upon time to
ensure the participant did not have to wait prior to the beginning of the interview. Interviews took place online for each participant. Each interview was audio recorded using Zoom and was transcribed immediately following each interview. Once the interview was converted from speech to text, the researcher reviewed the transcript for any errors by listening to the audio version of the interview to compare it to the text version. Once the interview underwent transcription, the recordings were saved in a password-protected folder on my password-protected laptop see Appendix G.

Interviews were the traditional data collection method used in descriptive phenomenological studies (Moustakas, 1994). For my study, I conducted individual interviews; my rationale for using individual interviews was as follows. Individual interviews allow for in-depth analysis because participants have a longer opportunity to speak, providing more insight into the researched topic. Creswell (2003) concludes interviews are intended to provide an opportunity for participants to express their views and opinions through open-ended questions. Interviews are intended to gain the participants' worldview before scientific explanations (Kvale & Brinkmann, 2009). Kvale and Brinkmann (2009) focused on a particular type of interview that is defined as “an interview to obtain descriptions of significant events the participant has experienced to interpret the meaning of the described phenomena” (p. 3).

Moustakas (1994) states researchers who conduct descriptive phenomenological studies enter into the interviews with predetermined questions related to the phenomenon, but they can be varied, altered, or not used at all when the research participant shares the full story of his or her experience of the phenomenon. Using attribution theory as a theoretical framework will provide me with a systematic process to analyze participants' accounts of experiences outside of the classroom that impacted their interest in STEM. Creswell (2003) notes the limitations of
interviews as follows 1) information is filtered through the participants, 2) researcher bias may be present, and 3) people are not equally articulate and perceptive.

According to Creswell (2003), qualitative data analysis should be ongoing, using techniques beyond regular approaches. Individual interviews were transcribed, and once transcription was complete, information was coded into categories. Saldana (2009) states coding should be a systematic arrangement of data. Saldana (2009) adds the purpose of coding was to move from codes to themes. A theme is a phrase or sentence that identifies what a unit of data is about and what it means (Saldana, 2009). By grouping data into themes, I analyzed transcriptions and found similarities in the outside experiences of African American students.

Van Manen (1990) supported this in describing how themes serve phenomenology at the latent level: The study of the life-world, the world as we immediately experience it, reflectively rather than as we conceptualize, categorize, and reflect on it. Descriptive phenomenology aims at gaining a deeper understanding of the nature or meaning of our everyday experiences (Van Manen, 1990). Saldana (2009) indicated there are two cycles of coding. Data were collected through individual interviews that lasted approximately 60 minutes. The information gathered during the interviews was obtained through the use of open-ended questions. My research was conducted over nine months; Table 3 provides an abbreviated timeline.
Table 3

<table>
<thead>
<tr>
<th></th>
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<th>July-Aug</th>
<th>Aug-Feb</th>
<th>Mar</th>
<th>Apr</th>
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<td></td>
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<tr>
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<td></td>
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</tbody>
</table>

*Timeline of Dissertation*

**Description of participants**

For this study, I recruited five students who self-identify as African American and are currently enrolled as undergraduate students in good standing at an HBCU and currently pursuing STEM as their major of study. African Americans are defined as people living in the United States, that are descendants with total or partial ancestry from any of the black racial groups of Africa. The classification of the participants ranged from Sophomores to Juniors to Seniors. The age range of the participants was between 18 – 30 years of age, as shown in Table 4.
Table 4

<table>
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<th>ID</th>
<th>Age Range</th>
<th>Status</th>
<th>STEM Degree</th>
</tr>
</thead>
<tbody>
<tr>
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<td>20-25</td>
<td>Married/Child</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Janet (P2)</td>
<td>18-20</td>
<td>Single</td>
<td>Social Work</td>
</tr>
<tr>
<td>Tina (P3)</td>
<td>25-30</td>
<td>Single</td>
<td>Behavioral</td>
</tr>
<tr>
<td>Naomi (P4)</td>
<td>18-20</td>
<td>Single</td>
<td>Engineering</td>
</tr>
<tr>
<td>Monica (P5)</td>
<td>18-20</td>
<td>Single</td>
<td>Pre-Medicine</td>
</tr>
</tbody>
</table>

**Participant Descriptions**

*Note: ID’s provided are Pseudonym’s used to protect the confidentiality of the participant*

The participants responded to the digital recruitment flyers sent by faculty and staff on campus; therefore, indicating their willingness to participate in the study. Prior to the interview’s participants provided background information and provided pseudonyms to be used in the study to ensure confidentiality. The above table also describes some of the attributes of each participant. The information used from the table was the pseudonym, age range, marital status, and STEM degree. Before the interview, none of the participants asked for clarification of the informed consent. They all states that they fully understood the purpose of the study and their right as participants. The interview process was explained, and before the interview, none of the participants asked for clarification of the interview process details. Interviewees were provided with open-ended questions. The benefit of open-ended questions is that the participants had the freedom to speak freely without interruption. Many of their answers provided extensive explanations and an abundance of descriptions about various experiences at home.

All the participants who self-identified as meeting the criteria for the study were provided with in-depth information about the study’s purpose and expectations via zoom. Confidentiality
was stressed, and the study was voluntary, and at any time, they could opt-out of participating. Consent forms were thoroughly reviewed and emailed to the participants during the initial meeting. Participants were encouraged to take their time and read through the consent form again and only after doing so to email the signed consent form back to me. All five participants provided me with signed consent forms and agreed to be recorded during their interviews. I discussed the risks and benefits of participating in the study. Each participant was provided with dates and times of the interviewer’s availability and had the freedom to choose the date and time that best meet their needs, including weekdays, weekends, mornings, and evenings. Due to the unusual dynamic that Covid-19 created, participants understood that interviews would be conducted virtually on the platform of their choosing. All participants choose to participate via Zoom. Data collection occurred with the use of semi-structured interviews based on phenomenological research methods.

Table 5

<table>
<thead>
<tr>
<th>Participant</th>
<th>1st Interview</th>
<th>2nd Interview</th>
<th>Time Planned</th>
<th>Actual Time</th>
<th>Platform</th>
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<td>12/15/2020</td>
<td>60 Minutes</td>
<td>60 Minutes</td>
<td>Zoom</td>
</tr>
<tr>
<td>Janet</td>
<td>8/28/2020</td>
<td>12/19/2020</td>
<td>60 Minutes</td>
<td>90 Minutes</td>
<td>Zoom</td>
</tr>
<tr>
<td>Tina</td>
<td>8/29/2020</td>
<td>12/25/2020</td>
<td>60 Minutes</td>
<td>45 Minutes</td>
<td>Zoom</td>
</tr>
<tr>
<td>Naomi</td>
<td>8/30/2020</td>
<td>1/2/2021</td>
<td>60 Minutes</td>
<td>60 Minutes</td>
<td>Zoom</td>
</tr>
<tr>
<td>Monica</td>
<td>8/31/2020</td>
<td>1/8/2021</td>
<td>60 Minutes</td>
<td>60 Minutes</td>
<td>Zoom</td>
</tr>
</tbody>
</table>

Order of Interview of Participants
Table 5 introduces the intended order in which participants would be interviewed, which ended up being the actual order of interviews. Each participant interviewed was enrolled in a STEM major at an HBCU. Two of the five participants were nontraditional students. Nontraditional students are students who do not enter into college immediately after graduating high school. Reasons for not entering college could be work, military, starting a family, or taking a gap year. The other three participants of the study are traditional students. Traditional students are students that enter college immediately after graduating high school. Evan took a break from college after high school to earn an honest wage and later decided to go back to school. Monica’s background was nontraditional because she had previously attended a community college and transferred to an HBCU to further her education. The other three participants are traditional college students who graduated high school, applied to college during their senior year in college, and immediately went to college. While the institution they are attending does offer dorms, only three of the students took advantage of the on-campus housing; however, due to Covid-19, on-campus housing was closed at the beginning of this study, and the participants were back home living with their parents. Evan did not live with his parents; he and his wife had recently purchased a house together.

The planned time for each scheduled interview was 60 minutes. One of the interviews lasted 45 minutes, three of the interviews lasted 60 minutes, and one interview lasted 90 minutes. A minimum of 3 hours and 30 minutes was scheduled between interviews conducted on the same day to ensure an adequate preparation time for the next interview. This time also provided sufficient time for the interviewer to review notes, download, and save recordings since the interviews were recorded. The gap also provided a security buffer that ensured that there was not any overlap between participants' end time and the next interviewers' start time.
Due to the security settings on zoom, the virtual room where interviews took place was set up, so when participants entered the room, they had to wait in a virtual waiting room until they were let into the room. To eliminate the possibility of participants having to wait before each interview beginning, I entered zoom 15 minutes before the scheduled start of each interview. When participants arrived, zoom provided a notification that someone had entered the waiting room and waited to join the meeting. Participants were allowed in the room shortly after entering with little to no wait time. After entering the room, they were greeted with hello, a smile and were asked how their day was going. This was done for two purposes; the first was to serve as an icebreaker. According to Heathfield (2020), an icebreaker welcomes participants and warms up the conversation among people in meetings, training, class, team building session, and interviews. Heathfield (2020) states any event that requires people to interact with each other, and a facilitator comfortably is an opportunity to use an icebreaker. Once, participants were prompted to question how their day was going, one of the most commonly and regularly asked questions. It provided an opportunity for me to engage the participants and break down any barriers that might have been present due to their not knowing what to expect.

The second purpose the greeting served was to provide an opportunity to make a connection that builds to a conversation so the transition from greeting to interview would be almost seamless. Bernstein (2019) suggests that small talk that creates a connection between participants led to questions that were perceived as higher in responsiveness. Bernstein also notes small talk creates an interpersonal construct that captures listening, understanding, validation, and care. All of the initial small talks led to more in-depth conversations where I connected with the participants relating to everything from the quarantine associated with covid-19 to things going on at work or the weekend plans to try to have some sort of normalcy.
I reviewed the interview protocol, the research questions, and the proposed benefit of the study. If the signed consent form had not been received from participants before the interview, participants were asked to sign the document electronically and email it to me before the interview. Participants were advised that following the research study, they would receive a copy of the research result. Participants were also reminded that the interview, recording, and everything said was confidential and would not be shared with anyone. Participants were informed that they had the right at any time to leave (withdraw) from the study if they felt uncomfortable. All participants responded they would not be withdrawing because they wanted to be a part of the research. At that point, I informed them that I would press record on Zoom, encouraged them to take their time answering questions, and that they did not have to rush because we had plenty of time.

Once the interview and recording started, each interview followed the interview protocol that I created. Questions asked were open-ended in nature, the benefit of asking open-ended questions. Rubkiewicz (2020) states open-ended survey questions allow the researcher to dig down to the respondent’s authentic, highly personal reactions enabling you to find out what they think. Farrell (2016) notes the benefit of open-ended questions is that they allow you to find more than you anticipate. Reinforcing this belief, Farrell (2016) further suggests that people may share unexpected motivations and mention behaviors and concerns they knew nothing about during interviews. When you ask people to explain things to you, they often reveal surprising mental models, problem-solving strategies, hopes, fears, and much more.

Probing questions were used if the participant did not elaborate on the initial question. For this study, all participants elaborated on the initial questions asked. To capture my preconceptions and biases and record my thoughts during the interview, I took field notes.
Afterward (when the interview was over), to maintain my level of impartiality, I reflected on the notes I made after each interview was finished. This also allowed me to finish or make any additional notes that I was not able to. After each interview, the participants said they enjoyed the time we spent, and they would be more than willing to be in any future studies that may come up. I thanked each participant for their time and willingness to participate. Four of the five participants wanted to know if they could see the study results upon completion. The president of the HBCU where participants were recruited also asked if they could have access to the study. Participants were advised that they would be contacted after the study was complete and provided with the study results and a digital copy of the dissertation. The president of the HBCU was also advised the results of the study would be shared with him so he could share them with his school. Once this dissertation has been submitted for publication by the graduate school, the participants will be contacted by email and asked if they have time to meet for a research results interview follow-up. I will meet with participants virtually to go over the study results; upon completion, the participants will also be provided with a digital link to view the dissertation. If someone is unable to meet, a summary of findings will be provided via email, along with a copy of the link for the dissertation. All participants will be provided with my contact information in case they have questions.

**Participant Backgrounds**

**Evan** was a 25-year-old male who always wanted to participate in a research study and was thankful for the opportunity to participate in this study. He said he was very excited and was more than willing to participate in any other future studies that may present themselves. When asked to tell me a little about himself, he said he was married and had one two years old. He said he never saw himself trying to finish school and raising a child, but he said things
happened, and he laughed. He said he enjoys his job in Information Technology but understands the importance of a bachelor’s degree. He said he never realized the importance of a degree until he started working and that he does not want to be making low wages for the rest of his life as an entry-level IT professional. He said he enjoys watching soccer and occasionally football and basketball but has a hard time enjoying baseball because it is so boring. He laughed and said the baseball might not be so bad now that he and his wife have not been able to go out as much because of Covid-19 and chuckled. He said college was a juggling act because aside from working, he is also very involved in the clubs and organizations on his campus. It helps the overall organization and adds something to his resume, which always looks good. He was majoring in computer science and was currently in his senior year in college and says he has been promised a promotion at his job once he finishes his bachelor’s degree.

Janet was a 20-year-old female who wanted to share her experiences to encourage or inspire other African American students, not to let anyone stand in the way of them achieving their dreams. She did say that while she was excited about being a part of the study, she was also nervous. She followed that statement with, “but I am sure my nervousness is only temporary cause once I get started talking, it is hard to get me to shut up as you saw earlier.” When I asked her to tell me a little about herself, she said she had a younger sister who still lived at home with her parents (mother and father). She is enrolled in the nursing program and is currently in the first semester of her Junior year. 

Tina was a 21-year-old woman in her last semester at school and was focused on maintaining her good grades to make her father proud. She said she was a little nervous because she had never participated in a research study; she was excited about the opportunity and hopeful that whatever information she shared would benefit others in a meaningful way. When I asked her to
tell me a little about herself, she said she has an older brother, a father, and her mother had passed away when she was nine years old. Her major is Educational Psychology; she plans to work with children with behavior problems in the future.

**Naomi** was an 18-year-old woman who entered college when she was 16 years old. She said she wanted to be a part of a study related to African Americans and STEM and thought this was the perfect opportunity to do something that would make a difference. She said she was so excited that she told her parents about the study and was nervous, but only because she did not know what questions would be asked. When I asked her to tell me about herself, she said she was one of four children, born in the United States; her mother is Black, and her father is Nigerian. Continuing, she said she has an older sister and a younger brother and sister. She did not give their ages, and I did not ask as I do not think the ages of her siblings are relevant to this study. She said she originally wanted to be a nurse but later decided that she wanted to be a doctor. She is currently in her Sophomore year.

**Monica** is a 19-year-old woman who entered college when she was 16 years old. She was well-spoken and expressed that she was nervous and spent the previous day preparing for the interview. She said she was excited about participating in the study and making a difference in the lives of others. When I asked her to tell me about herself, she said she had a younger brother whose age was not mentioned, and I did not inquire as to her brothers' age. She said she considered her entry to college nontraditional. I asked her what she meant by that, and she said that when she finished high school, she was 16 and her parents wanted her to get her feet wet with the college before going to a four-year school. As a result, she enrolled in community college and completed a years’ worth of classes before transferring to a four-year institution of higher education. She is currently finishing her junior year in engineering.
Data Analysis

Data analysis for this study started with analyzing field notes and continued until all field notes had been analyzed. Once field notes were analyzed, transcribed interviews were analyzed until I was able to identify the themes that governed my findings. Utilizing Moustakas' (1994) method of data analysis for the phenomenological study, I reviewed all of the transcripts multiple times, highlighting, pinpointing, and combining statements. I was able to use in-depth, open-ended interview questions as the research tool. This also allowed for the connections of statements within the data. The findings of this study reveal and provided in-depth insights into the in-home experiences of African American students and the role those experiences played in the selection of STEM majors.

Analysis transforms data into findings by bringing order, structure, and meaning to the mass of collected data. According to Patton (2002) and DeVos (2005), the analytical process does not proceed tidily or linearly but is more of a spiral process. It entails reducing the volume of the information, sorting out significant from irrelevant facts, identifying patterns and trends, and constructing a framework for communicating the essence of what was revealed by the data (DeVos 2005). DeVos (2005) maintains an inseparable relationship between data collection and data analysis, and this is one of the major features that distinguish qualitative research from traditional research.

In analyzing the data for this study, a considerable part of the process was understanding how I would interpret the data. Because this was somewhat new and unchartered territory for me, it was necessary to examine my stance, attitude, and background knowledge. Krueger (2000) emphasizes that data analysis does not provide answers to research questions as these are found by way of interpretation of the analyzed data. Denzin (1998) states the interpretation
involves explaining and making sense of the data. This involves an ongoing engagement with the process in that interpretation and analysis are closely intertwined as the researcher automatically interprets as he or she analyzes (Kruger, 2005). A plausible and coherent interpretation of data develops through this combined data collection and analysis process (DeVos, 2005).

Effective analysis of data as outlined by DeChesnay (2014) requires four steps in the analysis of data in descriptive phenomenological research: (a) bracketing, (b) analyzing, (c) intuiting, and (d) describing. This section will describe each step in this process.

**Bracketing.** To remain neutral, I engaged in activities that I felt would minimize and even neutralize my preconceptions and biases. Throughout my interviews and research, I employed bracketing strategies to remove as much of me as possible. To keep track of my bracketing, I noted journaled my preconceptions, feelings and reflected on those feelings. I also recorded field notes, read and re-read my interview transcripts, and reflected on the meaning of the participants’ lived experiences more often than not, reflecting on the possible biases that I had and the biases that my participants may have also had. During the interviews, when the opportunity presented itself, I freely shared my preconceptions with the participants. I also allowed the participants to comment and or provide their thoughts about my prejudices.

**Analyzing.** To ensure proper data analysis, I employed Colaizzi’s method for data analysis. Colaizzi’s method is commonly used in phenomenological research analysis and involves seven steps. The seven steps are listed below.

1) Reading and rereading the participants’ descriptions of the phenomenon to acquire a feeling for their experiences and to make general sense of those experiences.

2) Extracting significant statements that pertain directly to the phenomenon under study.
3) Formulating meanings for these significant statements to illuminate hidden meanings.

4) Categorizing the meanings into clusters of themes and confirming consistency between the emerging findings and the participants’ stories without giving in to the temptation to ignore data that do not “fit.”

5) Integrate the findings into a detailed description of the phenomenon under study; describing includes coding segments of text for topics, comparing topics for consistent themes, and bridging themes for their conceptual meanings, leading to creating a theoretical prototype model phenomenon studied.

6) Validating the findings by returning to the study participants to ask how the universal description compares with their personal experiences.

7) Incorporating any changes offered by the participants into the final description of the phenomenon.

**Intuiting.** Intuiting is a reflective activity whereby I tried to understand the experience from the participants’ point of view and begin to consider the commonalities in the participants’ descriptions of their lived experiences (Swanwick, 1994). To achieve this, I applied a combination of active listening to what the participant was saying and reflective practices (reflecting on the impact of what is being said or reflecting on the previous conversation with the research participant, reflection on thoughts in my journal). I engaged in intuiting by withholding my final interpretation while allowing my own opinions to go through a transformation process about the essences uncovered in the participants' narratives.

**Describing.** As defined by Meyers (2016), it is the final stage of data analysis. Where the researcher comes to understand and define the phenomenon, Myers (2016) said when done properly, if the true essence has been captured, then anyone who has experienced the
phenomenon should be able to see, identify, or recognize features of their own lived experiences in the description.

**Quality of Data**

To address the trustworthiness of my study, I used a modified version of Lincoln and Guba’s (1989) research validity. To establish validity in my study, I focused on credibility; credibility is confidence in the “truth” of the findings. In descriptive phenomenological research, the “truth” is an accurate description of the universal structure of participants’ lived experiences. Credibility in qualitative research has also been defined as whether or not the participants and or members of the community being researched feel that the findings represent their experience. Lincoln and Guba (1989) maintain researcher activities promote credibility in qualitative research. To effectively do this, I used semi-formal interviews while maintaining a flexible research approach. This allowed me to gather rich and detailed information about the participants' lived in-home experiences. I conducted reflection and data analysis within and across transcripts. By doing this, I was able to identify relevant data and bracket out irrelevant data (Onwuegbuzie & Leech, 2007). Since my research focuses on the in-home experiences of African American students pursuing STEM degrees, I think participants and community members will find value in the study because it will not simply represent an individual but the majority of individuals who can relate to the experiences.

For this study, I utilized a phenomenological research method to examine and describe the lived experiences of four African American students currently pursuing STEM degrees at an HBCU. The purpose of my research study was to describe the in-home experiences of African American undergraduate students pursuing STEM degrees enrolled at HBCUs. According to McMillan and Schumacher (2006), phenomenology increases the understanding of lived
experiences. The use of descriptive data in this research study provided readers with the opportunity to fully understand the essence of the in-home experiences to gain a rich understanding of not only where the emphasis is placed in terms of what being successful means. As well as better understand the support systems that have played an essential role in the pursuit of STEM from the participant's perspective.

**Limitations of the Study**

By design, this study focused on the in-home experiences of African American students pursuing STEM degrees. While briefly discussed, socioeconomic status, stereotype threat, standardized testing, classroom environment, and other critical race constructs contribute to the harsh environment in which African American students are exposed. This study sought to examine one aspect of a much larger persistence problem in STEM-related to African American students. Because the student sought to examine the experiences, the method used was phenomenological. There are unique challenges to conducting phenomenological research. Phenomenological interview limitations may appear due to the researcher’s lack of experience in conducting interviews (Downey, 2015), which may interfere with the researcher’s focus and intentionality (Ashworth, 2017). If a researcher is to understand the essence of a phenomenon, a suspension of judgment is required during participant interviews (Ashworth, 2017). Additionally, the researcher will need to be extremely attentive to experience the study through the participants’ eyes (Kelley, 2016).

There are also ethical limitations that can occur if the researcher lacks the commitment to the task at hand, which requires resisting personal thoughts, including preconceptions and biases. To not resist would generate biased interview analysis (Kelley, 2016). Janesick (2011) states the researcher’s role must include integrating biases, beliefs, and values up-front in the study.
Creswell (2014) notes a limitation of phenomenological research was that the process was time-consuming and labor-intensive due largely to the fact that it required a copious amount of data that had to be analyzed. Furthermore, the individual circumstances that data is collected from cannot be generalized (Maxwell, 2013). There are also limitations linked to the credibility, validity, and reliability of data. Rudestam (2015) advises it is the researcher’s responsibility to convince oneself and one’s audience that the findings are based on a critical investigation (p. 131). Patton (2002) argues there are no straightforward tests that can be applied for reliability and validity in phenomenological research. Therefore, the researcher must do their best in the interview phase to present the data and communicate what the data reveals given the purpose of the study (Patton, 2002, p. 433).

To minimize time limitations, data was transcribed immediately following interviews. Doing so ensured there was more than enough time to read through transcriptions, analyze data, look for similarities between emergent themes and take a second look to ensure nothing had been missed. To minimize biases and preconceptions, I identified my bias and preconceptions to the questions that participants were asked before them being asked. This allowed me to create an internal awareness of my thinking which eliminated me from interpreting what the participant was saying inaccurately. This is not the first phenomenological research study I have conducted on African Americans. My previous research helped me create targeted research questions for the specific purpose of this study. To understand the phenomenon, I paid close attention to what the participants were saying and took detailed notes and recorded interviews to ensure data was not lost. The data presented and communicated in a way that clearly explains what is meant by the in-home experiences and elements within the in-home experiences that detail the internal and external that play a role in African American students' desire to pursue STEM degrees. The data
is also presented to show the different ways African American students can be impacted. The reach is far greater than simply the external environment resulting from oppression. The oppression creates another dynamic that impacts the parents, and the parents, in turn, unknowingly impact the students by the things they say and do.
Chapter 4: Findings

Prior to the identification of themes, I read through the transcripts of the recording to better understand each session and what the participant was trying to convey with their words. Agar (1980) states this is significant because it gives the researcher a chance to get a sense of the interview as a whole before breaking it up into pieces. After reviewing the data several times, I identified the recurring patterns and trends that reflected the participant's feelings—being aware of what participants expressed the strongest emotional content that moved them and was typical of their common life is finding your themes (Isasi-Diaz, 1993). De Vos (2005) adds the process of identifying salient themes, which includes but is not limited to recurring ideas, and patterns of belief that link the participants, are the most intellectually challenging phase of data analysis and can integrate the entire endeavor. As the themes emerged, they were grouped by pattern and commonality terms known as generalizations.

According to Falmagne (2006), the notion of generalization in themes preserves the socially constituted nature of concrete individuals while enabling social interpretations. By taking into account my particularities and generalizations combined with the participants' experiences. Falmagne (2006) referred to making connections between participants for theme generation as producing meaningful condensations. The researcher can gain from one participant an understanding that can enhance one's knowledge of another participant.
Themes

Four themes emerged from participant narratives

- Conflict experienced early on improves character development
- Your focus influences who you become
- The power of parental persuasion in student achievement
- A positive mindset creates a positive self-image

Conflict Experienced Early on Improves Character Development

According to Schneiderman (2016), from the time we gain our motor skills, situations arise that challenge our perspectives or demand skills we have not learned; this creates a conflict within ourselves and our environment. If we had already experienced every conflict, there would be no growth. Conflict provides us with the opportunity to change how the degree to which the individual embraces this challenge or tries to avoid it determines who he or she becomes, for better or for worse.

The first theme that emerged conflict experienced early on improves character development stemmed from the question presented to the participants about what it was like growing up. My preconceptions about this question led me down a biased path of thought. A train of thought that said anyone pursuing STEM likely grew up not experiencing conflict. The reason for my thinking is because, in my mind, individuals pursuing STEM likely grew up in a multi-family home (with both parents), lived in an affluent neighborhood, went to the best schools, and experienced minimal amounts of marginalization, racism, and discrimination. This preconception and biased way of thinking grow from experiencing racism, discrimination, marginalization, and tracking.
When I was in school, it was only on a rare occasion that I would see someone who had grown up in a low or middle-class household in STEM. Rather, it is because students from this type of environment are not capable. This jaded train of thought is because there are so many factors outside of the home life working against students from low-income areas that make thriving in this type of environment difficult. Add in the dynamic of growing up in what is commonly referred to as the ghetto, which presents its own set of challenges relating to higher crime rates and gang violence, and thriving seems impossible. Wodtke (2011) states growing up in the most disadvantaged neighborhoods significantly reduces a child’s chances of graduating from high school. Wodtke (2011) further adds that even more concerning was the longer a child lives in such a neighborhood, the more harmful the effect. According to the National Center for Education Statistics (2019), this was more pronounced for Black children revealing their chances of graduating if they live in an affluent neighborhood can be as high as 96 percent but drops to 76 percent if they live in a disadvantaged neighborhood. Research conducted by the NCES (2019) also reveals White children in poor neighborhoods, by contrast, have an 87 percent chance to graduate, compared to 95 percent in a rich neighborhood.

The narrative put forth by Evan revealed growing up in an environment with less than and conflict between siblings that helped strengthen his character development.

Evan stated the following:

Growing up, for me, was crazy. I grew up in California in a rough neighborhood with my mother, father, grandmother, and three siblings in the same house under one roof. It was me, my two brothers, and my sisters, and we were always fighting for something; sometimes we were fighting over food, well, most of the time, we were fighting over food. We fought over chores; we fought over where
we were going to sleep, and we fought over what we were going to watch on television. My two brothers and I used to fight over clothes. We did not fight my sister over clothes because we did not want to wear her clothes. After all, she was a girl, and we were boys. But if you name it, we fought over it, and sometimes our parents would break us up, and other times our parents would let us fight it out, but it created a competitive nature within us that stayed with us because we were always trying to outdo each other. And that carried over into school in school; it was the same thing most of the time my sister got the best grades in English, one of my brothers got the best grades in math, one had the best grades in history, and I got the best grades in science. That competition we had growing up helped us develop the mentality that you have to fight for it if you want it.

Previous research on the conflict between siblings reveals that resentment, jealousy, and anger can result from sibling rivalry. Raffaelli (1992) argued sibling rivalry could be mind-altering and boost mental and emotional development, increase maturity and enhance social skills. Harris (1983) states, the more the children upset each other, the more they learn about regulating their emotions and how they can affect the emotions of others, the more they point-score, the more it can motivate them to achieve. Evan revealed that he and his siblings unknowingly participated in something very similar, and as a result, they were motivated to achieve even when it was not warranted.

The narrative from Janet did not reveal conflict between siblings; her story grew from having to deal with an internal conflict that arose from being at a disadvantage because of a language barrier.
Janet stated:

My parents are originally from Liberia and did not officially gain their citizenship until I was seven years old; I grew up speaking my native language Kpelle. I could understand a little bit of English but not enough to carry on a conversation with other children. So, when I started school, I had to be in the ESL program. And I had to take second grade twice because I did not fully understand my teachers. And I went to a predominantly all-white elementary school. So, I was always normally the only Black girl in my class, and I just never could understand. My mother and father sat me down one day and told me that they were sorry, but if I was going to survive, I had to learn how to speak English. I struggled to learn English, and to help me learn it faster my parents stopped speaking my normal dialect to me at home and started speaking—especially my dad since he had been in the United States for so long since he was 20. He was trying to teach me English and getting familiarized; he would tell me that I will have to fight to learn it because I was stubborn, and part did not want to learn English. Having to learn English by struggling with it year after year and having to repeat the second grade twice and then making it through third grade and then having to repeat fourth grade twice did something. I think it helped me because eventually, I learned the language, but I found myself being able to do more than carry on conversations. I found myself learning, and without that struggle, I do not think I would be where I am today.

Janet’s conflict was not an external conflict where her character was being developed from interactions with her siblings. Janet’s conflict was internal to herself because she was in a
position where not knowing put her at a disadvantage and was presented with two choices fight or flight. The fight or flight response was designed to deal with feeling fear for our lives, but it is much more likely to be triggered by more complex and subtle concerns: internal threats in the form of worries (Gwathmey, 2015). Janet’s problem was learning another language and not being made fun of, and gaining the proficiency needed not just to get by but to excel. Pinker (2020) found that early exposure to two languages was considered not a handicap but a cognitive advantage. The reason for this is because bilingual children performed better than monolingual children on intelligence tests. And we're more likely to inhibit unwanted thoughts and actions and were also more sophisticated abstract thinkers. Janet was forced at an early age to learn English to survive the rigor of the educational system. Through that experience, she learned to persevere even if there was some struggle involved in the process.

The dialogue with Tina revealed several different environmental dynamics, but the most transformative conflict experienced was when her mother passed away when she was nine years old.

Tina put forth the following:

In my household, growing up, it was me, my mom, my brother, and my dad. We lived in a small neighborhood. I will not say everyone knew everyone, but everyone knew of everyone. It was the hood you had people who would get up in the morning and out on the corner sell drugs, you had people who would buy drugs, you had the local hang out spots something I had never seen, but no one ever bothered me everyone always looked out for me maybe because I was a girl. Life for me growing up changed because, at the age of nine, my mother passed away. She passed from cancer at a young age and when I was young, but she
never once stopped fighting. Her passing changed the dynamic of our household; it ended up being me, my brother, and my father, and my grandmother because mom was no longer here. Her passing did not just change the dynamic of our household; more importantly, it changed the dynamic of me and who I would become. Was I going to become this little girl that stopped living life because she no longer had a mother? I mean, I still had my father, and I had my brother, but my mother was my world, and the conversations that I had with my mother are different than the conversations I had with my father. I had to fight. I was a young girl still developing mentally, physically, and emotionally. I could not and would not allow myself to be a victim to myself or anyone else. I became a Pitbull protecting my father, protecting my father, protecting the house, and most importantly, protecting me. I learned how to fight not physically, but mentally everything became a challenge me against it regardless of whether it was school, chores, etc.

Dealing with grief is an individual, multifaceted, and varied task that can be problematic if the individual cannot mentally process what has happened. Amid loss, people often find growth opportunities and emerge from the situation with greater confidence in their abilities to manage difficulties (Hirsch, 2015). Hirsch (2015) notes that it is not uncommon for people dealing with internal conflict (i.e., death, loss of a loved one, family problems, relationship problems) to look for ways to redefine themselves. Tina was young when her mother passed away, but used the conflict felt internally from that experience to alter her thinking. As a result, of the situation, she now found herself in and feeling the need to make the most of life because it
is short. She decided to redefine her role in her household, changed her thinking, and worked to make her mother and father proud even though one parent was no longer physically in her life.

Naomi’s narrative revealed conflict and the ability to grow from that conflict, but her story also revealed a different dynamic one that was not discovered with the other participants.

Naomi stated the following:

Growing up, I am the oldest child of my mother and father, but I have two other sisters from my dad. So altogether, it is five of us. Because my father had two children before they had us, it was the first time my mom and dad raised a child together. And since I was their firstborn, I was the guinea pig child because I was used to testing if things work out or not. So, I got made to do a lot of stuff that I did not want to do. And because I was, in my opinion, being forced to do things that I did not want to do, I rebelled, and because I rebelled, I got into a lot of trouble. My older sisters were always fussing me out and telling me I needed to grow up, and my parents were always telling me that I was a bad influence on my younger brother and sister. I did not fit in with my older siblings, and I did not fit in with my younger siblings, so I just had to survive. So, I learned how to be more mature since I was around many older people, so I do not know. People say that I act mature, so I feel like that is why because I learned how to adapt who I was to try to please everyone because when you grow up around a lot of older people if you act like a child even if you are a child and do not act mature, you get in trouble. Growing up, they were not very supportive, but they would help you. Because they are parents, and I guess they feel they have to help you even if they do not support you because you are trying to be a kid and want you to be an adult.
So, you lose some of your childhood to evolve into a role you do not know how to be. So, yeah. That is it.

Naomi felt like she was too young to relate to her older siblings and too old to relate to her younger siblings and, as a result, often rebelled against what her mother told her. According to Madison (2018), rebelling is a poorly understood psychological construct that does not always equal negativity. Rebelling is an inquisitive act that helps us discover our identity, gain the confidence to stand our ground, and face challenges (Madison, 2018). Halperin (2010) notes rebellion originates from a conflicting sentiment of anger and disapproval of a situation. It then manifests itself by the refusal to submit or to obey the authority responsible for this situation. Through the manifestation of rebellion through conflict sentiment, Naomi learned how to not only face but deal with challenges while developing her individuality.

Conflict for Monica was created when she asked what she thought was a simple question packed with ulterior motives.

Monica put forth:
Growing up, I think my experience was different, or maybe it was the same as other students, but my parents were very ambitious. From the time I was little, they always preached working hard. And so, growing up, all I did was help out around the house and school. When I was not doing chores, I was doing schoolwork, and when I was not doing schoolwork, I was doing chores. And there was a time when my parents stopped letting me do chores, and the only thing I did was schoolwork, and when I was not doing schoolwork, I was reading books. When I got to sixth grade, I talked with one of my white friends and learned that kids were getting paid to get A’s in their classes, and I was mad about
it. I thought I was being scammed. I was like, that is a scam. And I was like not to be like everyone else, but why are they getting $20 for an A, and I'm working for free. That is so unfair. So, I went to my mother, and we got into a huge argument because I wanted to get paid like the other kids. I remember telling her. You should not be complaining about me or my behavior because I'm such a good student. What more could you want? I'm such a good kid. And she was like, Oh, you get good grades, huh because you want to get paid for school. So, are the good grades for you or me? I remember her telling me that if you only do something because you are expecting something in return, you will never see your true potential. She's like, if you want to be homeless, you be homeless. I cannot make you do anything because you will grow up and do whatever you want regardless of what I say, so if you want to throw your life away like so many others, then go for it because I cannot stop you. I remember thinking to myself, wait, the conversation was not supposed to be like this. I was supposed to make my request and get paid for school. That conversation changed my life and my outlook on my priorities, and the rest is history.

Monica’s inquisitiveness placed her in a position where she unknowingly created conflict within herself. This happened when she took what she heard one of her friends say: they were getting paid by their parents for doing good in school. When she approached her mother with the request, her mother was upset and presented her with a choice. The choice was she would do good in school because she had a genuine desire to learn or simply because she was getting paid. The mother’s concern was if she was only pursuing academics for a temporary monetary gain would she stop caring and do poorly when she is no longer receiving financial incentives? The
conflict the conversation created set the stage for how Monica would proceed. Rather than making an immediate decision, she chose to step back examine herself and her motives and what she wanted out of school and life. Developing creative children who are confident in their abilities gives them the freedom to make a decision; doing so creates allows students to manage the decision and outcome and become abstract in their thinking (Ticktin, 2018).

**Your Focus Influences Who You Become**

According to Roomer (2019), our brains process millions of pieces of data throughout the day. Making our minds not overloaded, a part of our brain called the Reticular Activating System is constantly filtering information. Roomer (2019) states to a large degree, this filter is formed by us telling our brain what is important to us, what we believe, and what we fear. Over time the RAS creates a filter for the things we are focused on that we deem important and validate our beliefs. The second theme that emerged from the participant interviews was the theme Your Focus Influences Who You Become. When examining my own bias and preconception to bracket my position, I asked myself where African American students place their focus, and my first initial thought was on the money. When I questioned my rationale for thinking this, it is because depictions often seen in the media show African Americans in careers of athletes and musicians. As a result of the shallow depictions, students are more likely to chase the short goal of financial stability over education and a more fulfilling purpose. Most people go to school for a college degree so they can make more money. Digging deeper, I asked myself if there was anything else that mattered. It is not uncommon to hear people say you should do what you love. The argument can be made that if you do what you love every day for the rest of your life, it remains as something that you love or does because of a daunting job.
Dialogue from Evan revealed focus from growing up in a household where his mother did not work. His father was the sole provider; this created a desire that developed into a stronger character.

Evan stated:

I've seen very rich people, but they're not happy where they worked. And I have seen poor people, and they were as satisfied as they could be. And so, I've realized that it is not about the money. It is really about what you feel, what you can say about what you're doing because if you're not making the world a better place, then there is no point. My mom never went to school, so my dad was the only parental figure I had that was educated. So, I wanted to follow in his footsteps. Having a job did not make him any more successful than my mother because she did not have one. Most people would tell you one thing that they know about me is I'm not crazy about working for an organization that pays this huge amount of money. I'm really about working for an organization that does something good. For me, success has to do with, am I happy with what I'm doing? Can I be able to tell people, Hey, this is what I do for a living," and be proud about it? That is really what success is for me, being able to say, I do this for a living, and I'm happy about it. Because at the end of the day you cannot take any of it with you and since you cannot take any of it with you, why is it so important to make a huge amount of money that you will probably never spend?

Evan wanted to be like his father and go to school and achieve a higher degree.

Krisbergh (2018) states children whose parents have succeeded in school tend to meet with academic success themselves and stay in school longer than children whose parents dropped out.
The desire for Evan to be like his father created more confidence within himself regarding his abilities; thus, he too wanted to make an impact in the lives of others. Krisbergh (2018) states parents taking on the position as a role model occurs consciously and unconsciously and can have a positive or negative impact on the child.

The narrative from Janet revealed a much different but still shared some of the same similarities as the narrative from Evan.

Janet stated the following:

My parents being from Liberia and not gaining citizenship until I was born, have always shared their struggles. And when I was in school and was learning English, even though I was not entirely speaking my dialect anymore, I still had an accent. I was still bullied. I was still made fun of, but my parents always encouraged me to focus on school. Because when we talk about coming from another country, the main goal of coming to America is not to make money; it is to acquire the knowledge that you need. The ability that they could not get from Liberia and the knowledge that is still lacking in Liberia. So, my parents always really forced the school into my head. And they would say, this is why we came to America to get knowledge. And this should be your main focus. You do not need to focus on anything else. So, I kind of took that mindset into high school. When I started high school, I joined it was Dudley Academy. The academy had three things. They had the educational track. They had the engineering track. And then they had the medical track. So, I ended up taking the medical track. Not because I believed that the educational track was not the right track and not because I believed that the engineering track was not the right track but because I
believed that I could gain the greatest amount of knowledge from the medical track and with that knowledge, I could help people not just here in the United States but all across the globe. My parents would always tell me to take the knowledge that I have and share it with someone to make their life better.

Janet’s parents wanted her to seize the moment because they did not have the opportunity to have a quality education because of where they previously lived. As a result, Janet recognized that her parents were trying to encourage her to her full potential. Smith (2017) states parents also make many sacrifices for their children and want the sacrifices to pay off. Parents who did not have a lot growing up have a huge fear that their child does not achieve their full potential and waste an opportunity at an education. Janet recognized this and used this to fuel her desire to seize the moment and take advantage of the opportunity.

Tina revealed her mother’s death created a shift in her thinking that caused her to take a second look at where she was placing her focus.

Tina puts forth:
Growing up, what mattered the most was making my father proud since my mother was no longer here; I wanted to be the best child that I could be. I wanted to please my daddy. Because he was already dealing with the loss of momma and I did not want to be the reason that added more stress, I focused on trying to be successful with everything that I did to make him happy. And I know when it comes to what everyone thinks of when it comes to success, no one may have the exact definition. But for me, I would say that my definition of success is being able to take experiences and move forward, learn from them, do better, move forward, continue to build upon what I have learned so that I am always growing
and becoming better. When I was young, my success was not what I would consider as being successful right now. Success for me when I was young was making sure I did my chores. Making sure I was home on time, and no one had to come and look for me or making sure I helped my grandmother or making sure I did not get into trouble. That was then and now a success; I am 20 years old, and I still want to please my father, so my success last semester was to pass my math class. And being able to pass that math class allowed me to go to the next level. This semester, I am taking major classes, and passing those classes will lead me to the next goal, but I will not disappoint my daddy. It has been 11 years since my mother passed away, and if I do not do good in my classes, that will be a huge disappointment for not just me but my family, and I cannot do that; I will not do that.

Tina's focus on what matters was not one of money or education; it was focused on merely being successful. Her desire for success came from wanting to prove to herself that she was capable and, in doing so, in turn, show her father that she was the least of his worries. Independence discovered at an early age shows intrinsic motivation because students can create their reasons for success (Taylor, 2009). Tina believed that part of being responsible was giving her best effort, disciplined, staying committed to what she was doing, and completing all of her tasks school included. With each task completed, she increased her motivation and belief in her abilities and carried those traits with her through K-12 and into college.

Naomi revealed earlier in life her focus was based on her mother's personal and professional interests, which were income-based.

Naomi stated the following:
School matters, money matters, obeying your parent's matters, but I believe what matters most is as a human being is finding out what makes us tick. I'm not sure about my dad because we were not close. I do not talk to him, and growing up, I never used to talk to him, but that is a story for another time. But for my mom, in the beginning, when I was little, she just encouraged us to do what we love, and if we do what we love regardless of what it is, we will be happy with it, and it will make us successful. But as we (me and my siblings) got older, she changed and started saying that, When you are doing something that makes your life comfortable," which is earning money and having a nice house and nice cars, that is being successful, and having a life you're happy with, I guess. So not only about money and material things but living a life that makes you happy. And I used to think that life was all about getting money and making six figures. I used to tell myself every day if I am very rich, I'm successful, but as time has passed, I learned it is not only about money. Do not get me wrong, I would like to be happy and rich, so those things that I see as measures of success if you are looking at the socioeconomic status and where you fit in on the food chain of life. I try to focus on discovering myself because I think that is the most successful thing. Because a lot of people do not know themselves, and they die without knowing themselves. So, when you find yourself, you will be able to place your priorities stuff and understand what success means to you. So, knowing yourself. I feel that is the greatest success, and that is what matters most.

According to Scarr (1992), focusing on activities or interests that do not add any value to you, stringing one after another can make you forget about what is important. And gradually
throw things out of balance, which will take a lot of effort to reverse. To know which things you should prioritize, you should look inside yourself and discover what is important (Scarr, 1992). It was not until she was able to examine, identify, and place importance where she deemed necessary on helping people that she was able to prioritize what mattered to her the most. In Naomi’s mind, if she was doing what she loved, helping people to the best of her ability and making a positive impact in the lives of others, that was greater than anything that money could buy. She also believed if whatever she was doing was done to the best of her abilities, she would make money, so focusing on making money was no longer a priority. She was able to take this thinking and use it to motivate her to do well in school; her focus and priority became an academic success to help achieve the goal of making an impact in the lives of others.

Monica’s narrative revealed focus that came from what could be considered a non-traditional approach because she had the freedom to focus solely on her academics.

Monica stated:

My friend, whose father is Peruvian, passed away a few months ago. And we were talking, and I was helping her and trying to be encouraging when she was grieving. And she told me that her dad's last words were, I love you, baby. Always stay learning," And I started bawling my eyes out because I was like, That is exactly what my dad would tell me." It was the same thing. They'll be on their death bed and be like, Stay in school. It is like the same idea. But I know a lot of and not to generalize cultures, but sometimes in the African American culture, we prioritize different things. And it is just different for everyone. My mom did not even want me to do chores; she said that was my brother’s job since they were hardheaded. She would tell me that my job was to be a student. Your
job is solely to be a student. And just last week, I just wanted to complain to my dad about how much work I had. So, I go downstairs to complain because he was right there. So, I was just like, There's so much to do. And I was expecting him to be like, Oh, what do you have to do, right? Normal segue for a conversation. And he said, what is your job and I said school, and he said well. That is just how it is. And I was like, wow, that was so unhelpful. What the heck? And it is also that this is just part of the process. Looking back at it, since I said I want an education, I should focus on getting that education because it is something that I want, not for anyone else. Well, I mean, I do want my parents to be proud of me, but I want to do this for me.

Monica’s parents were lenient in the fact that she was not required to do chores because her mother and brother did the chores, and as a result, she was able to immerse herself in school. According to Xu (2005), when students immerse themselves in homework at an early age, they build the habits of accountability. Even if it is sometimes boring, sticking to a task helps them learn tricks to focus even when they do not want to. Admittedly, Monica never liked doing chores, so concentrate on school would put her in a position where she forced herself to learn independently. Monica said focusing on school also helps her when she does chores because what was once seen as a daunting task now seems easier since she has learned to focus on a task until she accomplishes it.

Monica maintains the tough love she received from her father put her in a position to learn life was not always fair and that part of being successful in life was going through some things that were going to make you uncomfortable. These teachings from her father taught her that even if she is not successful, she does not have to lose focus and quit. Jensen (2012) states
children brought up by parents practicing tough love are more likely to become rounded personalities with well-developed characters than those who face either authoritarian or laissez-faire approaches. Jensen (2012) reveal it did not matter whether the parents were rich or poor; those who adopted the approach brought up children who were more likely to be empathetic, more able to control their emotions, bounce back from disappointment, and more capable of concentrating and completing tasks.

The Power of Parental Persuasion in Student Achievement

According to Bandura (1977), there are theoretical pathways through which others influence children's perceptions and expectations of their cognitive competence: (a) performance accomplishments and performance mastery, (b) vicarious reinforcement, (c) verbal persuasion, and (d) emotion regulation. This was echoed by Gonzalez-DeHass, Willems, and Holbein (2005); Grolnick, Ryan, and Deci (1991) maintain higher parental persuasion contributes to an increase in a child's perceived level of competence. The third theme that emerged was the Power of Parental Persuasion. Persuasion is the ability to convince someone of something or to do something. My preconception about this particular theme is that parents from low-income households strongly encourage their children to pursue quick money, so their children do not have to struggle the same way their parents struggled. Or pursue careers that provide a good return on the investment that they have made in college. Additionally, my preconceptions lead me down a path where I think parents who are not overly involved and do not dictate to their children the career path should choose to believe their child will be more successful. My own bias says STEM is a great field for African American parents to push their children toward because it is a field that is in high demand and has a lot of earning potential.
Parental persuasion in student achievement was revealed to Evan from encouraging conversations with his parents.

Evan stated the following:

My parents had four kids, so I would say they tried to move it. So, for my younger brother, he wanted to go into basketball because that is really what he wants. So, they're pushing that for him. My sister has always been in the science department, so they pushed that for her. My parents never tried to force anything on us that we did not like, that we did not want to do. They let us work to our strengths. That is something they did a lot. Yeah. They let us work to our strengths, not try and force all this, because-- I know you mentioned music. So, my mom used to say that-- if she tried and pushed us to do all that, one thing she used to say is that we are going to be successful in doing it. Because if you do not have-- if you do not have-- what is the word I'm looking for? If you're not willing inside to do something, no matter how much they force you, you're not going to give it all your effort; provide it with everything, give it your best. You're not going to give it your best. You're just going to do it so your parents will be happy, and you're not going to do your best. It is very funny because growing up changed a lot for me what I wanted to do. I remember when I was younger, I wanted to be an astronaut. Then I wanted to be a lawyer. Then I wanted to be an engineer. It has always been just a series of different things, but I always had the support of my parents regardless of what I wanted to do. Their conversations may have been different away from us when they talked to each other about all of the different
things we came upon daily that we wanted to be when we grew up, but if they did, they never showed it.

The narrative Evan provided was an informative one where his parents allowed them to be creative while building their strengths. According to Comer (1989), allowing your children to be creative and explore new ideas stimulates mental growth and development. Comer (1989) states, “this freedom stimulates their brain, and they learn more about themselves and their world and learn to get outside of their comfort zone and grow. They’ll discover what they like, do not like, what they are good at and what needs improvement. One of the easiest ways for children to tackle new tasks or ideas is by focusing on building their natural learning strengths’ (p.34).

Morin (2019) further adds learning strengths combine talents and abilities with existing skills and knowledge to help kids take in new information. These strengths are ways of thinking, feeling, or acting that can be used effectively in a situation in-home and the classroom (Morin, 2019). Evan was encouraged by his parents to learn but build his strengths. That freedom he had to be creative and time spent identifying and building his strengths is what he attributes to helping him decide which degree to pursue and how to navigate the obstacles he would encounter as he progresses toward degree completion.

Janet’s narrative revealed a different perspective on persuasion but also brought to light the importance of creativity.

Janet stated:

Being an African American whose parents still have traditional values growing up in their head, you're a doctor, lawyer, engineer, something that will make you money, no models, no art, no creativity. Anything that I brought to my parents was something creative, or artistic, or when I said like, Oh. I want to be a fashion
model "it is like, Oh. No. You know fashion models do not make any money. What are you going to do with that? You do not need to--you do not need that. You do not need to focus your mind on that. You need to focus on being an engineer, doctor, or scientist. And that is the reason why we came here to America to provide a better opportunity for you to be successful, not to have a daughter that is going to be a fashion model. And that is the way it always was instilled. It is like the job title you chose, and the career field you chose defined who you are in my parent’s eyes. If you are out here choosing something really basic, you're not going to amount to anything. No matter if it is something that you love to do with your entire heart, it is not what you need to do. If you want to be something in life, you cannot be creative, not in my household, because those jobs do not pay. It was difficult getting them to understand that there are other things out there than the medical field. Things out there that can make you successful in different ways that you can love were impossible. And it was just-- I felt like I just had to choose. When I went to them and told them I wanted to be a pediatrician, my mom was like, what is that? And I grew up with that. If I'm not choosing the path, they want then in my parents' old-fashioned way of thinking, and it is an embarrassment because you cannot make a good living in anything other than STEM fields.

The narrative from Janet revealed one instance where parents encouraged their child to enter into STEM and did not allow for as much creativity. Her parents framed their opinion about why she should not pursue a specific career that significantly impacted her. According to Latimer (2010), the main tenant of parental persuasion is message framing, which emphasizes
the benefits of engaging in a behavior or activity or the costs of not engaging in a specific behavior or activity. Her parents framed their views in a way that allowed her to see the benefit of what they were saying. As a result, she reflected on the many conversations and realized while she wanted to be a model, she also wanted to help children, and she could do both if she worked hard. Doing so would require self-determination skills. Denney and Daviso (2012) note strengthening self-determination skills, children can set demanding yet realistic goals for themselves and achieve them. Janet’s self-determination helped her position herself to excel in both areas of interest.

Parental persuasion from Tina came from her father encouraging her to be creative through her developmental years.

Tina puts forth:

Growing up, I did not know what I wanted to be, and it did not matter to me; I just knew I wanted to have fun. I would always play in school with my dolls, friends, and family. And I would have play dates; my family could have rejected my playdates, and who knows what type of impact would have had on my creativity. But they did not; they would consistently support me by playing along and encouraging me on the different activities included during our playdates. I remember in school, they used to have career day, and I wanted to be an elementary school teacher; it was just a dream. Over time, I realized that I enjoyed working with younger children. While in high school, I participated in an Early Childhood Education course that afforded students an intern experience in an early childhood educational setting such as a childcare facility or head start program. This experience is what opened my eyes to my target population of
children from birth to kindergarten. My creativity was never stifled, and I am thankful because that allowed me to explore and find out what I was interested in.

Tina was encouraged by her father to be anything that she wanted to be the only thing she had to do was work for it. That persuasion from her father created within her ambition or a strong desire to accomplish something. Sabates (2011) states ambition is a major driver for personal growth and development, and without it, no one can succeed. Sabates (2011) maintains if you want to be more, know more, do more, give more, or have more; you have to have ambition because ambition drives you to advance and accomplish your goals. Tina realized that she could not be afraid to try, and being timid was not a fruitful event at an early age. According to Qvortrup (2009), timidity leads to mediocrity; having a clear vision with goals laid out encourages healthy mental growth that allows you to create a plan that will push you past thinking and into doing. Being ambitious is key for personal growth in students of all ages (Qvortrup, 2009).

Naomi’s narrative was very similar to that of Tina, where she had the support of her parents to explore her creative side.

Naomi stated:

When I was young, I really wanted to be a doctor, but that was long before anybody even said anything to me; I wanted to be a doctor. My auntie's a pediatrician in LA. They also have these medical missions in my hometown, and they would help people and give them drugs and injections and stuff they needed. And I liked that. That was so cool. And growing up, I talked about being a doctor so much that all of my family started pushing me to be a doctor. And then I did not want to be a doctor anymore. I do not know why I do not like doing what I'm
asked to do. I just do not like being forced with anything, so. Then I wanted to be a fashion designer, but I'm better at art, and then I wanted to be a dentist because I like being hands-on. Everyone told me that if I wanted to be a dentist, why not just be a doctor, but it is not the same thing. At one time, I wanted to go into real estate and town planning because that is kind of what my dad does, and I find that interesting. But my mom told me I'd end up just like my dad. My dad drives trucks, and I do not want to be like that. So, yeah. A couple of years ago, I finally decided what I wanted to be, and I want to be an actor, and when my mother found out, she got mad and told my dad. My dad then called my older sisters, and everyone was mad at me, saying I would throw my life away chasing dreams and that most people did not become professional actors. My parents and everyone told me they were so disappointed in me and that I would embarrass the family because my older sisters are in the medical field, and I need to be more like them. They treated me so badly that I just told them that I would go to medical school to please them, and so yes, I will go to medical school, but it is not for me; it is for them.

Spitz (2013) defines creativity as the act of turning new and imaginative ideas into reality. Further building on the point Spitz (2013) puts forth, and creativity is characterized by perceiving the world in new ways, finding hidden patterns, making connections between seemingly unrelated phenomena, and generating solutions. As she got older when she was in high school, her interests shifted, and she wanted to pursue a career opposite of STEM. Her parents made their case and strongly encouraged her to rethink the decision she was making. Before she wanted to be an actress, she wanted to be a doctor or a nurse. Her parents saw the
value in both careers. Her parents also knew if Naomi planned to stay in North Carolina, acting likely was not the best decision. According to Jacobs (2002), bad decision-making is a part of development because children develop into what their parents have taught them; knowingly letting a child make a poor decision can have lasting adverse effects.

Persuasion for Monica came in the form of encouragement from her parents to be active and involved in sports and the community.

Monica stated the following:

The direction I took in life was very much connected to my parents and based on what my parents would say. I had my parents' support, and when I wanted to play sports, they let me I was involved in sports and skating and all of that. And I was in a beauty pageant, which was awful, by the way. But I remember enjoying it a lot. But in those things, the outline of success appeared to be just winning and losing, right? Or maybe not just being in those activities does something to us mentally that shows us we can do anything and helps us overcome fear. I was not really into soccer. My brothers were, and they say that my parents were awful soccer family parents and way too competitive, like You better win, right? But I guess it is good to have that parental investment. I remember when I was a kid. I think that, for me, success was not only just the shiny trophy. But as I transitioned into middle school, I stopped doing a lot of the stuff I did in elementary school and started focusing on joining clubs in school and theater. I think my mom was pretty solid that success is very individual, and we all have to chart our path. It is also very much like having a degree; it is a personal achievement that you are responsible for regardless of your parents say. After my brothers did not go to
college, my mom was like, Any degree works. Anyone, it does not matter; pick one. I do not care. My standards are so low. Get any degree cause your brothers did not go to college, okay?

According to Mattox (1977), community involvement at an early age can boost teenagers’ self-confidence and self-esteem by teaching them to learn to deal with challenges, communicate with different people, and build up life skills in a supportive environment.

Monica’s parents persuaded her to try new and different things and after trying them to make a decision. Monica believed this helped her learn what she liked and did not like and what she wanted to do in life. All too often, we let the fear of the unknown stop us. But pushing ourselves out of our comfort zones is good for us. Trying new things not only helps us to vanquish those fears, but it also allows us to expand our minds and learn both about said new things and about ourselves (Peikton, 2009). Without the persuasion and encouragement from her parents, she admits she would not have had the experiences she has had. She credits her interest in STEM to be able to explore new things at a young age.

A Positive Mindset Creates a Positive Self-Image

The fourth and final theme that emerged was the theme of A Positive Mindset Creates a Positive Self-Image. Harris (2012) notes a positive mindset has often been related to the phrase mind over matter which describes situations in which a person controls how they respond to internal and external events using their mind. My preconceptions about a positive mindset creating a positive self-image are that if you change your thinking, you also change how you view yourself and what you can accomplish. Emigh (1997) states if you stop thinking negatively, and start focusing on success, and see in your mind’s eye your dreams and wishes as already fulfilled, your life will change accordingly. Within my own biases, I also believe that far
too often, students psych themselves out, doubting their abilities and listening to others talking about how much difficulty they had with STEM classes. Eccles (1999) states self-doubt occurs when we lack confidence or feel incapable of doing things, so while a certain level of self-doubt is good because it indicates that you understand what you need to improve. Persistent fear and self-doubt can hugely affect your life in a bad way.

Evan’s awareness of the challenges he would face and was faced with allowed him to create a positive mindset.

Evan puts forth:

Growing up, I wanted to be so many different things that I could not decide. I was always changing; I wanted to be an astronaut, then a lawyer, then an engineer. We were told repeatedly to believe that we can do anything as long as we put our minds to it. We can become anyone as long as we put our minds to it. I did not understand it at first, but I have learned and am still learning that it is okay to fail. It is okay not to get it right because most people believe that getting into a STEM program will be very hard, and if you go in with that type of mentality, you're going to fail. I had a professor who said that failing is the most important part of the program because you do not learn from your success; you learn from your failures because you know what not to do. So that is what I tell myself I have to give it my all. And the worst that would happen is taking a class, and you do not get it right, and you fail; you learn from your mistakes and retake the class. And if you do put your mind to it, do not give up, and believe the information is not out of reach, you would be amazed by the number of things you will learn.
Evan was mentally aware of the challenges that he faced and, as a result, was able to prepare himself mentally for what was ahead. He also did not put himself in a negative position by psyching himself out. According to the American Psychological Association (2018), psych out means to psychologically manipulate or intimidate someone or oneself due to undermining performance or confidence. Evan acknowledges that while he did not know everything, he repeatedly told himself he could do the work or accomplish the task at hand. This type of mentality allowed Evan to navigate K-12 even though he did not learn the same way as other students and admittedly struggled at times. Emigh (1997) states the biggest thing that will motivate you not to give up is knowing how achieving that dream or goal will change your life. Evan realized the importance of achieving the goal he was after and used that to motivate him not to give up even if he was not successful on the first or second attempt.

Janet’s narrative revealed triumph in being bullied and how that mindset helped create a positive self-image.

Janet stated the following:

I got bullied a lot because I am dark-skinned, some of the reason is that I went to a predominately white school, and some of the reason is that I did not conform to the normal standards. As much as I brushed it off, I still got bullied, and I had to tell myself, "I'm not going to let it continue to weigh on me. But it did, and I tried to change my behaviors, and nothing I seem to do changed anything. I outcasted myself. Whoever spoke to me spoke to me. And some people would speak to me and others would not, and my mentality was oh, well, if you did not like me, I'll try to avoid you. Then I began telling myself these people do not define who I am or what I do, and I started to stand up to them. Standing up to them did a couple
of things for me. It taught me that I do not have to settle in life. It also taught me that how someone else sees me does not have to be how I see myself. It also taught me that mentally I could do anything and be anything I want as long as I put my mind to it.

A teachable moment is an event or experience that presents a good opportunity to learn something about a particular aspect of life. Morin (2019) defined a teachable moment as a stage in a child’s development when he is most receptive to learning a certain concept or skill. According to Harlow (2003), many people empower others to influence their feelings of self-worth and esteem with their words. If the words are harsh, it can be difficult to process this feedback without feeling upset, depressed, or angry. When we allow these negative feelings to get the better of us, it puts us in an unhealthy and vulnerable state of mind; what matters the most is what you think. Janet, through her experiences, learned that what other people said about her and her abilities did not mean a thing, and what mattered even more, is what she believed about her abilities. She took that mentality and applied it to life and acknowledges that while it is not easy, the only person that can prevent her from attaining education is herself.

Tina's narrative revealed a positive mindset that developed from the loss of her mother, and through that loss, she was able to create a positive self-image.

Tina stated:

Anytime you lose a loved one, it is difficult, but at nine years old, losing a parent changes your whole world. You only have a few options as a child stop moving and try to figure it out, or keep moving and figure it out. I remember my mother telling me that I can do anything that I want to do, and I can be anything I want to be and that if I believe it, I could achieve it. And that is what I told myself and
still tell myself every day that there is nothing too big or too small for me to overcome and that I can do anything with a little hard work and determination. I might not get to the same destination as quickly as you, or I might not solve the same problem as quickly as you, but I grew up telling myself that there were no limits to learning. I might not get it the first time, and I might not get it the second time, but if I do not get it will not be because I did not try. This is why I never thought STEM was out of reach. I was not the best at math, but I know if I applied myself, I could learn anything.

Tina lost her mother at an early age and remembered her mother telling her that she could be anything she wanted to be with a little hard work. Those words of encouragement stuck with her and showed the power that words have in our lives. According to Kuik (1999), we hold on to words spoken to us for an incredibly long time and give them more power and place in our lives. Kuik (1999) adds words are singularly the most powerful force available to humanity; through words spoken to us or by us, our thoughts are impacted, and we create our reality. Negative and positive words have the ability to alter our thinking which in turn affects our mental state. The words spoken to Tina are something that she took with her and applied to her everyday life. It served as a reminder, even when she wants to stop that she can overcome any obstacle that she faced.

Naomi’s narrative of a positive mindset creates a positive self-image revealed that her success is a state of mind.

Naomi puts forth:

Classes like chemistry, biology, math, and all of those traditionally harder subjects can be challenging, but they are not impossible. You have to tell yourself
that you can do it and then work hard. And I understand there are learning
disabilities and other things that impact how we learn as individuals, but if you
tell yourself you cannot before you start, you will not be able to. I thought it
would be challenging, but it has been easier than I thought it would be. Listening
to people will make it seem like I'm going to die taking these classes, but it is not
that bad. Add in that I am not interested in pursuing this degree to show you that
you can do anything you put your mind to with hard work. Still, we as people
limit our thinking, and as a result of limiting our thinking, we limit what we are
capable of; at least, that is my opinion.

If you think something is impossible, the likelihood of you failing increases, but if you
think something is possible, the possibility of finding success increases. With this mindset, she
could maneuver through coursework she considered easy and coursework she considered hard.
In your brain, the neural pathway or circuit representing a particular thought gets activated every
time you have that thought; the more often you think it, the more entrenched that pathway gets
(Phinney & Haas, 2019). Phinney & Haas (2019) suggest this type of persistent thought that is
negative takes root over time and leads to what is known as generalized anxiety. Generalized
anxiety is a condition in which you consciously and unconsciously anticipate negative things.
Naomi had positive, persistent thoughts and as a result, what took root was that she is capable of
accomplishing anything that she sets her mind regardless of what someone says or believes about
her, and she has applied that to school.

Monica’s desire for success drove her positive mindset, and that drive created a positive
self-image that she could become anything she wanted with a little hard work.
Monica stated the following:

Education to me has always been an individual goal or an individual achievement—it something attainable and something that you can control. And because you can control it, then why not do it? All you have to do is apply yourself. Sometimes we put so much emphasis on what someone else says that we begin to think that what someone else says has to be our reality. But if that were the case, I would not be in engineering right now because engineering is a field that men dominate and because men dominate it, it would be easy to tell yourself that you will never succeed in that field or that it is too hard. But why do that to yourself? If it is something that you are passionate about, go for it, you have absolutely nothing to lose, first of all. And the payoff is going to be amazing when you get through it. So, believe in yourself and do not be afraid to ask for help, and if you do not find the help, you are looking to go somewhere else. But if you are interested in something, if you believe you can do it, you can accomplish anything.

Oh (2016) states, “Passion is the fuel that inspires and drives people toward specific goals, no matter how unlikely or difficult they might be. It generates the enthusiasm needed to plow through the biggest obstacles and overcome the most intractable challenges. It inspires loyalty, teamwork, hard work, and, most importantly, success (p.152)”.

Monica believed that far too often, we let what people say impact us in negative ways, and if you are truly passionate about pursuing a goal with the right mindset, nothing can stop you. Monica also emphasized maintaining a positive mindset is a constant mental battle because you hear so much negative
over time. If you are not careful, you can start to believe it, especially from your parents, brother, sister, or teacher.

**Conclusion of Findings**

Five participants were studied over nine months to understand better the in-home experiences and the role in students’ decisions to pursue STEM degrees. To remove my bias, I identified my preconceptions and biases about the topic and questions. Reflecting on my prejudices and preconceptions never led me to a point where I could anticipate what the participants were saying. After each participant, I reflected on my own experiences growing up, and I was able to find connections between my experiences and the participants. The results from this study brought to light some of the gripping narratives that paint a picture of the home experiences of African American students pursuing STEM Degrees. The themes that emerged revealed conflict experienced early on improves character development. The findings also revealed your focus influences who you become. The importance of parental persuasion in student achievement and a positive mindset creates a positive self-image. Figure 4 provides a graphic representation of a five-layer inverted triangle showing themes from the interviews that lead to the more specific goal of success in STEM.
Figure 4

Inverted Tringle showing factors influencing STEM in African Americans
Chapter 5: Analysis of research findings

The participants in my study came from a variety of backgrounds. Some of the participants' parents were from other countries but came to the United States before having children; other participants' parents were born in the United States. Several of the participants in my study were native English speaking, and some of the participants learned English as a second language. As for the socioeconomic status, four of the five participants said they considered themselves to be low class based on their parent’s income, education, and occupation. In contrast, one of the participants believed themselves to grow up in a middle-class family.

In 2019, the National Center for Education Statistics examined more than 5,600 Black, Latino, and White students enrolled in college for the first time. Revealing students entered into college relatively the same with 19 percent of the White students declaring STEM as their majors, 20 percent of Latino students, and 18 percent of Black students. The report further notes Black and LatinX students switched majors at much higher rates than their white peers. According to the NCES (2019), roughly 37 percent of Latino students and 40 percent of Black STEM students switched majors, compared to 29 percent of White STEM undergraduate students. The NCES 2019 puts forth 20 percent of those Latino students and 26 percent of Black students who left their STEM major eventually dropped out of college. Critical race theory, socioeconomic status, tracking in K-12, lack of preparation, and stereotype threat all contribute to the challenges faced by African American students pursuing STEM degrees. These challenges can be overcome, but it begins at home with the internal and external attributes.

The purpose of this phenomenological research study is to describe the home experiences of African Americans undergraduate students pursuing STEM degrees enrolled at HBCUs. This chapter synthesizes and discusses the results in light of the study’s research questions, literature
review, and conceptual framework about the in-home experience of African American students pursuing STEM degrees. This provides a depth of knowledge that has been absent from literature and research on African Americans pursuing STEM degrees. Katz (2005) emphasizes learning is distributed unevenly throughout society, with information more accessible to wealthier and more educated people. This uneven distribution of knowledge creates a knowledge gap that continuously gets passed on from generation to generation.

To effectively analyze the results, I reflected on my study, its findings, and the practical and theoretical implications. Mortari (2015) states reflection is a vital mental activity, both in private and professional life. Mortari (2015) further suggests reflection is fundamental because it allows people to engage in a thoughtful relationship with the world-life and thus gains an awake stance about one’s life experience. Reflecting on the research questions allowed me to closely examine my beliefs and presupposed ideas while also being hyper self-aware of my bias and preconceptions, so my research study is not impacted negatively. My discussion of the research results will paint a clear picture of what this means for the African American community, society, and STEM.

Sharma (1982) states the discussion should always explain how your study has moved the reader's understanding of the research problem. The rich meaning of the home experiences and the active roles those experiences played are multi-dimensional and comprised of four themes. (a) conflict experienced early on improves character development, (b) your focus influences who you become, (c) the power of parental persuasion and student achievement (d) a positive mindset creates a positive self-image. Human behavior is only to a certain extent hereditary predetermined because, at birth, a child has some “natural predispositions” which subsequently, influenced by the environment (including education), change features of personality that direct
the behavior (Lumen, 2013). At the same time, some of the factors can be attributed primarily to the internal characteristics related to the participants. There were just as many external factors attributed to the decisions students made regarding their pursuit of STEM.

Major (2001) defines situationism as the view that our immediate environment and surroundings determine our behavior and actions. In contrast, dispositionalism holds that our behavior is determined by internal factors (Heider, 1958). An internal factor is an attribute of a person and includes personality traits and temperament. The internal and external factors all played a massive role in the decision that students made to pursue STEM. Lumen (2013) echoed this sentiment saying human behavior is strongly influenced by a series of both internal and external factors. Lumen (2013) also states individuals choose between two varied paths or courses of action, determined by their personality features, which result from the interaction between environments.

The purpose of this study was to understand better the in-home experiences of African American students pursuing STEM degrees. In comparison, it would have probably been feasible to send out surveys to students. I found in-depth interviews to be more effective for the overarching goal of this study. In-depth interviewing can shed light on events that would otherwise remain unknown because they happened in the past or out of public sight (Weiss, 2004). Thus, it was essential to hear from the students in their own words using descriptive phenomenology to tell the story. This approach allowed me to draw out the complexities of social problems (Siltanen, Pich, Klodawsky, & Andrew, 2017; Tilley, 2016). The emphasis on storytelling in qualitative research is more conducive to findings that can be used to support transformative social, political, and economic change (Chatteron, Fuller, & Routledge, 2007; Haiven & Khasnabish, 2014; Kermoal & Altamirano, Jiménez, 2016).
While all of the participants' backgrounds, experiences, household dynamics, age, and neighborhood, and socioeconomic status differed, each of the four common themes was prominent in their narratives. These themes create a noteworthy dynamic related to the overall in-home experiences and the role those experiences have played in STEM selection. Previous research by Dawson-Threat and Huba (1996) found that men were more likely to choose male-dominated majors, and women were more likely to select female-dominated majors. These gender differences in choosing a major by students have been substantiated by others (Jacobs, 2002; Solnick, 1995), who suggested that women tend to select disciplines due to their female gender role orientation (Lackland, 2001). In addition to socioeconomic status, family educational and occupational backgrounds were also found by researchers to affect the choice of major (Leppel, Williams, & Waldauer, 2001).

Self-determination theory distinguishes between two different types of motivation— intrinsic and extrinsic—based on the reasons or goals that promote an action or behavior (Deci & Ryan, 1985). Galotti (1999) concluded that “students see the choice of major as one that both reflects important core characteristics of themselves (including their gender role identification, their interests and values, and their abilities) and has consequential implications for their futures” (p. 379). According to Deci and Ryan (2000), intrinsic motivation refers to undertaking action because it is inherently interesting or enjoyable. Extrinsic motivation refers to an activity undertaken because it leads to a separable outcome. Whereas intrinsic motivation moves one to act for satisfaction, enjoyment, or personal challenge, extrinsic motivation propels action because it is externally prompted and valued by others to whom one is connected—such as family, peers, or society (Ryan and Deci, 2000).
Connection to the Study

My household composition growing up was my mother, father, myself, and my two sisters. I also had an older brother and two older sisters who were already grown and out of the house. My father’s occupation was as an enlisted soldier in the United States Army, with a take-home salary of around $25,000 per year. My mother’s occupation varied because we were always on the move changing duty stations; her greatest responsibility was raising her children. Her passion was math, and her love for learning created an environment where the emphasis was placed on education, and things like athletics and extracurricular activities were an afterthought. My father excelled in athletics and had a different perspective in his mind you did what you were good at and whatever would provide a decent living for yourself as long as it was not illegal.

When I was in school, I struggled like many students, but I had a knack for athletics. As a result of my athleticism, my father pushed me toward sports, my mother, on the other hand, pushed me toward school. They both understood the importance of being active and the positive results of participating in athletics and arts. Still, you had to have some education to fall back on because not everyone will become a professional athlete. To strengthen my understanding of the subject material, I spent countless days being tutored by my two older sisters in gifted and talented classes. When I was younger, I desired to be a professional basketball, football, or baseball player. It was not until the age of 14 that I began thinking about life outside of sports. The shift in my thinking from sports to academics resulted from looking at life through several different lenses. As my interest shifted, I began to focus on medical school with the mentality that what mattered more than making a lot of money was to help people.

The high school I attended was predominately white, and in my graduating class, out of 400 students, there were 390 white students, one Hispanic student, two Asian students, and seven
Black students. Most of my days were spent fighting because I was bullied and called any racial slur a Black person could be called. My fighting in school came with consequences, and I spent my senior year in high school going to an alternative school where there were not very many Black students. Teachers labeled me as a troublemaker in class, I was skipped over, and if I interrupted asking for help, I did not receive assistance from the teachers.

Conversations with my mother at home reminded me of the importance of school and that the one thing no one can take from you is your education. My mother would also tell me it does not matter what anyone else thinks about you because they do not control your destiny. My father encouraged me to be the best that I could be and constantly reminded me that anything was possible with a little hard work. Although I believed them, there was still a level of skepticism. During my senior year, I sat down with the guidance counselor and inquired about college. And she said to me, “Michael, school’s not your thing is it?” I said, “I think it is,” and she said, “well, I do not, and I think you should just find a good trade; you know you could be a carpenter, cabinet maker, or a mechanic.” At that point, I decided that regardless of what anyone else said, I could learn at a higher level. I set my mind on academics. I knew there were a lot of obstacles that I would face. I also knew that education and learning are individual goals. Even if the teachers didn’t think I was capable, what mattered more was what I thought of my abilities and how hard I was willing to work to become a doctor.

**Analysis of Conflict Experienced Early on Improves Character Development**

Psychological growth is defined as “the potential to cultivate inner potentialities, seek out optimal challenges, and integrate new experiences into the self-concept” (Baldwin & Landau, 2014). The term character is often used interchangeably with individuality, and personality refers to the sum of the characteristics possessed by a person. Character refers primarily to moral
qualities, ethical standards, principles, and the like. Individuality refers to the distinctive qualities that make one recognizable as a person differentiated from others. In comparison, personality refers to the combination of outer and inner characteristics that determine the impression that a person makes upon others.

Research regarding the benefit of conflict has revealed information that teeters on both sides of the spectrum. Kohn (1987) notes competition often makes kids anxious, and that interferes with concentration. Kohn (1987) further adds competition does not permit kids to share their talents and resources as cooperation does, so they cannot learn from one another. Trying to be number one distracts them from what they are supposed to be learning. Participants' narratives reveal that competition created a healthy conflict that proved instrumental in the participants' growth. Carter (2008) states conflict is entirely necessary for intellectual, emotional, and even moral growth because even though we try to avoid conflict, the conflict will always exist. Research by Carter (2008) also reveals that conflict between children is like the air they breathe and that kids playing experience conflict once every three minutes.

Evan’s conflict manifested itself through the competition between siblings, almost a sibling rivalry. I believe coming from a household with four sisters and a brother that sibling rivalry stems from different personalities and temperaments. According to Bradley (2020), sibling rivalry describes the ongoing conflict between kids raised in the same family that can manifest itself differently. Some of those ways include verbal or physical fighting, name-calling, tattling and bickering, being in constant competition, and voicing feelings of envy. Competition for Janet came from being challenged with learning English as a second language to survive in school. Survive is a means to continue to live or exist, especially despite danger or hardship. The competition was competing with classmates, which created an internal conflict that proved
beneficial in building a stronger, more determined individual. Previous research shows that there is a huge benefit to learning a second language. A study conducted by Kreisha (2021) on how learning English as a second language impacts students reveal that learning another language change you. As you learn and get better at the language, you’re likely to find you have increased confidence and self-awareness.

Competition for Tina happened earlier than the other participants, which resulted from the passing of her mother and having to decide between choosing to die emotionally or choosing to live emotionally. NTCSN (2017), death can be difficult for a child, and many emotional and behavioral responses are common. Some of the more common responses include changes in sleeping pattern or appetite; sad, angry, or anxious feelings; social isolation; persistent thoughts about the death; or feeling the person’s presence nearby. Equally as important is the ability for a child to persist through the loss of a loved one. Hirsch (2018) notes people often emerge from the depths of their grief with greater confidence in their ability to manage life's sorrows and difficulties. Hirsch (2018) further suggests people often redefine themselves in terms of their position in the family or their role in the world; that is precisely what happened with Tina. Her mother's death created an internal competition within herself, and by dealing with the conflict, she was able to redefine her role within her family and herself. Competition for Naomi came in the form of not fitting in with her younger siblings or older siblings and the desire to prove herself to her parents and siblings.

According to Shirai (2017), the need to prove ourselves to others often stems from a moment of feeling vulnerable, unaccepted, undermined, or misunderstood and brings with it a deep sense of unworthiness. The urge of wanting to prove ourselves tries to protect us from feeling vulnerable. The ability to push past the feelings of unworthiness stems from recognizing
that you will never be perfect also creates a deep sense of self-acceptance which is directly linked to self-confidence. Shirai (2017) notes it takes a conscious practice of cultivating our self-worth when we feel criticized, developing a deep sense of self-acceptance of whatever we experience without judgment. Competition for Monica stemmed from her desire to get paid for doing well in school, similar to her friends who were getting paid by their parents to make A’s. She competed with her friends, but that competition when she took her request to her mother did not respond the way she thought. That interaction created a conflict between the two, and her mother essentially presented her with an ultimatum. Conflicts and compromises are a normal part of relationships, and conflicts can help kids to learn more about themselves; conflicts can help children decide what is most important in their lives (Ballantine, 2015).

Analysis of Your Focus Influences who you Become

When I reflect on the theme, Your Focus Influences who you Become, several things come to mind. The first thing that comes to mind is what does it mean to focus? The American Psychological Association (2018) states the average human being has an attention span of eight seconds; this is a sharp decrease from the average attention span of 12 seconds in the year 2000. Focus is defined as a central point of attraction, attention, or activity. The emergence of this theme speaks volumes about the participants' capabilities and mental state. While none of the participants came from the same background, had the same upbringing, or same experiences, they were all able to focus their attention on what mattered in their worlds. A recent study conducted by Mayo Clinic (2018) reveals the ability to focus is a learned behavior. The study also revealed your mind could only switch rapidly between tasks, so instead of trying to do two things at once, look for ways to maintain focus on the task at hand.
The ability to prioritize what matters is directly related to motivation for that particular choice. When you have total objectivity of your thoughts, feelings, and abilities, you can move toward your top priorities. Smith (2017) puts forth self-management, or the ability to identify the differences between what you should do, can do, and want to do will help you identify your top priorities and what matters most. For my participants, the ability to determine what mattered was not tied to financial gain at an early age. However, the idea of having increased finances was not as crucial as the richness that came from wanting to make an impact in the lives of others. This is where the second theme of where you place your focus influences who you become.

Individuals pursue STEM for different reasons; some pursue STEM for financial gain, and others pursue STEM to make an impact in the lives of others. Brand (2016) states STEM was popular because as the world becomes increasingly complex and competitive, and the cost of education continues to climb, teachers, parents, and students are looking at STEM studies as a way to align education with career-oriented majors that are likely to result in well-paying jobs for graduates. The participants in my research reveal a much different focus. For Evan, your focus determines who you become originated from a place early on where the participant was exposed to various external challenges from moving from place to place, growing up in a household where not everyone went to school. The desire to be more than his parents created the ability for him to see himself as more than his parents and more than their past experiences. Brenegar (2018) maintains the past does not have to define us. When it does, we tend to find ourselves protecting it or defending it from change. The result is we get stuck living in the past and only see ourselves as who we were in the past. Evan recognized that he could be more than his parents at an early age, and richness in life does not come from money but life itself.
Janet asserted your focus determines who you become derived from her parents, instilling the importance of education at an early age. This resulted from her parents coming to the United States early in life so they could be free. Freedom to them meant having an opportunity to better life and provide more for their family than they normally could. The impact of this is that Janet was acquiring knowledge to perform at the highest academic level possible. The ability to do so would position her to have a life better than the one provided by her parents. Her ability to maintain focus early in life would inadvertently put her in place to share the knowledge she has learned to make a positive impact in the lives of others. According to Tegze (2018), knowledge sharing is connected to impression management, emotion regulation, information acquisition, social bonding, and persuading others. Janet was faced with three tracks in school education, engineering, and medicine. All directly connected to STEM, but three different focal points education focuses on teaching, engineering focuses on building, and medicine focuses on healing. The latter's selection for Janet subconsciously reveals the desire to help people overcome everyday hurdles faced in life.

Tina’s idea of your focus determines who you become began to develop with the loss of her mother. The loss created a desire to want to be more and do more than her mother to include live longer than her mother. Focus often is referred to as a state of mind, and Tina revealed focus was much more than a state of mind. Norman (2019) adds where you put your attention will largely determine your life. Her focus created a desire within her to succeed, and the desire to succeed went further than simply maturing; it created a desire to be successful at all levels and in all endeavors. The state of mind inadvertently transformed her focus from a state of mind to a way of life. Gardner (2012) also put forth if your mind is confident, no obstacle will deter you from all that you have resolved to achieve or attain, and nothing will block your purpose.
Naomi’s perspective of our focus determines who you become was deeply embedded in a plethora of feelings and emotions. Partly because of the influence her mothers' conversations had on her and the uncertainty surrounding where she placed value. She was acknowledging that while she understood the importance of money, more important in her mind was the idea of helping people. Legg (2019) found that the idea that money can buy happiness is not a farfetched as some may think because the concept is connected to cultural values, where you live, how you spend your money, and what you value. Naomi realized through her experiences that while money could provide some form of happiness. Her focus needed to be on what mattered in her mind: helping people, and the reward that came from helping people outweighed the financial reward.

Support for the idea of your focus determines who you become for Monica was unlike the other participants because her experiences revolved solely around school and evolved into helping in the community. The focus she had on doing well in school inspired her to want to help and do good in the community. That potential was acknowledged and recognized by her parents. You may not have enough experience if you are young, but there is an automatic level of confidence from others about your potential (King, 2012). Her mother's confidence in her helped inspire and create a desire to further her education than her mother. Monica’s desire to push past her brother’s achievements of a high school diploma was an individual goal because, in her mind, education and learning were something no one can stop you from achieving. She wanted to use the knowledge she gained to help other people, which mattered the most.

Analysis of the Power of Parental Persuasion in Student Achievement

Persuasion is the action or fact of persuading someone or being persuaded to do or believe something. Convincing someone to do something can happen consciously when we are
aware, but persuasion also happens subconsciously or subliminally. Woodley (2009) describes subliminal persuasion as influencing people at a level below their conscious recognition. Stating, every time you communicate with words, you are sending other messages non-verbally whether you are aware of them or not. Social behaviors influence our decisions which impact our lives.

Cialdini (2007) notes that the power of persuasion is linked to six principles, as shown in Figure 5.

![Figure 5](Model of Cialdini’s six principles of persuasion)

1) Reciprocity – Social norms compel us to respond to favor with another favor to not be considered ungrateful.

2) Consensus – the decision is based on the rate of collective approval.

3) Similarity – Once someone says yes, they will do something, they are less likely to back out because keeping our word is a noble quality.

4) Consistency – Receiving compliments and finding similarities between ourselves and another helps us be persuaded when we otherwise might not be, not to mention we tend to say yes to people we know and like.

5) Authority – People respect others who are credible; children are more likely to perform a task because their parents want them to.

6) Scarcity – The feeling of competing for scarce resources has powerfully motivating properties.

Cialdini’s six principles of the power of persuasion are impactful and relevant; all of the participants in my study fell in the category of Authority. The power of parental persuasion in student achievement for Evan was not a result of his parents telling him what he was or wasn’t going to pursue. The persuasion came from his parents encouraging him to do what he loved and was passionate about and try new things. Malmsteen (2017) states by pursuing your passion, you'll push yourself to do better. Any job, regardless of age, can wear on you, but if you're doing something you feel connected to, it will seem much less like work. Malmsteen (2017) suggests passion gives you the determination to keep working hard and also makes what you're doing fun since it is something in which you are invested. Evan acknowledges he did not always know what he wanted to pursue. Even more impactful is that even though he did not always know what he wanted to do, his parents never discouraged him from pursuing whatever he felt he
could. For him, that made the difference in him going on to achieve his dream of pursuing STEM.

The power of parental persuasion in student achievement impacted Janet differently. Her parents' upbringing from another country played a huge role in influencing how they would rear their children. The reason why is because they came from a third-world country where education was valued and seen as mandatory. Pursuing something aside from a STEM career is the equivalent of squandering a golden opportunity at education. Cultural influences played a huge part in the authority role in the power of persuasion. Although Janet initially wanted to be a model as she grew older, she understood and recognized the value of her parents pushing her towards a career where she should provide for herself and her family. She also decided that she could always model on the side, understanding the importance of not losing herself in pursuing a career.

Analysis of A Positive Mindset Creates a Positive Self-Image

The theme A Positive Mindset Creates a Positive Self-Image that emerged from each of the participants' dialog reveals the participants' ability to persist in a society traditionally deemed out of reach for African Americans. This theme for participants stemmed from several internal and external factors that taught them that nothing was out of reach and the only limits they have are the ones they create. Trock (2014) notes the mind, in itself, can accomplish infinite limitations brought on by the environment. The limitations, whether they be physical or mental, hinder us from reaching our full potential. Therefore, we need to believe that we are nothing less than decisive in our determination and grit to succeed.

Mental blocks prevent us from reaching our full potential, be they conscious or unconscious. Rew (2015) describes a mental block as a psychological obstacle that prevents
athletes from performing a particular task and is often easily confused with performance anxiety. They both derive from a challenging scenario that arises in our everyday lives. Rew (2015) also suggests the underpinning factors which explain why mental blocks occur are very much dependent on individual differences, such as focus styles, perceptions, degree of self-confidence, and mental toughness. Jones (2002) implies individuals who lack self-efficacy or lack mental toughness are more prone to developing a mental block. If a mental block is formed, there is be a greater chance the individual will avoid the challenge altogether. Self-doubt correlates with low self-confidence, meaning you’re more likely to adopt avoidance behavior due to the negative perception you hold regarding your lack of ability.

Interested in STEM fields and the desire to pursue STEM was something that piqued Evan’s curiosity. He admits he was not the best; he also understood the reward outweighed the risk. This is significant because, in his mind, he could already see himself in STEM as an engineer, computer programmer, astronaut. To become what he wanted, he had to push past and persist in an area that was admittedly unfamiliar and challenging to him. He was able to achieve this seemingly daunting task through mental fortitude. Mental fortitude is a necessary element of success; it is the ability to focus on and execute solutions when in the face of uncertainty or adversity. Figure 6 provides a graphic representation of the elements (creativity, exploration, execution, and patience) students must have for mental fortitude. The absence of mental fortitude can cause us to lose patience with the process we are being challenged; this confrontation can cause us to quit.
Having the mental fortitude necessary to succeed requires patience, creativity, exploration, and execution (Campbell, 2018). Mental toughness is a personality trait that describes mindset (MTP, 2018). Our mindset essentially describes the way we act and the things we do. Campbell (2018) states mindset is described as both the pre-cursor to behavior and the explanation for such behavior. The link between mindset and behavior is a contributing factor for individual success.

A positive mindset evolved from a place where Janet realized the importance her parents placed on seizing an opportunity to be more than they were or squander the opportunity to pursue a desire. While she saw herself as a model, she could also see the importance of being something else that would allow her to give back to the community and change lives for the better. Admittedly it was not a task she felt she could thrive in and struggled in high school to overcome, but she told herself that she could do anything with a bit of focus. This breakthrough resulted from her seeing herself as capable and seeing the value in her parents' work ethic and the
sacrifices. If you see yourself as someone who can learn new things and envision all of the benefits, you increase the propensity to learn (Corso, 2011). On the same note, if you see yourself as someone who cannot learn new things because of the mental blocks you have put in place, your learning's likelihood of learning decreases. Corso (2011) notes how you see yourself is more important than how others see you and determine your outcomes long before you even get to them.

Being raised in an environment where she was told repeatedly told she could do anything, she put her mind to create a positive mindset for Tina; over time, this mindset positively impacted her academics. Fazio (2018) states psychologists call this the illusory truth effect: the more you hear something, the easier it is for your brain to process, making it feel authentic, regardless of its basis. Growing up, Tina heard that she could do anything she put her mind to and she could be anything she wanted to; that repetition had a positive impact on her psyche. Horton (2018) maintains negative words, whether spoken, heard, or thought, not only cause situational stress but also contribute to long-term anxiety. Waldman (2000) adds that you stimulate frontal lobe activity by holding a positive and optimistic word in your mind. This area includes specific language centers that connect directly to the motor cortex responsible for moving you into action. The longer you concentrate on positive words, the more you begin to affect other areas of the brain. Tina decided to believe what she was being told early on, and that belief removed any pessimism that could have hindered her growth internally and externally.

For Naomi, the development of a positive mindset came from a place where she saw it as beneficial to her livelihood, although she was not interested in STEM. Her parents' desire for her to pursue a STEM field outweighed her desire to pursue acting. BLC (2014) maintains parents
who force or strongly encouraging their children to pursue a specific degree outside of their interest do two things:

1) Create resentment, and relationship estrangement

2) Create a psychological dynamic where they may never find their true life’s passion.

Even though Naomi was not interested in STEM, she told herself at an early age that just because the classes did not mean they were impossible. She also said to herself that even if they were hard, that should not limit her ability to perform well in those classes because if she does not get it the first time or her first attempt at a class is a failure, that does not mean she has to stop trying. Knowing that anything is possible as long as you think you can and are willing to work hard.

The realization of the impact of having a positive mindset for Monice evolved, and as she got older, her outlook and understanding of education changed. Living at home, her parents pushed education, but when she got older, she began to see education as an individual goal and never told herself that she was not capable. Horton (2019) maintains by exercising consistent positive thoughts and speech, we change our self-perception and how we perceive the world around us. Monica’s ability to identify and recognize education as an individual goal created a state of mind where one of two things would happen success or failure. According to Ageykum (2017), failure is a teacher that teaches you what did not work out, and if you allow it, it will motivate you to find other ways to accomplish tasks. By telling herself that she would be successful, she created a path to success that was not limited by shallow thinking about herself and her abilities.
Analysis of Socioeconomic Status and Household Dynamics

In this study, I closely examined the in-home experiences of African American students pursuing STEM degrees. Specifically looking into the interactions participants had with their parents and their role in their decision to pursue STEM degrees. In examining the in-home experiences, several contributing factors were revealed that impact students are pursuing STEM degrees. They were socioeconomic status, household environment, parental influence, sibling influence, the impact of the household environment. These factors relate directly to the dynamics of the family. To include but not limited to whether the family was a single parent or dual-parent household. The level of education attained by the parents and siblings and the neighborhood in which they were raised. The impact parental and sibling influence had on the participants and what all of those contributing factors played in deciding to pursue STEM. This is significant because, as part of my theoretical framework attribution theory, internal and external factors impact students’ success. Weiner (2010) notes attribution theory is concerned with the perceived causes of success and failure for oneself and others. Equally important is an attributional inquiry which examines the impact of those beliefs and the consequences. Weiner (2010) further clarified this position stating, “Causes have three distinct properties: location within or outside of the person, endurance over time, and controllability. These dimensions of causal beliefs influence affective reactions (anger, pride, gratitude, guilt, shame, and others) as well as expectancy of future success, which, in turn, affect achievement strivings and reactions toward others (p.121).” The American Psychological Association (2019) defines socioeconomic status as the social standing or class of an individual or group; and is measured as a combination of education, income, and occupation.
In the United States, there are vast inequalities in educational attainment based on the family socioeconomic status. Children from lower-income backgrounds receive worse grades, test scores, and college attendance rates than their higher-income counterparts (Rozek, 2019). African American students historically from low-income and middle-class families perform poorly and often do not achieve academically what students from affluent communities achieve. Rozek (2019) echoes this statement saying, “the academic achievement gap between students from higher- and lower-income backgrounds can be two to three times as large as notable and persistent racial achievement gaps, such as the White-Black achievement gap (p.34).” The participants in this study were able to overcome the traditional barriers to achievement resulting from low-income areas, schools that lack resources, and one or no educated parents. The participants in this study revealed their parents often worked two or three jobs to provide what they considered to be necessities and worked jobs with traditional and nontraditional hours. Socioeconomic status often reveals inequities in access to resources, plus issues related to privilege, power, and control.

Figure 7

*Household Dynamics*
Figure 7 provides a graphic representation of the household dynamics of the participants. Taylor and Goldfarb (2014) maintain family intactness has a beneficial influence on reducing out-of-wedlock births, increasing high school and college graduation rates, and even has long-term benefits such as higher employment rates. Historically African Americans from single-family homes have been less likely to persist in STEM. My research revealed the household dynamics of the participants varied greatly. Both parents raised Evan in the house, and conversations with Evan revealed his parents had been together for over 30 years. Even though his mother lacks the education that his father had, she still understood and emphasized its importance. Evan was the eldest of three children.

Janet was raised by her father and mother, her father had a high school education, and her mother had a high school education. Janet is the second to the youngest of five children, all of which were step stair siblings. Tina was raised in the house with both parents until her mother passed at the age of 9. After her mother's passing, the household dynamics changed, and she was raised in a single-family household by her father. Her father has a high school diploma but did not go to college. She was the youngest of two children; her brother was four years older than her. Naomi was raised in a single-family household by her mother and is the middle of five children. Her two older siblings have a different mother, and her two younger siblings have the same mother and father as she does. Her mother went to community college and got her associate degree, but her father did finish high school. Monica was raised in a home with both parents and is the youngest of three children. Her mother and father both finished high school but never attended college.

In this study, the household dynamics of participants reveal 60% were raised in a household with both parents, the other 40% of participants were raised in single-family homes.
As shown in Table 6 of the eight parents, one parent attended a four-year school, and one parent attended a two-year school. Four of the five remaining parents had high school diplomas, and one parent did not finish high school. Of the 13 siblings, not including the participants, 3 had degrees from four-year colleges. The other 11 never attended college or went to college and did not finish for one reason or another. The phenomenon of the in-home experiences is the external (interactions with parents and siblings) consciously and subconsciously impacted students’ psyche positively. Participants were able to persist in their academic endeavors and are closer to achieving their STEM degrees.

Table 6

![Bar chart showing educational achievement of participants' parents.]

*Educational Achievement of Participants Parents’*
Analysis of Parental Influence in Growth and Development

Gross (2016) states our genes provide a blueprint for our potential development and do not determine how we will grow. That growth and development are determined by the environment internal and external during our early years in life. Gross (2016) adds to this, saying it is the environment your parents create that instructs and directs your genes by enhancing some and turning off others. Chen (2020) spoke about the critical role moms and dads play in a child’s growth and development. In the crucial first few years of life, children are not just building language and communication skills – they are developing their personality. Your choices as a parent include but not be limited to what you say (and do not say); what you do (and do not do) will influence who your child becomes. All of the participants in this study felt like their parents played a huge role in their decision-making growth. Research also reveals parental influence played a role in their decision to pursue STEM as a degree.

Of the participants, three of the five were exposed to a positive, supportive environment where they had the freedom to explore their creativity. The remaining two participants were exposed to an environment that fostered “tough love.” A research study conducted by Devos (2012) found that children with “tough love” parents were twice as likely to show good character capabilities by age 5. Devos (2012) adds that warmth and consistent discipline were crucial for helping kids build character. The decision for parents to be involved to an extent and allow their children to be creative has incredible benefits. A study conducted by PBS (2015) on the impact of parental involvement reveals innovative experiences that could help children express and cope with their feelings. Smith (2012) maintains creativity fosters mental growth in children by providing opportunities for new ideas and new ways of thinking and problem-solving.
Interaction between participants regarding what they were interested in becoming or what they wanted to be when they grew up started in the early stages of adolescents. All participants agreed that while they had the freedom to explore different ideas even if their parents did not agree with what they wanted to be, they never expressed their dislike in front of them. It wasn’t until they were in high school and could better understand the parent's perspective. At no point did the participants express that their parents demeaned them in any way by calling them stupid, dumb, or saying they were not capable. If anything, the participants' stories reveal their parents told them they could be anything they wanted to or that they did not have to limit themselves.

Success is correlated with psychological capacities, including optimism, curiosity, a sense of oneself as capable (different from self-esteem, which is about self-worth), and the ability to manage negative emotions and weather obstacles (Tough, 2012). These capacities develop in the context of secure attachments with parents, which occurs when we give teens space by being present, responsive, and interested – rather than reactive, controlling, or preoccupied (Tough, 2012). Based on responses from the participants, their parents did not tell them they were going to go to college, and if they did not, they had to get out of the house. The parental influence also did not lead the participants down a path where they were told that they could not compete in STEM fields. Even though they lived in low-income housing, parents made below 30,000 dollars, worked irregular hours, and were critical children. This means that regardless of the external factors outside of the home, more important is the parental influence. Positive parental influence that is intentionally filled with support, encouragement, and stimulation has positive long-term benefits in individual growth and development. Jones (2014) maintains living situations with warmth and intellectual stimulation foster the neural connections in the brain responsible for thought, emotion, and behavior.
Analysis of Sibling Influence

Ansbacher (1956) notes that social comparisons and power dynamics in families, particularly sibling rivalry for family resources, were fundamental influences on personality development. According to Brim (1958), older siblings unknowingly serve as role models to their younger siblings. As a result, younger siblings tend to imitate the things their older siblings do and often adopt some of their personality traits. At the same time, personality traits were not something that was explored between siblings. Only one of the five participants said they looked up to their older siblings as role models. On the same note, three of the five participants reveal that they know their younger siblings are watching them, and because of that, they want to make sure they set a good example.

Concerning the marital subsystem, sibling relationship associations reveal that sibling relationships were more positive in divorced families than married families (Kunz, 2001). This could be since often, in divorced families, the children feel like they have to depend on the other sibling since the relationship between the mother and father is broken and no longer stable. Tina, who grew up in a single-family home raised by her father, reported that her relationship with her older brother did get more substantial after her mother's passing. Naomi's parents separated, and as a result, she grew up in a single-family home raised by her mother. Her bond with her younger siblings was much stronger than her older siblings. Some youth may compensate for family negativity (e.g., in their parents’ marriage) by forming close sibling relationships, which protect the child from adjustment problems (Jenkins, 1992; Kim et al.; Milevsky & Levitt, 2005).

Both participants in my research study that lived in single-family homes reported that the relationship with their older sibling(s) was not as strong as they would have liked during their earlier days of growth and development. Noller, Conway, and Blakeley-Smith (2008) found
sibling conflict and negativity were higher in divorced and separated families versus married families and higher in single-parent versus stepparent and married families (Deater-Deckard, Dunn, & Lussier, 2002). Although the family dynamics changed from participant to participant, all participants agreed that a contributing factor to developing relationships with their younger or older siblings happened outside of their parents' supervision when they were either watched by older siblings or looked after their younger siblings.

According to Dunn (1985), siblings’ extensive contact and companionship during childhood and adolescence increasingly outside the direct supervision of parents or other adults—provides ample opportunity for them (children) to shape one another’s behavior and socioemotional development and adjustment. Mchale (2012) suggests that sibling influence did not just impact younger siblings but also that children can also influence parents’ expectations, knowledge, and parenting behavior in ways that have implications for their siblings. Naomi states that because she was a female and grew up with two brothers who did not go to college, her parents had the attitude it does not matter what you do, whatever you want but do something. The negative attitudes the other brothers had toward school, in turn, influenced Naomi to want to do better for herself.

Analysis of the Impact of the In-Home Experience

The in-home experiences for participants reveal a culmination of external factors the participants were faced with to include but not limited to parental influence, sibling influence, household dynamics, and sociocultural status. All of the contributing factors played a role in the participants' growth and development as they worked to decide to pursue STEM as a degree. Based on the analysis of participants of conversations, the external factor that had the least impact on the participants was the sibling influence. Almost all younger siblings have the innate
desire to mimic their older siblings, especially early in life; they want to look like them, act like them, and mostly want their approval (Varedy, 2015). At the same time, participants reported wanting to mimic their older brothers and sisters. That did not relate to educational attainment; the desire to imitate older siblings stemmed from the desire to have the same freedoms as a teenager. For example, staying up late, staying out late with friends, watching excess amounts of television, playing video games, or unrestricted access to social media and technology. Instead, participants wanted to pave their way. This could be viewed as a sign of independence, or it could simply be a difference in goals at such an early age. Of the five participants, only one participant is pursuing a field similar to that of their sibling.

The attribute that had the most significant impact was the parental influence. PTA (2000) notes the best predictor of student success is the extent to which a parent(s) encourages learning at home and shows interest in what the child is doing. The participant expressed their parents were not what is commonly referred to as helicopter parents. A helicopter parent is a parent who is overly involved in the life of his or her child. The term has also been used to describe a parent who takes an overprotective or excessive interest in the life of their child or children. As mentioned earlier, none of the participants reported or states anything that could be interpreted that their parent(s) were helicopter parents. Instead, the parents actively showed interest in their children’s interests. This action for the participants was encouraging and provided enough room for them to explore while being reminded of the importance of education to have a better life than they (the parents) could provide.

The household dynamics played a crucial role in the participant's mental state, helping shape their belief in themselves. The participants who grew up in single-family homes reported receiving encouragement from the single parent. If they did not receive encouragement, they did
not take it personally because the attention had previously been there. Participants in single households were also forced to take on some of the roles that they probably would not have had to were there another parent in the house. Participants did not view the extra responsibility as a daunting task; instead, they viewed it as a learning opportunity and a chance to gain independence. Participants who grew up in a household with both parents reveal most encouragements came from one parent and occasionally from the other parent. The disconnect from one of the parents was attributed to the one parent working more than the other. Participants reported that they did not feel like they had more responsibilities than their siblings. If they had extra responsibilities, they did whatever was being asked to get back to what they were previously doing.

Socioeconomic status impacted the participants because they all recognized that while they were able to persist with many dynamics working against them. They felt like they did not have the mindset that they could have easily given up and settled for a different degree. Four of the five participants admittedly went to schools in low-income areas and did not have the same resources as students from affluent areas. They, however, did not let that discourage them from their desire to pursue STEM degrees. Stressing that a valuable lesson they learned growing up in a low to middle socio-economic household, they would have to work hard to achieve their goals. However, if they worked as hard as possible, not even socioeconomic status could keep them from attaining an education.
Chapter 6: Conclusion

This phenomenological case study examined the in-home experiences of 5 African American students pursuing STEM degrees at an HBCU. The two questions that guided this phenomenological research study were.

1. What are the in-home experiences of undergraduate African Americans pursuing STEM degrees at a Historically Black College?
2. What impact did the in-home experiences have on the student’s decision to pursue STEM?

The first question sought to understand the in-home experiences of African American students. The in-home experiences of African American students reveal a complex system of internal and external attributes. The participants' homes varied, with some of the participants coming from homes raised by both parents and some being single-parent homes. The participants' neighborhoods were largely lower-class except for one student who reported coming from a middle-class family. None of the participants came from households where both parents had bachelor’s degrees, but all parents had a high school diploma or completed their GED. The participants' parents' employment varied, with some of the parents being a stay at home parents and others working up to three jobs to support their families. All of the participants grew up around younger or older siblings. Participants who had younger siblings reported having to take on parenting roles while their parent(s) were away from the house. Participants said that growing up, they had the freedom to explore and be creative and that even if their parents disagreed with their ideas for careers when they grew up, they never let it be known until they were in high school. Participants also reported the competition between siblings helped develop their character and focus of the participants. The principle they maintained helped them stick
with pursuing science, technology, engineering, and math. Discussions reveal that all participants experienced some level of persuasion from their parents, but their parents never forced them to pick one particular field. However, participants did report that some of the interactions they had with their parents were encouraging them not to waste their educational opportunity. Equally as impactful and vital was the emergence of a positive mindset that creates a positive self-image. All participants believed that you could do anything that you put your mind to regardless of your background, race, ethnicity, or socioeconomic status. The important thing was to believe in yourself and work hard.

The second question sought to understand the impact/role the in-home experiences played in pursuing STEM. All of the participants states that they believed in the freedom from their parents to explore different things. To include but not limited to the ability to be mentally creative or imaginative, the option to participate in exemplary art programs and athletics proved beneficial to their growth and development. Participants also recognized that their parents never told them they were not competent or not capable; instead, they helped encourage them to move through grades in K-12. Participants also acknowledged that while there was a healthy competition between siblings, their siblings' desire was social and not academic.

Although the home environment was not the ideal atmosphere that historically fosters growth and development, students admitted that they used that environment as motivation. The idea of giving up was one that rarely came to mind because education is an individual goal, and even if you fail, the only thing stopping you from trying again is yourself. Participants said they had to have the desire to want to overcome any obstacles that presented themselves. With each block, they overcame participants reveal there was a boost or increase in confidence. The rise in confidence was gradual and happened over the years but had a positive social and academic
influence on the participants. As a result of the positive reinforcement received from parents mentally, participants felt an increase in confidence, which helped them face complex challenges in the classroom. At some point, all of the participants told themselves they could accomplish anything they put their mind to, and that knowledge was something no one could take away. The participants' experiences served as a solid foundation for learning and growth, which created a positive self-image that nothing could stop them from pursuing STEM if that was their desire.

Even more impactful was the revelation that both males and females achieved persistence in STEM. Historically the problem of depressed graduation rates in STEM subjects is confounded by the field’s relative failure to attract and retain diverse students (National Science Foundation, NSF, 2015; Tsui, 2007). Depressed graduation rates result from the racial stratification of the STEM field; in a society that struggles to overcome the intersection of race, class, and poverty presents an additional moral and ethical dilemma (Oates, 2004). Even in an academic culture that provides few formal support structures to overcome barriers encountered by African Americans in STEM. African Americans can persist even with all odds against them. Equally as impactful and more potent than the chains of the psychological barriers that stereotype threat, inadequate preparation, and tracking in K-12 present are the students' confidence in their abilities, parental support, and the sheer desire to succeed. There is no doubt that implicit bias, or unconscious beliefs, contribute to stubborn racial disparities in education, such as differences in student achievement. Standardized testing poses a threat to historically marginalized groups of students like African Americans; these tests are designed with racial, cultural, and socioeconomic bias.

Psychological barriers exist, but what is difficult but not impossible is finding a way around the obstacles—preparation from parents and encouragement when children are growing
up and progressing through K-12 education. Students need to know there will be times when they feel like they are falling behind, bored with the material, or feel like classes are moving too slowly or too quickly; it is a normal part of the learning experience. The reinforcement that students can do or be anything they want to be, even if they fail the first time, does not mean they cannot be scientists, technologists, engineers, or mathematicians. Persistence is firm or obstinate continuance in the course of action despite difficulty or opposition.

If students aren’t successful the first time does not mean they should give up, it simply means they have to try again. The adage is if at first, you do not succeed, try again. African American students are just as capable and even more capable than white students to persist in STEM. But cognizance of barriers, parental support, and focus on the overarching goal is key to student’s success. The in-home experiences of the participants are crucial to providing a solid background for positive emotional growth, which in turn translates into a positive state of mind which is a core element for success at anything attempted. Without positive in-home experiences, African American students are at a greater risk of believing that they are not capable and do not have the mental capacity to persist in fields that other ethnicities have historically dominated. Figure 8 provides a hierarchy chart showing external factors outside of the home that impacts the underrepresentation of African Americans in STEM as well as the in-home experiences that impact African Americans' persistence in STEM.
Factors contributing to the Underrepresentation of African Americans in STEM

While not often depicted in television, media, and history books, African Americans have played a vital role in STEM growth over the last 400 years. The contributions African Americans have made in STEM date back to the 1700s with the likes of Benjamin Banneker. Banneker was the son of a slave and was a mathematician and also an astronomer. In 1800 George Washington Carver, a scientist, botanist, and chemist, invented over 100 products from the peanut. Euphemia Haynes was a mathematician who was also a fellow for the Association for the Advancement of Science. In the 1900’s George Caruthers, an astrophysicist, was inducted into the National Inventors Hall of Fame for his contributions to aeronautical engineering. There was also Valerie Thomas, a physicist, and technologist who developed real-time computer data systems. Mae Jemison, a physician that was the first African American woman to travel in space. Neil deGrasse Tyson is an astrophysicist who has received 18 honorary doctorates and the NASA Distinguished Public Service Medal.
While this in no way is an accurate representation of all the members of the African American community that have made contributions to STEM. The individuals above are a small representation that shows that since the 1700s, African Americans have played massive roles in STEM in the United States. For 400 years, African Americans have played instrumental roles in STEM. It is hard to believe that African Americans are not interested in STEM fields as their White, Latino, and Asian counterparts. The decline of interest in STEM cannot be blamed on the fact that there are fewer African Americans in the United States than other races. Findings by the United States Census report (2019) reveal Asians represented 5 percent of the total population in the United States, and African Americans made up 13 percent of the total population.

The National Center for Education Statistics (2015) reveals African Americans represent only 6 percent of the total population of engineers, compared to whites at 12 percent, Asians at 16 percent, and LatinX at 9.4 percent. The National Center for Education Statistics (2015) adds the most sought-after majors for African Americans were:

1) Business Administration
2) Psychology
3) Nursing
4) Criminal Justice

The least popular majors were:

1) Math
2) Chemistry
3) Physics
4) Biology
There is nothing wrong with a degree in Business Administration or Psychology; African Americans are capable of far more. Marginalization and oppression have always been present in the African American community. While the landscape for pressure has changed over the years, close to 30 percent of Black families still live below the poverty line. Individuals interested in a particular field should not be swayed from selecting career paths to have a strong passion. The reality is that while African Americans’ jobs are essential and rewarding for many, positions held by African Americans do not have the short-term or long-term earning potential as degrees in science, technology, engineering, and mathematics. African Americans are fully capable of being a contributing force in STEM but must be conscious of the challenges that lie ahead and overcome those challenges. Preparation for the ominous task does not begin once students are in high school or when students get to college. The foundation of preparedness starts in the early years in the home as students progress through stages of development. The role parent(s) play is crucial in stimulating growth and fostering creativity at all levels. Success in STEM begins in mind and grows when students are fed positivity and believe they are fully capable of accomplishing what has seemed off-limits. Freire (1970) taught his students how to break the invisible chains that continue to oppress, and parents of African Americas do the same.

**Internal and External Attributes**

Weiner (1985) states attribution theory attempted to understand the behavior of others by attributing feelings, beliefs, and intentions to them. Weiner (1985) also implies that depending on a person’s internal drive, the internal factors (to include but not limited to behavioral outcomes, emotions, and expectancy of success) played a more significant role in students' motivation. Motivation can be split into two groups Intrapersonal and Intrapersonal. Intrapersonal motivation is directly connected to the person internally and deals with self-
directed thoughts like self-esteem, guilt, and shame. All of which have the propensity to be controlled by the individual. Participants acknowledged they were faced with internal decisions every day and depending on their state of mind. They may be inclined to make a favorable decision or an unfavorable decision.

Participants also reveal as it relates to STEM coursework, they chose to believe that they were capable of doing the work even if they struggled. Stating the decision to quit would have created a negative domino effect in their internal (within self) environment and the external environment. When asked to expand, participants said the decision to give up shifts their thinking, putting them in a place where they begin to doubt everything and their abilities. Consistent with Weiner’s findings, the internal drive of the participants to overcome the barriers and obstacles they were faced with proved to be crucial for their success in STEM.

Weiner (1985) states that interpersonal motivation is directly connected to the person externally and deals with interactions with people in the external environment and how others see and judge them. Consistent with the research findings, participants recognized that their interpersonal environment played an equally important role as the intrapersonal environment. Participants state that listening to others and succumbing to the negativity they have faced with every day shifts the external environment. Once the external environment shifts, students are placed where others begin to doubt their abilities. The lasting effect is that conversations that were once positive with externals entities (parents, siblings, friends, etc.) become harmful. Negative conversations can lead to increased criticism, which can have a lasting impact on the individual's internal environment, creating negativity bias.

According to Swaim (2020), negativity bias is our tendency to register negative stimuli more readily and dwell on these events. Also known as positive-negative asymmetry, negativity
bias means that we feel the sting of a rebuke more powerfully than we feel the joy of praise. Psychological research suggests that the negative bias influences motivation to complete a task. People have less reason when an incentive is framed to gain something than when the same stimulus will help them avoid the loss of something Goldsmith, (2013); this can play a role in your motivation to pursue a goal. Rather than focusing on what you will gain if you keep working toward something, you're more likely to dwell on what you might have to give up achieving that goal (Cacioppo, 2015).

**How do the Findings Connect with Existing Research?**

Currently, there is no known research on the in-home experiences of African Americans in STEM, nor could research be found on the impact of the home experiences of African Americans in STEM. Simultaneously, connections to various studies could be made that impact the internal and external attributes that impact the persistence of African Americans in STEM. External attributes that impacted participants could be found that related to critical race theory. Soloranzo (1998) defined Critical Race Theory in education as a framework or set of basic perspectives, methods, and pedagogy that identified, analyzed, and transformed those structural, cultural, and interpersonal areas of education that maintain the marginal position and subordination of African American students. The social structures created by the income gap put participants in situations where they asked themselves whether they should pursue STEM or pursue a trade.

I also found research related to African Americans' psychological barriers in STEM, more specifically stereotype threat. Beasley (2012) states stereotype threat is the fear of confirming a negative stereotype about one's social group. Stereotype threat is connected to our internal attributes because it is largely unconscious. Freud's psychoanalytic theory of
personality, the unconscious mind is defined as a reservoir of feelings, thoughts, urges, and memories outside of conscious awareness. If this is true, that would mean most of the contents of the unconscious mind are considered unacceptable, including but not limited to feelings of pain, anxiety, and conflict. Freud also adds that the unconscious mind influences our behavior even though we are unaware of the underlying influences. Unconsciously participants were not focused on the fact they were enrolled in degrees where they are historically underrepresented. Participants also were not concerned courses were created with implicit bias and designed with the background knowledge that caters toward less marginalized groups.

Existing research about parental words and the impact on child development by Newberg (2012) reveals by using more positive comments in the home, parents can create healthy development of their child’s brain. Equally as impactful is the effect of negative words like ‘dumb.’ Newberg (2012) puts forth a single negative word that can increase the activity in our amygdala (the fear center of the brain). This releases dozens of stress-producing hormones and neurotransmitters, which in turn interrupt our brains’ functioning. Through positive words, parents can promote children’s cognitive functioning, and with negative comments, a child’s brain function can be interrupted. My research revealed that encouragement, support, and positive parental words helped reinforce participants' belief that they were more than capable and helped to encourage students to push beyond their perceived limits.

Literature, as it relates to sibling influence Mchale (2012), suggests extensive contact and companionship during childhood and adolescence increasingly outside the direct supervision of parents or other adults provides ample opportunity to shape one another’s behavior, socioemotional development, and adjustment. My research revealed that their siblings influenced participants' behavior. If they grew up with siblings who were constantly
misbehaving, they did not act as badly because they saw their parents' stress with their other siblings. On the same note, participants also revealed the majority of influence from their siblings only lasted a short period. Mostly until the participants were old enough to realize they did not want to be like their older siblings; they tried to forge their path. As it relates to the younger siblings’ participants state, they recognized the importance of setting a good example for their younger siblings. They tried to share positive words of encouragement because they understood the importance and power of influence.

**Practical Implications of the Study**

Students should be taught early that their race and ethnicity put them at greater risk for discrimination, marginalization, and stereotyped. This is because individual and political actions cannot maintain the bottom position of an entire race (African Americans). It has been integrated into the design of institutions across the United States and is apparent when we examine things like educational segregation and the school-to-prison pipeline. While intended to educate, those institutions have also been created to push African Americans to the bottom of society to ensure the marginal societal position is maintained or kept by African Americans. Negative stereotypes and images surrounding African Americans are made, upward mobility for significant proportions of African Americans is highly impaired and reversed by those institutional implications. This system of segregation and the design of specific institutions such as the educational system consciously and unconsciously impact African Americans' morale and well-being.

African American economic, social, and political position continues to benefit mainstream society in all areas. Mainstream society is not striving and fighting as hard for a just and equal society, as this would mean sacrifices on their behalf. The Community benefits from
African Americans, such as in labor and positioning within vulnerable jobs. Therefore, certain rights have to be given to African Americans to maintain stability and relative satisfaction amongst the African American population within society. Those rights are always positioned within certain boundaries that will not thwart a system designed to benefit Whites primarily. African Americans continue to be marginalized and are faced with obstacles every day; these obstacles can be overcome. To overcome the barriers that have plagued African Americans in the quest for STEM equality.

There has to be preparation in the home and the participant's mind long before selecting a major. That preparation begins with the parent(s) raising the child to know what obstacles they will face with stereotypes, bias, and racial discrimination not just in everyday interactions but academically. Equally important is for African American students to know that African Americans less pursue STEM degrees due to barriers. Still, students can overcome obstacles with focus, hard work, and the right mentality. It is also essential that students know that it is acceptable for you to want to be a basketball, football, or baseball player, or even a wrestler. Parents should also teach their children just because this is how you commonly see African Americans portrayed does not mean you cannot be a scientist or engineer. Parents should continue to plant seeds of excellence in the minds of their children (students) and not plant seeds of doubt by telling their children that a subject is too complicated. Parents should also avoid telling their child because they (the parent) were not good at math or science; the child (student) will not be good at those subjects.

While children can be genetically predisposed to learning disabilities, children cannot be genetically predisposed to not learning an issue because their parents struggled in that content area. Equally important is for students to be able to have the freedom to explore and be creative.
Fostering creativity stimulates growth while encouraging exploration. This exploration is vital to students deciding what they want to study and what career to pursue. Students have to know that they can become everything they see on tv, from doctors to lawyers, to athletes to physicists, and nothing is out of reach with a little hard work and determination. Education is an individual goal, and you control what you learn and how much you learn. People and systems may try to prevent you from learning, and you may even fail; if so, try again. Success isn’t achieved by listening to everyone else and following the crowd. Success is achieved by believing in yourself and your abilities. Educational achievement is an opportunity for you to be selfish and seek a career that you as an individual find rewarding.

Implications for Policy

The current federal policy for STEM is the STEM Opportunities Act of (2019). According to the United States Congress, this bill provides guidance, data collection, and grants for historically underrepresented minority groups in science, technology, engineering, and mathematics (STEM) and education at higher education institutions (IHEs) and federal science agencies. The bill specifically requires that the Office of Science and Technology Policy (OSTP) provide specific guidance to federal science agencies and IHEs. The statement goes on to say that each federal science agency is required to collect comprehensive demographic data on recipients of merit-reviewed research, as well as grants given to IHEs and laboratories supported by federal agencies. Each agency has also been tasked with implementing recommendations from the OSTP on what is being done to reduce bias in the STEM workforce. Each agency should launch a pilot program and implement policies and practices to minimize implicit bias for grants.
The National Science Foundation (NSF) has been tasked with collecting survey results on the demographics of STEM faculty at institutions of higher education. In addition to collecting and analyzing survey results, the NSF must also carry out a variety of grant programs, including grants for increasing

1) The recruitment, retention, and advancement of individuals from underrepresented minority groups in STEM careers

2) The recruitment and retention of minority students who are underrepresented in STEM fields; and

3) Student participation in computer science and computational thinking education programs at tribal colleges and universities.

Reports from the Congressional Research Report (2018) reveal federal concerns center around a broad set of issues to include but not limited to the governance of the national effort and broadening participation of underrepresented populations. As well as those that are specific to STEM in elementary, secondary, and postsecondary schools. One challenge is that governance concerns focus on perceived duplication and lack of coordination in the federal effort. Not to mention participation concerns tend to highlight achievement and participation gaps between various demographic groups. While there are several policy options, most of the policies relate to elementary, secondary, and postsecondary STEM education. The focus of most of these policies at K-12 includes but is not limited to educational accountability, standards, and teacher quality. At the postsecondary level, proposals center on efforts to remediate and retain students in STEM majors; these policies are essential to creating a more STEM diverse workforce.
My search for policies related to children revealed federal policies and regulations that provided overarching standards and guidelines for child protection, welfare, and adoption, with each state regulating its laws on matters relating to child welfare. Information was found on the Child Abuse Prevention and Treatment Act (CAPTA), Child Welfare Policy Manual, U.S. Department of Health and Human Services, and the Administration for Children and Families. There was no information on policies in place that supported positive growth and development in the home. The focus of my research was the in-home experiences of African American students pursuing STEM degrees.

According to the U.S. Department of Health and Human Services, in 1965, the federal government launched a project head start program. According to USDHHS (2019) project, Head Start launched as an eight-week summer program by the Office of Economic Opportunity to break the cycle of poverty; by providing preschool children of low-income families with a comprehensive program to meet their emotional, social, health, nutritional, and psychological needs. The USDHHS (2019) adds while many people think headstart is one program, Head Start consists of two programs: Head Start and Early Head Start. Head Start is a comprehensive early childhood development program primarily serving low-income preschool-age children and their families, while Early Head Start was established during the 1994 Reauthorization of Head Start. Early Head Start is a comprehensive early childhood program serving primarily low-income children prenatal to age three, pregnant women, and their families.

The findings reveal that internal and external attributes played a considerable role in students' persistence in STEM. Specifically, positive interactions and reinforcement with siblings and parents at an early age stimulated, which helped create a mindset within the student that they could accomplish anything they set out to do. Regardless of the economic status,
marginalization, or gaps in knowledge, students were able to persist in STEM classes in K-12 and persist in higher education as they work toward completing a STEM degree. This information is vital to the creation of policies that support minorities and marginalized groups within the community. Current policies mandate new parents to provide a wealth of information related to financial assistance, childcare rules, and laws and choose quality childcare. There was also information found on pregnancy, Medicaid, supplemental nutrition programs, free health care programs, and childcare subsidies and vouchers. The current focus of policies in STEM education caters to K-12.

Future policies moving forward should focus on the following.

1. Eliminate or overhaul the Head Start and Early Head Start program. According to the Center for Law and Social Policy (CLASP) (2016), only 43 percent of all eligible children have access to the federal preschool program Head Start. This includes 36 percent of low-income Asian children, 38 percent of Latinos, and 54 percent of African Americans. The numbers for Early Head Start, the federal program aimed at younger children, reveal even lower numbers, with only six percent of low-income African-American children, five percent of Latinos, and four percent of Asians enrolled in the program.

2. Make training on child development mandatory to receive federal assistance like WIC. According to the Food and Nutrition Service in 2017, the people eligible for WIC included 5.3 million White people, 4.9 million Hispanic people, 2.4 million African American (Black) people, and 1.4 million people of other races or multiple races. The coverage rate (the share of eligible people who receive WIC benefits) is approximately the same for African American (Black) people (59 percent) and Hispanic people (60
The coverage rate is estimated to be 41 percent for White people. WIC targets four areas (1) categorical (pregnancy through year five of childbirth), (2) low-income thresholds (income categorized by the state as low or poverty level (3) nutrition risk requirement based on medical or dietary conditions (4) residential applicants must apply for assistance in the state they live. Packaging parent and child training as a part of a program like WIC provide parents with the assistance needed while educating parents about their children rather than parents trying to figure it out as the go.

3. Provide educational training for parents on child interactions as well as positive reinforcement. Souders (2020) states positive reinforcement as a form of positive discipline allows us to tap into our children’s strengths, draw attention to their personality traits and interests, and as a result, will enable us to connect, communicate effectively, and ultimately empower them to be more of themselves. Trautner (2019) all parents, regardless of whether they come from low, middle, or high socioeconomic status, mandated and non–mandated can benefit from evidence-based parenting education. Trautner (2019) went on to say that parents who have attended classes and learned effective discipline and parenting techniques report having children with higher grades, fewer behavior problems, fewer substance abuse issues, better mental health, and greater social competence.

4. Develop parenting skills that contribute to the overall health of the child (student). Training on child development, much like psychological awareness training, is only mandated when parents are negligent or abusive in their relationships with their children. There is just as great a need for African American parents to be further educated on practices that improve children's cognitive and social skills and in-home techniques that
stimulate positive growth and development of children. Successful child development can be done without training, but raising a successful STEM child starts in the home and develops due to their internal and external attributes.

**Suggestions for Future Research**

While the current study focused on the in-home experiences of African Americans in STEM, there are opportunities to explore other factors that impact and contribute to the underrepresentation of African Americans pursuing STEM degrees. There are also opportunities for exploring factors that influence and contribute to the underrepresentation of African Americans in STEM careers. Future research could focus on African Americans between the ages of 18 and 30 who are currently not pursuing STEM to better understand why participants decided not to pursue STEM. Additionally, future research could also target minorities who are not pursuing STEM degrees, focusing on exploring and answering questions.

1. What experiences do minorities not pursuing STEM attribute to major selection?
2. What was the impact of the in-home experiences of minority students not enrolled in STEM?
3. How did those experiences impact the selection of a major?
4. How do Minority students describe their experiences in high school?
5. How do Minority students describe their experiences in college?
6. What motivates African American students in K-12 to strive for excellence?

While there are several gaps as it pertains to the knowledge about the experiences of African Americans in STEM and reasons for the decline in African Americans in STEM. Future research could help explain factors that contribute to the deterioration of this already marginalized population. Future research could also help us better understand how
improvements can be made in homes, schools, colleges, and the workforce; this is significant for closing the racial gaps in STEM. Federal funding is provided to increase diversity and equity training and STEM scholarships. Still, until future research can provide more insight into the factors contributing to STEM and active efforts to eliminate those barriers, there will likely continue to be a decline.

**Future Research Possibilities**

In this study, I sought to examine the essence of the in-home experiences of African American students pursuing STEM. My research reveals that several internal and external attributes impact a student’s desire to pursue STEM. Nonetheless, if I were to design this study again, I would make a couple of minor modifications. Not because I believe my research lacks information in any way, but to further the advancement of STEM for all ethnicities. I would target underrepresented, marginalized populations and include LatinX. Lomax (2018) states HBCUs provide a stable and nurturing environment for those most at risk of not entering or completing college: low-income, first-generation college students. To effectively study other ethnicities, it would be equally important to not just focus on HBCU’s but also recruit participants from Predominately White Institutions, Hispanic Serving Institutions, Religious Institutions, and Private Colleges. To effectively reach students interested in STEM, we must be able to answer the following questions.

1. With many students filling multiple roles in and out of the house, how do you reach students who have to split commitments?

2. How can we educate the community on the internal and external attributes that improve persistence among minorities in STEM?

3. Are internal and external attributes the only skills needed to be successful in STEM?
4. What does STEM persistence look like for students from low-income families with no siblings?

**Implications**

Since 1990, STEM employment has grown 79% (9.7 million to 17.3 million), and computer jobs have seen a 338% increase over the same period Funk, (2018). African Americans, American Indians/Alaska Natives, and Latinos historically comprised a minority of the population in the United States. Currently, these groups make up approximately 30 percent of the U.S. population. NCAME (2020) maintains underrepresented minorities are particularly underrepresented in science, technology, engineering, and mathematics (STEM). With African Americans accounting for 11% of the U.S. workforce overall but represent 8% of STEM workers. Among employed adults with a bachelor’s degree or higher, Blacks make up just 7% of the STEM workforce.

Research relating to African Americans in STEM revealed six themes as to why African Americans do not persist in STEM. The six themes that emerged were inadequate funding, lack of preparation and access due to socioeconomic status, tracking in K-12, psychological barriers to involvement in STEM, inadequate support by colleges and universities, first-generation college students. The theme of inadequate funding refers to schools in low-income areas where schools lack the necessary resources for classroom instruction; this is primarily due to budget cuts. The amount of funding schools receive in low-income compared to income received per student in high-income areas. The disparity in funding creates difficulties finding educators that are willing to teach for low wages. As a result, the increase in teachers who are not considered highly qualified and long-term substitutes becomes the classroom norm.
According to the National Assessment of Educational Progress (2018), from 1996 to 2015, the average weekly wages of public sector teachers decreased by $30 per week, from $1,122 to $1,092 in 2015 dollars. During this same period, the weekly wages of all college graduates rose from $1,292 to $1,416. With classrooms filled with long-term substitute teachers and volunteers, the preparation students receive less than adequate to prepare students to be successful in college in STEM courses or degrees. Lack of preparation and access due to socioeconomic status reveals that students from low socioeconomic families who attend schools in low-income areas do not have access to the same technological resources as students from more affluent areas. As a result, a gap is created in learning in required courses that impact students' persistence in STEM.

There is also evidence that the opportunity to learn (particularly in mathematics) is more restricted for lower socioeconomic students, with systematically weaker content offered to lower-income students, so rather than ameliorating educational inequalities, schools were exacerbating them (Schmidt 2015). Lack of resources eliminates students’ opportunities for access because the schools do not receive the funding for state-of-the-art technology, organizations, and after-school programs. Willett (1954) drew attention to the disparities in funding in schools by saying the amount spent for educational purposes compared with amounts paid for many other items and services, including luxuries, indicates the importance of education in our democracy is not yet realized.

Tracking in K-12 refers to how students are grouped based on performance as early as elementary school. Based on achievement tests or other test scores, students may also be classified as fast, average, or slow learners and grouped with students who scored similarly (Oakes, 1985). Tracking prevents students from advancing or exit lower achieving classes even
if students perform at a higher level. As a result of monitoring, low-income and ethnic minorities are guided away from STEM toward the vocational track. Simultaneously, wealthy Caucasian students are often directed or advised to choose the college-bound course of study. A common belief in education is that students learn better when grouped with other students at the same level academically. The reasoning behind this is the mentality is a student at the same level academically has the same background knowledge; this is not true. This suggests that students who do not learn as quickly are tracked away from college-bound curriculums have not learned as much at graduation as those who did not finish school (Loveless, 1999).

Psychological barriers to involvement in STEM relate to the mental impact that the media has had on helping shape the minds of individuals. Depictions in the media when STEM is represented on television are White and Asian males and females. In STEM classrooms in K-12, most posters around classrooms have pictures of white males and sometimes females. Stereotypes surrounding STEM would lead you to believe that certain ethnicities are better suited for STEM than others. When individuals perceive that negative stereotypes about their group are salient in a particular situation or context, they experience “stereotype threat” (Steele, 1997). Individuals' apprehension represents the threat that they may be viewed in ways consistent with group stereotypes. As a result of the lack of representation, African American students believe they are not capable, or they would not be a good fit for STEM fields. Research suggests that the underrepresentation of women and students of color in STEM careers is the product of contextual and psychological factors that shape academic and career choices long before students arrive on a college campus (Perry, 2012).

The final theme was inadequate to support by colleges and universities. Bauer-Wolf (2019) maintains that STEM programs in college are often structured in a way in which students
have to prove their intellectual worth to stay essentially. If they cannot, they may be forced out if they do not meet high academic standards. The pressure of feeling like you have to prove your intellectual growth often leaves students discouraged or scared to reach out to faculty if they struggle to understand STEM content in a particular class.

Jones (2014) notes that African American students attending predominately white institutions could not form the critical bonds that foster positive growth and development that carry students through college. To cope, students may come to minimize attributes and behaviors necessary for success in their educational domain and develop personal identities in areas outside of that domain (Cokley, 2013). These negative experiences can lead to a decreased sense of connectedness and community within students' academic settings. These experiences are a source of educational inequity as they negatively affect the quality of many of these students' social and intellectual experiences (Chang, 2011).

Critical race theory and socioeconomic status contribute to why African American students do not persist in STEM majors and fields. Bell (1979) defined Critical race theory (CRT) as the view that the law and legal institutions are inherently racist. And that race itself, instead of being biologically grounded and natural, is a socially constructed concept that white people use to further their economic and political interests at the expense of people of color. Bell (1979) suggests racial inequality emerges from the social, economic, and legal differences that white people create between “races” to maintain elite white interests in labor markets and politics, giving rise to poverty and criminality in many minority communities. My findings are foundational to African Americans being able to overcome the challenges presented by critical race theory and socioeconomic status and have the propensity to change some of the literature. My findings reveal that while critical race theory and socioeconomic status play a huge role in
students' persistence. African American students have the mental capacity to persist in STEM but can do so even with all odds against them. Critical aspects of a student’s growth and development and success in STEM are linked to parental support and the mindset or mentality of the student.

Participants in my study acknowledged that their mindsets changed over time. Cherry (2020) states mindset refers to whether you believe qualities such as intelligence and talent are fixed or changeable traits. Dweck (2014) identified two different types of mindsets: People with a fixed mindset believe that these qualities are inborn, fixed, and unchangeable. Those with a growth mindset, on the other hand, think that these abilities can be developed and strengthened by way of commitment and hard work. Dweck (2014) adds a fixed mindset assumes our character, intelligence, and creative ability are static givens that we cannot change in any meaningful way. And success is the affirmation of that inherent intelligence, an assessment of how those givens measure up against an equally fixed standard; striving for success and avoiding failure at all costs become a way of maintaining the sense of being competent or skilled. Simultaneously, a growth mindset thrives on challenge and sees failure not as evidence of unintelligence but as a heartening springboard for growth and stretching our existing abilities.

My research reveals that these two vastly different mindsets develop as early as age five, with participants recalling talking to their parents about what they want to be when they get older. My research also reveals that the development of these mindsets is directly linked to participants' interactions with their parents. All of the participants states regardless of what was going on, their parents used a positive, constructive approach. Participants also said their parents made time to talk to and listen to their children, give them praise and attention when they behaved well and punished them when they behaved in challenging ways. Carlson (2001) states
an enriching and stimulating home environment fosters healthy growth and brain development by providing a child with love, emotional support, and opportunities for learning and exploration.

Tracking in K-12, lack of preparation, inadequate access due to socioeconomic status, mental barriers due to stereotype threat, and lack of support, and first-generation college students contribute to poor performance in STEM. Equally important is the mindset of the student and the early interactions with their parents. If students have had healthy interactions with their parents and have had the freedom to be creative and go through the intellectual discovery stage. Students are more likely to have and keep a growth mindset and progress through K-12 and into college, overcoming obstacles and barriers that arise due to socioeconomic status resulting from healthy interactions with their parents. In contrast, if a student has had negative interactions with their parents and has not had the freedom to be creative. Nor received positive reinforcement from their parents; they will have a fixed mindset and see themselves as less than capable of overcoming the obstacles encountered.
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Appendix A

Individual Interview Questions Round #1

1. Describe what it was like growing up in your house

2. What about your experience do you feel made you who you are?

3. Where was the emphasis placed in terms of being successful?

4. Outside of school, describe the environment that you feel like you thrive in

5. What were some of the short-term goals and long-term goals you set for yourself growing up?
Appendix B

Second Round of Individual Interview Questions

1. What is your major and how far along in your program are you?

2. Why did you choose the major that you are in?

3. What is it about the major you are pursuing that intrigues you?

4. Had you known then what you know now. Is there anything you would have done differently to prepare yourself for majoring in this field?

5. What has it been like as an African American pursuing a STEM major?
Appendix C

Digital Recruitment Flyer

[Volunteers] Wanted for a Research Study

*Exploring the home experiences of African American undergraduate students pursuing STEM degrees*

Purpose: The purpose of this research study is to gain a deeper understanding of the home experiences of African Americans pursuing STEM degrees enrolled at a Historically Black College. Previous research and statistics sheds light on the poor performance of African Americans pursuing STEM degrees and the need to seek out those students who are currently pursuing STEM degrees as undergraduate students.

This research study will be conducted over 24 weeks. Participants are asked to participate in 2 virtual interviews (1 during the Fall 2020 semester and 1 during the Spring 2021 semester). Interviews will last approximately 60 minutes and will be conducted using the virtual platform of your choosing.

Eligibility: Participants must self-identify as African American and be male or female adults between the age of 18 and 30 who are enrolled at North Carolina Central University. Participants must be undergraduate students in good standing currently in a STEM Major.

Participation in this study may encourage other African American students to pursue STEM degrees regardless of their home environment and encouraged students that they can do anything they put their mind to. The project will further the noble goal of striving for STEM equality among all students regardless of race or ethnicity at Colleges and Universities.

To learn more about this study contact…
Hello,

I am seeking participants for a research study on African American students. The purpose of the research is to explore the home experiences of African American undergraduate students who are currently pursuing STEM degrees. You were identified because you are currently an undergraduate student enrolled in a STEM degree at North Carolina Central University between the age of 18 and 30 years of age.

Participation in this study is voluntary and will last approximately 24 weeks. Over the 24 weeks participants will be asked to participate in 2 virtual individual interviews. The first interview in the Fall 2020 semester and the second interview in the Spring 2021 semester. Each interview will last approximately 60 minutes in length and will be conducted virtually on the platform of your choosing.

For more information about this study, please contact the principal investigator, Michael Lewis.

Very Respectfully,

Michael Lewis
Appendix E

Informed Consent Form for Research Involving Human Subjects

Protocol Title: Exploring the home experiences of African American student pursuing STEM degrees at a Historically Black College.

Principal Investigator: Michael Lewis

1. Introduction

You are being asked to take part voluntarily in the research project described below. Please take your time making a decision and feel free to discuss it with your friends and family. Before agreeing to take part in this research study, you must read the consent form that describes the study. Please ask the study researcher or the study staff to explain any words or information that you do not clearly understand.

2. Why is this study being done?

You have been asked to take part in a research study Exploring the home experiences of African Americans students enrolled at a Historically Black College. This purpose of this research study is to gain a deeper understanding of the home experiences of African Americans pursuing STEM degrees enrolled at a Historically Black College. Previous research and statistics sheds light on the poor performance of African Americans pursuing STEM degrees and the need to seek out those students who are currently pursuing STEM degrees as undergraduate students. You are being asked to be in the study because you have self-identified as an African American, and you are enrolled at a Historically Black College. Students involved in this study will participate in 2 virtual individual interviews over 24 weeks. One interview will be held in the Fall 2020 semester and one interview will be held in the Spring 2021 semester with each interview will lasting approximately 60 minutes. No more than five students will be enrolling in this study.

3. What is involved in the study?

If you agree to take part in this study, you will be invited to participate in individual interviews.
4. What are the risks and discomforts of the study?

There are no physical or financial risks known in this study. Psychological and emotional risks are potential in this research because you may describe feelings of loneliness, isolation, and discrimination that may have been suppressed. There may also be the risk of stress or distress. If your participation in the research study triggers unwanted feelings of loneliness, isolation, discrimination or other adverse feelings, contact the North Carolina Central University Counseling Center at 919-530-7646.

5. What will happen if I am injured in this study?

In the event you are injured you should report any such injury to Michael Lewis, 919-383-2678 and the NCCU Institutional Review Board (IRB) at irb@nccu.edu.

6. Are there benefits to taking part in this study?

There will be no direct benefits to you for taking part in this study. An important goal of this research is to provide a look at the home experience which includes internal and external factors that have played a role in African American student’s decisions to pursue STEM degrees. The research may encourage other African American students to pursue STEM degrees regardless of their home environment and encouraged students that they can do anything they put their mind to. The project will further the noble goal of striving for STEM equality among all students regardless of race or ethnicity at Colleges and Universities.

7. What other options are there?

You have the option not to take part in this study. There will be no penalties involved if you choose not to take part in this study.

8. Who is paying for this study?

There is no funding supporting this study.
9. What are my costs?

There are no direct costs associated and since individual interviews will be online no costs should be incurred for travel.

10. Will I be paid to participate in this study?

You will not be paid for taking part in this research study.

11. What if I want to withdraw, or am asked to withdraw from this study?

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you do not take part in the study, there will be no penalty.

If you choose to take part, you have the right to stop at any time. We encourage you to talk to a member of the research group so that they know why you are leaving the study. If there are any new findings during the study that may affect whether you want to continue to take part, you will be told about them.

The researcher may decide to stop your participation without your permission, if he or she thinks being in the study may cause you harm.

12. Who do I call if I have questions or problems?

You may ask any questions you have now. If you have questions later, you may call Michael Lewis, If you have questions about your rights as a research participant, or if you have complaints or concerns about this study, you may contact the Research Compliance Manager, 

13. What about confidentiality?
1. Your part in this study is confidential. None of the information will identify you by name. All records will be stored in a secure file cabinet and electronic files will be stored on the researcher’s laptop, password protected. *The researcher will be the only individual with access to the data.* All records will be maintained in these secure locations, and will be destroyed after 5 years.

14. Mandatory reporting

If information is revealed about child abuse or neglect, or potentially dangerous future behavior to others, the law requires that this information be reported to the proper authorities.

15. Authorization Statement

I have read each page of this paper about the study (or it was read to me). I know that being in this study is voluntary and I choose to be in this study. I know I can stop being in this study without penalty. I will get a copy of this consent form now and can get information on results of the study later if I wish.

Participant Name: ___________________________ Date: ____________

Participant Signature: ___________________________ Time: ____________

Consent form explained/witnessed by: ___________________________

Signature

______________________________

Time: ____________
Appendix F

Approval Letter

July 9, 2020

Michael Lewis, Doctoral Student
University of Texas at El Paso
500 West University Avenue
El Paso, Texas 79968

Re: Congratulations! Approval of Research Involving Human Subjects

Dear Mr. Lewis:

Congratulations! As required by the Institutional Review Board (IRB), the IRB has reviewed your research study, Exploring the home experiences of undergraduate African Americans pursuing STEM degrees at a Historically Black College: A Phenomenological Study. You have been granted approval to begin your research.

Your IRB approval number is 1201524. This approval will expire on July 10, 2021.

This research study is exempt from the Federal Policy for Protection of Human Research Subjects under 45 Code of Federal Regulations 46.101 (b)(2). As such, this research study is not subject to annual review by the IRB. You are, however, required to obtain IRB approval for any revisions or modifications to your original research application prior to implementation of those changes.

You are responsible for reporting any unanticipated events involving risks to research participants or others.

You are also responsible for notifying the IRB when the research study is completed or discontinued.

Failure to renew your research study on or before July 10, 2021 will result in the suspension and/or termination of your research.
Appendix G

Interview Protocol

1. Log into Zoom 15 minutes early to ensure participants don’t have to wait.

2. Greet the participant with a “hello” greeting, and ask how their day is going.

3. Remind the participant the interview will last approximately 60 minutes. Remind the participant they have the right to end the interview at any time or refuse to answer any question without penalty. Remind the participant the interview will be audio-recorded and data transcribed upon completion. Remind the participant they can refuse to have the interview recorded. Remind the participants to answer the questions honestly, and there are no right or wrong answers. Assure the participants their identity and responses will remain confidential. Remind the participants the data will be locked in a file cabinet, with only the researcher having access for five years and then destroyed.

4. Complete the interview by reading the questions with the same wording each time.

5. Thank the participant again for being part of the study. Provide the participant with the contact information of the researcher.
Curriculum Vita

Michael Lewis, M.Ed. is an educator with ten years of experience in the K-16 educational system, and ten years of senior management experience.

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