Theses and Dissertations

August 2017

Perceptions of Belongingness in Stem Subjects and Career Development for Middle School African American Girls

Anya Woronzoff Verriden
University of Wisconsin-Milwaukee

Follow this and additional works at: https://dc.uwm.edu/etd

Part of the Educational Psychology Commons, and the Social Psychology Commons

Recommended Citation

PERCEPTIONS OF BELONGINGNESS IN STEM SUBJECTS AND CAREER

DEVELOPMENT FOR MIDDLE SCHOOL AFRICAN AMERICAN GIRLS

by

Anya Woronzoff Verriden

A Dissertation Submitted in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

in Educational Psychology

at

The University of Wisconsin – Milwaukee

August 2017

ABSTRACT

PERCEPTIONS OF BELONGINGNESS IN STEM SUBJECTS AND CAREER
DEVELOPMENT FOR MIDDLE SCHOOL AFRICAN AMERICAN GIRLS

by

Anya Woronzoff Verriden

The University of Wisconsin – Milwaukee, 2017
Under the Supervision of Thomas Baskin, Ph.D.

This study addresses the hypothesis that African American girls' early perceptions of

support in middle school influences their narrowing or broadening of interest in STEM

(Science, Technology, Engineering, Mathematics) subjects and careers. As previously

researched the belief that boys excel at math and science while girls do well in the

humanities is not supported by findings. Therefore the purpose of this study is to

investigate the interaction of contextual factors such as teacher, parent, and peer support

for African American middle school girls and their interest in STEM subjects utilizing a

qualitative research method. Students are drawing conclusions about careers as early as

middle school and lack exposure to career possibilities in the STEM fields and may be

making determinations about careers without accurate information. Math and science

teachers are imperative in early STEM- related career interest development and similarly

significant is students' perceptions of support and feelings of belongingness within their

various settings.

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGMENTS

Many thanks to the University of Wisconsin – Milwaukee, my dedicated faculty, my research team and particularly Dr. Thomas Baskin: my advisor, committee chair, professor and friend, who supported me on this journey despite the many bumps and bruises that I endured.

To Zach: without you, this would not have been possible. You keep me motivated, encouraged and confident. "I love you without knowing how, or when, or from where. I love you straightforwardly, without complexities or pride; so I love you because I know no other way than this."

To my children: Henry, Thomas and Katherine, your wonder, investigation and observations of this beautiful world never cease to amaze me. I wake up every morning and go to sleep every night feeling like you are my greatest accomplishments. When I felt like quitting I am acutely aware of your beautiful eyes watching me and know I can't. Your presence in my life has made me who I am today and I feel humbled that I get to be your "mama". To Henry, your strength and resilience through challenges that no child should have to face have left me humbled. I hope you will read this one day and know how humbled I am by your strength, demeanor, and continued defiance of the odds the doctors gave you.

And to my wonderful father, who I wish every day was still here: "I carry your heart (I carry it in my heart)."

Chapter I

Introduction

Job growth in STEM (Science, Technology, Engineering, and Mathematics) fields is expected to continually rise with more than 2 million jobs openings predicted between 2008 and 2015 (Byars-Winston, 2013).[1] Demographically, women, people of color, and older individuals are increasing their share of the labor force (Byars-Winston, 2013). However, women, particularly women of color are grossly underrepresented, holding less than 25% and 9% of STEM occupations that require a college degree with only 967 Bachelors in engineering degrees given to African American women in 2007 (Byars-Winston, 2013; Hill, Corbett, & Rose, 2010).

Restricted and foreclosed STEM opportunities for certain individuals result in underrepresentation and an inequity due to systematic barriers and obstacles (Byars-Winston, 2013). This results in the "loss of human talent" that consequently prevents certain occupations from benefiting from the contributions of a diverse labor force (Byars-Winston, 2013, p.343). Research has shown that college and high school level students with high science and math self-efficacy and positive outcome expectations have strong associations with more precise educational and career interests (Rowan-Kenyon, Swan & Creager, 2010; Hackett & Betz, 1981). However, a strong negative influence or

---

[1] For purposes of this study, STEM fields uses the definition outlined by the US Department of Homeland Security (DHS), which exclusively includes Math, Engineering, Natural and Technical Sciences.

negative outcome expectations can obstruct choices to pursue STEM-related majors and careers, specifically African American women (Rowan-Kenyon et al., 2010). Limited information exists on the role of these factors on early, pre-high school STEM interest. Furthermore, there are no qualitative studies that examine interest in STEM subjects for low-income middle school African American girls. Researchers have successfully identified two major barriers that keep African American girls from STEM classes and careers: (1) the lack of STEM courses that are offered in low-income schools disproportionately attended by participants of color and (2) stereotypes that exist for race and gender that inhibit African American girls from continuing in STEM subjects, careers and opportunities (U.S. Department of Education [DOE], 2014). Systematically, the lack of opportunities is striking: nationwide only 50% of high schools offer calculus and 63% offer physics, while between 10% to 25 % of high schools are not able to offer additional core high school math or science courses (DOE, 2014).

Current research has focused primarily on high schools. Findings show that within the U.S. high schools with the highest percentage of Black and Latino participants, one quarter do not offer Algebra II and one-third do not offer Chemistry. Finally, only 57% of African American high school participants have access to the full range of math and science in their schools. This is in contrast to 71% of White high schools (DOE, 2014). Furthermore, African American girls had lower scores on the STEM portions of the ACT college entrance exam. In 2012, only 6% met the ACT science college readiness benchmark compared to 27% of girls overall. Moreover, only 14% of African American girls met the math benchmark, compared to 42% overall (DOE, 2014). African American

girls are also the least likely to graduate from high school with college credit (through Advanced Placement classes) and the least likely to earn high scores on college entrance exams (DOE, 2014).

Qualitative inquiry provides ample opportunity to develop a better understanding of the genesis of some of these perceptions by uncovering the factors that younger students use to evaluate their academic abilities (Usher, 2009). While on the cusp of their high school transition, middle school girls can provide a rich narrative of their history of academic performance and feedback. Many researchers have documented a decline in academic motivation during school transitions and have considered the changing developmental needs and the school environment as major factors (Eccles, 2004; Usher, 2009; Baskin, Wampold, Quintana, & Enright, 2010). Narratives provided by African American girls provides new insights about these perceptions of STEM related subjects and careers and highlight a time period that may be ripe for intervention.

The purpose of this study was to use qualitative methods to investigate what factors might be related to students' academic self-concept in STEM related subjects, specifically math and science. Of particular interest was students' belongingness, as related to teachers, family, and peers. This study asked the question, do students who view themselves as capable tend to have stronger interpersonal connections and feelings of belongingness, which in turn serve as supports against barriers such as sexism, racism, and other systemic prejudices? Thus, the aim identified how participants discussed belongingness within the context of STEM classes and how it affected their academic

self-concept and career aspiration. Additional barriers were also taken into consideration, more, to any other factors or sources that may have surfaced during the interviews.

In Baumeister and Leary's (1995) seminal article on belongingness, they proposed the "belongingness hypothesis" which posits, "human beings have a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships" (p. 497). A lack of belongingness leads to feelings of social isolation, alienation, and loneliness while a sense of belonging can be seen as a precursor to social connectedness. Baumeister and Leary (1995) argue that the need for belongingness is more than the need for social contact; rather it is the need for positive and pleasant social contacts within the context of desired relationships with people other than strangers. As a result, the need for belongingness is satisfied by an interpersonal bond marked by "stability, affective concern, and continuation into the foreseeable future" (p. 500). Although math and science interest has been researched extensively, there is a lack of literature that fully examines teachers', families' and peer relationships' impact on belongingness and career indecision (Slaten & Baskin, 2013). While factors, such as demographic characteristics, stereotypes, prior experiences, and perceptions of others' beliefs and behaviors affect achievement, belongingness may also influence performance, effort, and persistence. These variables are influenced by individuals' perceptions of their own previous experiences and a variety of socialization influences (Eccles, 2004).

Similarly, Blustein (2006) believed that people require a strong innate need for social connection, healthy attachments, and secure interpersonal relationships, which

framed his psychology-of-working perspective and underscores the significance of relationships and working. Similarly to belongingness, Blustein (2006) hypothesized that work provides a venue for connecting to others in one's social and cultural environment. If the relationships forged through work are supportive and nurturing, they can be instrumental in helping individuals successfully negotiate some of the challenges of working (learning new tasks or skills, dealing with work-related stresses, finding work, etc.). Additionally, for many, working can be a critical component in the construction and expression of identity (Blustein, 1994; Schein, 1990).

Fouad and Byars-Winston (2006) found that perceptions of career opportunities and barriers did differ across racial/ethnic groups, with racial/ethnic minority group members having lower expectations than their aspirations. Further evidence has supported the effectiveness of educational and psychosocial interventions that include strengths and promotes the enhancement of competence in schoolchildren. Nevertheless, participants in low-income, culturally diverse urban schools who are academically underachieving may be the least likely, but most in need, to experience feedback about their strengths and potential competence for academic and career development (Jackson, Peroilini, Fietzer, Altschuler, Woerner & Hashimoto, 2011).

Correll (2001) focused on high school participants' perceptions of their mathematical competence and how these perceptions influenced decisions to persist on the path leading to careers in the quantitative professions. The results of this study demonstrate that widely shared cultural beliefs attached to various tasks affect not only how individuals are channeled into particular activities and subsequent career trajectories

by others, but also how individuals "self-select" into occupationally relevant activities. The results of this study showed that males assess their own mathematical competence higher than their otherwise equal female counterparts. Males were more likely than females with the same math grades and test scores to perceive that they are mathematically competent.

Fouad, Hackett, Smith, Kantamneni, Fitzpatrick, Haag, & Spencer (2010) created three studies that looked at STEM-related supports and barriers using Social Cognitive Career Theory (SCCT). Their study considered the drop in the participation of women in STEM-related activities from elementary school. It was noted that during elementary school girls and boys have similar levels of achievement, but towards 8th grade the attitudes towards math and science begin to differ. Boys had a tendency to believe more than girls that they liked or performed well in math and science (Fouad et al., 2010). These differences became even more pronounced by the 12th grade. The study cited the National Science Foundation (2006) and reported only 20% of the degrees earned in undergraduate engineering were by women and only constituted 11% of the workforce in the United States (Fouad et al., 2010).

Interestingly, results showed that friends were a significant barrier for both males and females at the middle school level. Additionally, a lack of inspiration by teachers and deficient advice from teachers were seen as a barrier by middle school and college females. Finally, test anxiety as a barrier in science was cited by the most high school females (Fouad et al., 2010). One unanticipated finding was that in the total number of barriers and supports, significant differences by gender were not apparent. This is

6

contrary to the literature on STEM careers and women, but may also be the result of a participant's lack of awareness of the existence of certain barriers and how that may affect choice (Fouad et al., 2010). Overall, the results of the study indicated differences in perceptions of barriers and supports in pursuing math and science based on gender and developmental differences.

Effective support career support is important for young people's career development (Lent et al., 2000), especially support in the immediate contexts of family and school. Perceived support from families, schools, and peers is instrumental in its effect on career-related outcomes for middle school participants (Turner et al., 2004). Parents are a particularly important source of support for participant development of math and science self-efficacy, levels of engagement, and career options (Turner et al., 2004).

The purpose of conducting the following literature review is to provide a deeper understanding of contextual expectations in the narrowing or broadening of STEM related interest in middle school African American girls. When these three topics are investigated individually, there is a fair amount of literature available. However, when the convergence of these concepts are analyzed, the amount of literature is sparse. Overall, research involving adolescents can be hard to attain and middle school girls provides a unique and multidimensional experience that at times goes unrecognized in order to focus attentions more toward high school participants and college readiness. Additionally, the use of qualitative research methods allows for the ability to provide these young women with a safe and empowering atmosphere to discuss difficult topics such as academics, gender, race, family and the future. Qualitative research methods and,

narratives are gathered through hearing stories and perceptions. They provide firsthand

accounts that consider goals, experiences, social and relational influences and how they

impact their perceptions of STEM related coursework in school.

Chapter II

Literature Review

As indicated in Chapter I, this study examines the hypothesis that African

American middle school girls' feelings of belongingness strongly influence the narrowing

or broadening of their interest in STEM subjects. This chapter provides a review of the

literature that is relevant to this study. First, literature describing African American

middle school girls is examined. The second section of this chapter reviews relevant

theories, treatment approaches and how they have informed an understanding of the

population of concern. The third section of the chapter reviews and critiques research

examining how these relevant theories and treatment approaches have been applied to

STEM studies.

Defining the population and development

Early adolescence is widely characterized as a challenging time for youth (Ryan

& Makara, 2013; Baskin et al., 2010). Middle school involves great changes and new

demands; social networks may become disrupted, as they must learn to navigate the

varied styles and demands of multiple teachers. Additionally, according to a report from

the National Women's Law Center and the NAACP Legal Defense and Educational

Fund, the pervasive racial and gender biases in education often prevent participants from

succeeding (DOE, 2014).

Adults, particularly parents and teachers, appear to have a strong impact on

occupational development (Blustein, 2006). Palladino, Schultheiss, Palma, and Manzi

(2005) found that elementary school children are able to describe how important figures

in their lives have had a significant influence on their understanding of work. They indicated that their families have shaped their understanding of the functions and meanings of work through the communication of the importance of hard work and earning an income. The type of relationships adolescents have with others also plays a role in career vocational development. In a study conducted on French high school students, those who showed more secure attachment to parents explored educational and vocational environments more (Vignoli, Croity-Belz, Chapeland, de Fillipis, & Garcia, 2005). Similarly, adolescents who report higher levels of attachment to peers are more likely to engage in environmental exploration and to commit to career choices, suggesting that supportive, intimate friendships and teacher relationships facilitate the career development tasks of late adolescence (Felsman & Blustein, 1999).

The identity and developmental formation of the African American adolescent female is multidimensional and complex. Stevens (1997) discussed a core developmental task in early adolescence (12-14) for this population as synthesizing coherent meaning systems from three experiences of socialization: (1) mainstream society (Euro-American worldview); (2) a devalued societal status (affected by the status convergence of gender and race); and (3) cultural reference group. At the onset of adolescence, there is an inner desire for coherence and synthesis, augmented by formal operational thought (Palombo, 1988). As a result, although this age group may not always accurately articulate the steps required to follow a career, they are already synthesizing what they believe is attainable to them (Felsman & Blustein, 1999).

Stevens (1997) suggests that the development of healthy social identities for the

African American female adolescent must be anchored in those experiences that provide worth and value as an African American female. At the same time, however, the African American female adolescent must develop bicultural competence and awareness of both opportunities and barriers that may exist on many different levels. The psychological stress of both racial victimization and gender devaluation is more keenly experienced in adolescence than in earlier developmental periods and can be destructive to future pursuits and ambitions (Blustein, 2006). When destructive behaviors are used to manage identity problems in oppressive environments, however, a survival existence is maintained, not a liberated one (Stevens, 1997)

The construct of identity is useful in several ways to account for the importance of individual agency as well as societal constructs that constrain individual possibilities. Fordham (1997) describes a culturally distinct route to womanhood among African American woman. In contrast to many middle-class White communities, in African American communities, women are not vocally silent. For instance, when African American girls enter school their White teachers often perceive them as loud or disruptive. As a result, one process in school becomes about "unlearning" in order to adapt to mainstream rules. Appraisals of middle schools as problematic environments for most aspects of a girl's identity development is well noted (DOE, 2014). But current research suggests even more pervasive issues for middle school African American girls as academic adjustment declines (Fordham, 1997).

Although there is significant research on American children and education, the lack of data broken down by race and gender has fueled the assumption that girls are

doing well in school (DOE, 2014). Although, girls graduate at higher rates than boys, girls of color are graduating at far lower rates than White girls and boys. Additionally, the overall high school graduation rate for African American girls is below the national average for girls overall. Through case studies, Brickhouse, Lowery and Schultz (2000) analyzed a variety of middle school girls and how they engage in science. Their analysis of different identities highlighted the need for further research that considers differences among girls rather than in continual comparison with boys. It was found that the overall developmental trajectory of middle school girls indicated that GPA and intrinsic value of schoolwork declines during the transition to middle school.

Belongingness

Previous research has indicated that belongingness is also associated with an individual's academic motivation and their level of psychological distress (Baskin, Wampold, Quintana, & Enright, 2010; Goodenow, 1993). Baskin and colleagues (2010) found that peer belonging serves as a protective factor and moderates the influence of peer acceptance on depressive symptoms and loneliness. Regarding academic motivation and achievement, Goodenow (1993) found that a subjective sense of belonging to school has important influences on academic motivation, engagement and participation especially among participants from groups at risk of dropout.

Maslow (1968) indicated that most emotional issues stem from a need for belongingness, love, and respect. Building upon this, Goodenow (1993a) believed that middle school settings do not accurately accommodate students' needs for belonging and support, which in turn results in a decrease in student academic motivation. Previous

studies suggest that students who experience belonging in educational environments are more motivated, more engaged, and more devoted to school (Osterman, 2000). This basic need for belongingness especially in school settings becomes more paramount during early adolescence, when students developmentally start seeking out peers and adults such as teachers for guidance, rather than solely relying on family members.

Roeser and colleagues (1996) analyzed a self-report of two hundred and ninety-six eighth-grade students that revealed that a perceived sense of school belonging was the most powerful predictor of perceived academic self-efficacy. This sense of school belonging showed a small but significant positive relation to academic outcomes, and students who conveyed a high sense of belonging in the school environment reported less self-consciousness in school tasks than those who reported less belonging in school.

Current research suggests that belongingness is a complicated social construct that contains multiple relationships in various domains (Baskin & Slaten, 2013, Baskin et al., 2010; Baumeister & Leary, 1996). Baskin and colleagues (2010) examined belongingness as a strengths-based protective factor and posited that it is possibly an important factor in considering the interrelationship between social and mental health constructs. Researchers comment on the limited empirical research that has been done in this area, especially within a multicultural context. Data were collected from subjects concerning peer acceptance and about themselves for other variables. Ratings of peers and self-reported survey data were analyzed from 294 eighth-grade students from a culturally and ethnically diverse school. Researchers found that the interaction of peer acceptance with belongingness was significant concerning loneliness, and revealed

belongingness as a moderator for this outcome. Researchers found that students with high belongingness levels showed essentially no impact from peer acceptance levels. This suggests that high levels of belongingness can serve as a barrier against the negative effects of low peer acceptance. As a result, belongingness appears to be a protective and an important factor in promoting resilience. However, because effect sizes were small, recommendations must be made tentatively for interventions.

Additionally, students with high belongingness displayed less vulnerability to depression in response to high levels of loneliness than did students with low levels of belongingness. This significant relationship also shows belongingness as a potential protective factor that can promote resilience. The results of this study provides firm support for further research concerning belongingness in school settings. However; it needs further replication in its implementation to fully understand the validity of its psychometric properties.

As it has not been addressed elsewhere in the vocational literature, Slaten and Baskin (2013) examined belongingness in the career decision-making process of college participants. Researchers hypothesized that high levels of belongingness with family and peers would be indirectly associated with career decision-making and mediated by academic motivation and psychological distress.

Slaten and Baskin (2013) sampled 436 undergraduates and measured levels of belongingness, psychological distress, academic motivation, and career decision-making difficulties. They found the current hypothesized model was a good fit on all three indices (X^2 =.882, p = .63, RMSEA =.00, CFI =1.00). Another criterion for a model fit is the

amount of variance that it explains in the endogenous variables (Weston & Gore, 2006; as cited in Slaten & Baskin, 2013). In the current study, the model explained 18.8% of the variances in career decision-making difficulties. Additionally, family and peer belongingness combined account for 13.4% of the variance in psychological distress. Through path analysis, they found that the relationships between peer belongingness and academic motivation (.01) as well as psychological distress (.04) were insignificant. However, psychological distress had a strong positive path coefficient (.43) with career decision -making difficulties. Family belongingness also had a significant positive relationship with academic motivation (.12) and negative relationship with psychological distress (.37). Overall, Slaten and Baskin (2013) found results, which supported the hypothesized path model, suggesting that there is an indirect association between family belonging and career decision-making difficulties. However, interestingly, they found no association between peer belonging and career decision-making difficulties, which actually counteracts current literature (Baskin et al., 2010).

Furthermore, Goodenow (1992) ascertained that belongingness strongly influences academic motivation, engagement, and performance of economically disadvantaged families; however this research tends to be scarce. In related studies Goodenow (1993b) studied the relationship between middle schoolers' feelings of belongingness and their expectations, value systems, motivation for school, effort, and achievement. The Psychological Sense of School Membership (PSSM) Scale was developed for this study and Goodenow (1993b) explored the relationship between sense of school membership, expectancy around success, value, and effort. 1,366 middle school

students (fifth through eighth grade) from one suburban school and two urban junior high schools were sampled and results revealed that sense of school membership was significantly associated with expectations around success and values. Conversely, thesewere not statistically significantly associated to academic effort or behavior. Goodenow concluded that motivation may act as a mediator between the relationship, sense of school membership, and academic effort and achievement.

Goodenow (1993a) also researched the relationship between adolescents' sense of belonging, academic motivation effort, and achievement. Goodenow developed a questionnaire measuring domain specific motivations such as expectancy of success and educational value, personal support and belongingness around math, social studies, English and science. Teachers were also asked to rate students' possible final grade and their academic effort. Classroom belongingness surfaced as the most powerful and noteworthy predictor of students' educational values and expectations surrounding success. Perceptions of teachers, support, and respect also emerged as powerful factors associated with a student's effort and achievement.

Nichols (2006) researched belongingness at a high school serving 150 students in a large metropolitan city in the southwest. Students were mostly Hispanic (98%), and all were eligible for free or reduced-price lunch. Nichols utilized qualitative and quantitative data and collected interviews with 45 sixth- ($n =28$), seventh- ($n=10$), and eighth- ($n= 7$) grade students. Nichols utilized Goodenow's "Psychological Sense of School Membership Scale" to measure students' sense of belonging at the school. Interviews also included open-ended response opportunities for students to articulate their

16

belonging. Responses were then compared with 8 teachers' ratings of students in terms of

their social standing relative to other students. Students estimated the grades they

received on their most recent report card. Results suggested that teachers' ratings of

students' social hierarchy and students' feelings of belongingness were not related and

that students varied in the value they placed on student-student and student-teacher

relationships in their definitions of belongingness. There was no relation between

students' PSSM2 scores and the estimates of their grades. Teachers' ratings of how males

fit in with their peers were significantly related to males' grade estimates but not to

females'.

Although the interviews provided an opportunity for students to elaborate on their

beliefs, many students' comments were brief, making it difficult to interpret their

meaning and assess their complexity. As a result, much of the qualitative portion of this

study did not carry the impact first hypothesized. The researcher did not provide the

interview protocol to further consider what questions she was asking and why the

students struggled with responses.

Fouad, Smith, and Zao (2002) have suggested that a strength of using SSCT is

that it can be directly linked to interventions. Other studies have also shown that SCCT

is a useful framework for conceptualizing the influences of variables on math efficacy,

math outcome expectations, and math and science career interests of adolescents (Turner

et al., 2004; Usher, 2009). This methodology also reveals that SCCT have supported the

relationships among self-efficacy, outcome expectations, interests, and other variables in

samples composed of middle school students (Fouad & Smith, 1996). This study,

however, moves away from SCCT and is intended to support those findings by providing additional research suggesting that engagement, a sense of belonging, and mattering are critical to academic achievement (Goodenow, 1993a). Schools and counseling psychologists can partner with teachers to consider what can promote achievement and offer support so that the STEM workforce in America can potentially undergo significant change when African American middle school girls persist in STEM throughout their academic careers. Given the age group and context (i.e. school setting) of the sample this seems especially pertinent. The researcher will also return to the schools where the data was collected and share these results with administrators.

Research on belongingness supports the hypothesis that a sense of belonging mediates the relationship between contextual variables of a school setting such as teacher-to-student relationships, peer-to-peer relationships, academic motivation, and self-efficacy beliefs (Roeser et al., 1998). Studies have also suggested that positive associations around feelings of belonging and academic achievement encourage academic help-seeking behavior, and discontinue self-handicapping behaviors (Goodenow, 1993b). Furthermore, Osterman (2000) specifies that satisfaction around belongingness in settings such as schools is significantly associated with students' engagement and involvement in school related activities (academic and social). Additionally, it is suggested that psychological processes such as motivation, attitudes, self-esteem, self-concept, and self-efficacy are also affected.

Critical Consciousness

Freire's (1993) monumental work on critical consciousness was developed as a

pedagogical method to foster empowerment and change in inequitable social condition in Brazil via dialogue and analysis. It has been used and applied within United States settings to understand oppressed and marginalize youth development and how they develop a consciousness of inequality and act to produce community and social change (Ginwright & James, 2002, Diemer & Li, 2011). Similarly, critical educational perspectives examine how marginalized youth develop the critical literacy to ''read'' inequities in their schools and in social structures, engendering participation in social action (Diemer & Li, 2011).

Teachers' emphases on social injustice and an open classroom climate where students consider sociopolitical issues from multiple perspectives may engender students' agency to produce social change or consider avenues of academics or careers that may have not been otherwise considered (Diemer & Li, 2011). Teachers who help youth form their own opinions regarding sociopolitical issues and encourage democratic dialogue may facilitate marginalized youth's sociopolitical awareness and agency (Westheimer & Kahne, 2004). Parental and peer discussion of sociopolitical issues may help low-SES youth of color connect external issues of inequality to their lived experience and become motivated to participate in social action that transcends previously prescribed narratives (Westheimer & Kahne, 2004).

The Psychology of Working

In addition to belongingness; this study will consider Blustein's (2006) psychology of working framework. This framework was developed as a socially inclusive just perspective for career development theory, research, practice, and public policy. The

psychology of work perspective seeks to include everyone who works, not just those with access to choice and volition. This framework describes how working functions to fulfill three basic human needs: the need for survival and power, the need for connectedness, and the need for self-determination. A key assumption is that working intersects naturally with the diverse roles that people occupy in their social and economic lives. In addition, working is critical for psychological health and for the vigor and structure of communities (Blustein, 2006).

Access to the resources needed to construct a meaningful and satisfying working life is not equal. As such, the psychology of working seeks to delineate the impact of injustices and how it affects experiences. The psychology of working becomes an impactful element of this study. While mainstream career development theory and practice has focused on the needs of individuals who have access to education and work that match their goals, interests, and values, it has excluded those who do not. As a result, the systematic barriers are complex and multidimensional and can be considered even before a person begins working. Specifically, it clarifies how to enhance a student's interest and consideration of a STEM field as a meaningful career. By exploring the experiences of African American middle school girls in a low-income environment and how new inferences may be drawn that can inform subsequent research and program development that affirms the context of these students and their career aspirations.

STEM and Middle School Students

Rowan-Kenyon et al. (2010) explored the limited available information on early, pre-high school career interests. This study focused on the ways that math engagement,

in addition to perceived support from peers, teachers, or parents, might influence the development of STEM interests, particularly interest in mathematics, among middle school participants. Rowan-Kenyon et al. (2010) presented qualitative findings from the 1st year of a 3-year study designed to characterize STEM interests, goals, and behaviors among girls and boys in late childhood and early adolescence. They focused on mathematics as the critical foundation and early filter for later STEM-related educational and career options. More specifically, the research examined participant perceptions of support and barriers to the development of math interests and the perceived influence of math engagement. These perceptions included perceived supports and sense of engagement in school learning as well as teachers' and parents' STEM-related perceptions.

The results are based on data collected from sixty-seven, fifth-, seventh-, and ninth-grade participants during the 2007-2008 academic year. Results from the study support the hypothesis that development of early and marked perceptions of math and math learning. Furthermore, perceptions of positive parental and teacher support and opportunities to engage in math learning were related. If participants cannot maintain engagement in the tasks of the math classroom, either because of disruption or because of perceptions of a lack of teacher support, participants will, over time, come to view their math learning as unrelated to their future (Rowan-Kenyon et al., 2010).

Utilizing Bandura's (1986) social cognitive theory (SCT), Usher (2009) examined the heuristics participants use to form their mathematics self-efficacy. Usher (2009) conducted eight semi-structured interviews with middle school participants in a suburban

setting. Information was interpreted through the lens of four sources: mastery

experience, vicarious experience, social persuasions, and physiological or affective states.

Consistent with Bandura's (1997) social cognitive theory, results showed that participants

with high mathematics self-efficacy also reported having high levels of achievement in

mathematics, while those with low self-efficacy focused on poor performances and

struggles. Mastery experience emerged as a powerful source of self-efficacy: meaning

that participants who feel that they mastered the material had a stronger belief in their

personal efficacy. Results also showed that participants base their beliefs on personal

experiences. For example, parents' failures in mathematics could enhance or affect self-

efficacy beliefs as well. Teachers providing opportunities for successful skills attainment

also improved self-efficacy. Ultimately, the study provided an interesting qualitative

analysis of the multi-layered approach participants take when considering their own self-

efficacy.

Although the challenges confronted by talented urban youth, especially those in

under resourced communities, are historically embedded and persistent, highly successful

programs exist that can serve as models for discovering and developing diverse STEM

talent (Osterman, 2000). One such model, constructed by Miller, Ward, Sienkiewicz and

Antonucci (2011) considered the efficacy of an innovative, STEM education project for

middle-school youth participating in afterschool programs, targeting girls and participants

from underrepresented communities. Participating participants attended urban schools in

Eastern Massachusetts. The two main goals for the technology-based project are to

inspire the participants to consider STEM careers and increase the participant mastery of

fundamental STEM subject matter.

Miller et al. (2011) recruited 84 participants and 9 teachers from 5 schools. All participants were enrolled in grades 5 through 8, were between the ages of 10 and 14 and were from underserved, low SES backgrounds. The results showed that the pilot of this program had been effective in several ways, including amplifying participant interest in STEM content and providing quantitative data on the use of technology. They found that there is no significant difference between the genders in terms of interest in STEM and in STEM careers. Instead, it was the girls in the sample who embrace technology more extensively. Although data shows the majority of participants receiving higher degrees in STEM subjects are white and male, this study also found that STEM appeals far more to girls of color than to white girls or males of any race or ethnicity.

It is ascertainable that individuals are more likely to develop interest in an activity if they believe they are competent at it (self-efficacy) and believe that performing the activity will produce valued outcomes (Lent, Brown & Hackett, 1994, 2000). Likewise, a person is less likely to develop an interest in, and may even develop an aversion to, activities or tasks in which they have lower self-efficacy or expect undesirable outcomes. Grounded in SCCT's account of the relationship between task success and self-efficacy in that domain, Jackson et al (2011) produced an exploratory study that examined career-related success-learning experiences as a socially learned source of career self-efficacy.

The purpose of Jackson's study was to describe and explore the relationship between learning experiences with success in various life domains and the evolving career-related interests and self-efficacy beliefs of one group of academically

underachieving urban middle school participants (Jackson et al., 2011). They hypothesized whether this construct could be identified, described, and further understood from these participants' responses in interviews and inventory results. In the context of a strength-based preventative career exploration intervention, the study was conducted with eight Hispanic and Black youth in a low-income urban middle school who were identified as academically underachieving. Jackson's and colleagues' (2011) results suggested support for a positive association between vocational interests and success-learning experiences with personal performance accomplishments or sources of self-efficacy from direct learning experiences of success in performing a specific task. However, the finite sample size of just eight participants limited the study's results. .

Turner, Steward, and Lapan (2004) tested a causal model based on SCCT on math and science career interests among 6th grade adolescents. This study considered a sample of 318 students and found that career gender-typing, mother's and father's support for pursuing math and science career, and family structure were predictors of a student's math efficacy. Two instruments were used in this study: the Science scale of Revised Unisex American College Testing Interest Inventory (UNIACT) and an abbreviated version of the Fennema-Sherma Mathematics Attitude Scales (FSMA) which contained five of the nine original scales. Results showed that both mother's and father's support positively affected math self-efficacy and children of two-parent intact families. Counselor recommendations were also included to assist school personnel in working with students and parents to increase math and science interest. Although the sample size was large, the majority of students (76.6%) were white and only 20.5% were African

American.

As it applies to the middle school population, Fouad and Smith (1996) were able to garner a much more diverse sample, providing rich results with respect to several aspects of the model proposed by Lent et al. (1994). Participants were middle school students in a large Midwestern urban city from low socio-economic backgrounds. 380 students participated in the study with 55 (15%) identifying as Caucasian, 225 (59%) identifying as Hispanic American, 40 (11%) identifying as African American, 13 (3%) identifying as Asian American, 14 (3%) identifying as American Indian, and the remaining 33 marking "other" (Fouad & Smith, 1996).

The instrument measured self-efficacy, outcome expectancies, and intentions and was created by the first author and discussed in some detail in a different study (Fouad, Smith, & Enochs, 1995). This study found strong paths between self-efficacy and outcome expectations (.55) and between outcome expectations and intentions (.39). Self-efficacy also had a fairly large direct influence on interests (.29), thereby demarcating a large effect on intentions (.28). Through interests and outcome expectations, this study made it clear that self-efficacy is a significant factor in the development of middle schools students and their future intentions. This study also called for further research on factors that directly tests the influence of race and ethnicity as affecting self-efficacy, outcome expectancies, interests, and intentions (Fouad & Smith, 1996). Since then numerous studies have been conducted that consider various effects of career development on different races/ethnicities. However with the exception of the Fouad and colleagues studies, the majority of research has lacked significant sample sizes.

STEM and Underrepresented Populations

Women are less likely to enter STEM fields (Hill et al., 2010), a disparity that exists even when men and women are equally matched by ability and experience (Correll, 2001). Anticipation of success (Bandura, 1997; Eccles, 2004) may be a key variable in the foreclosure of certain subjects in as early as middle school for certain underrepresented populations. Cheryan and Plaut (2010) sought to explain what processes best highlight women's underrepresentation in U.S. based STEM fields and whether these factors also explained men's underrepresentation in the Humanities. Researchers utilized two survey studies across two U.S. West Coast universities (N = 62; N = 614) and addressed these questions in the context of two fields: one male-dominated (Computer Science) and the other female-dominated (English). They ascertained the academic fields, like all social groups contain specific prototypes that define and identify group members. This is so pervasive that a person's own perceived traits and attributes can be overridden. Since a Computer Science prototype is perceived as incongruent with the female gender role, they hypothesized that women will perceive less similarity between themselves and Computer Scientists, and vice-versa for men in the field English.

As researchers predicted, among a set of social predictors, which including perceived similarity to the people in the field, social identity threats, and expectations of success, the best mediator of women's lower interest in Computer Science and men's lower interest in English was perceived similarity. This research provides important insight into identity, social identity threats, and how changing students' social perceptions of how they relate to those in the field may help to diversify academic fields.

Similarly, Cheryan and colleagues (2011) tested the assumption that female role models improve women's beliefs that they can be successful in STEM. The researchers created two experiments that varied role models' genders. Interesting, role model gender had no effect on success beliefs. Instead, it was found that women who interacted with non-stereotypical role models believed they would be more successful in Computer Science than those who interacted with stereotypical role models. This supports the hypothesis that women's success beliefs are mediated by their perceived dissimilarity from stereotypical role models. As previous research indicated, social identity can convey to women that they can be successful in STEM fields. As a result, role model gender may be less important than the extent to which role models embody or defy current STEM stereotypes.

Bluestein and colleagues (2013) researched urban high school participants' reactions before and after a STEM enrichment program. The sample included 9 participants who participated in a semi-structured interview at the end of a two-week summer program and then again 12-18 months later. They conducted a qualitative study based on interview data collected at two points in the participants' lives. The interview protocol was constructed to include issues that have emerged as potentially viable factors in previous research on career development and STEM education and included factors that have been pointed to in the educational experiences of the population in theory and research including participants' "constructions of themselves and work, their experience of resources and barriers, and their views about STEM education, connections between school and future work, planfulness, and participants' identities" (Bluestein et al., 2013,

p. 41). Researchers utilized Consensual Qualitative Research (CQR; Hill et al., 2005) as the methodological framework in order to gain a broader and deeper understanding of the narratives of the participants. Researchers included the interview protocol, which forms a basis for this study.

A trend in results found that most students exhibited a strong sense of pride and comfort with their racial and ethnic identities, feeling that it would not inhibit their career interests. Participants also noted that support from teachers and family members provided them with the ability to handle racism and sexism. Relational resources also surfaced as an important theme in the results, especially from teachers and the curriculum offered at their schools. Participants noted that motivation and perseverance allowed them to stay driven. However this motivation could waiver due to concerns about financing college and aversive peer relationships. The findings of this study are rich and informative, yet again the major limitation is the small sample size of 9 students.

Additionally, the students participating already held an interest in STEM because they were recruited and involved in a summer program, thereby not making the sample generalizable to more urban students. Despite this, these results echo some of the concerns described earlier in this chapter concerning access to classes and resources; but also supports the data on feeling supported and having high levels of belonging in a school setting.

Fouad, Hackett, Smith, Kantamneni, Fitzpatrick, Haag, and Spencer (2010) created three studies that looked at STEM-related supports and barriers using SCCT. The study considered the drop in the participation of women in STEM-related activities from

elementary school. It was noted that during elementary school girls and boys have similar levels of achievement, but towards 8th grade the attitudes towards math science begin to differ. Boys had a tendency to believe more than girls that they liked or performed well in math and science (Fouad et al., 2010). These differences became even more pronounced by the 12th grade. The study cited the National Science Foundation (2006) as reported only 20% of the undergraduate degrees earned engineering were by women and only constituted 11% of the workforce in the United States (Fouad et al., 2010).

The research considered three studies that examined STEM-related supports and barriers. The first study recruited 113 females and utilized literature reviews and interviews at three educational levels (middle school, high school, and college) to identify barriers and supports at each level. Participants then developed a taxonomy based on the identified barriers and supports. From this taxonomy study, 2 constructed and tested an instrument that measured barriers and supports. This study used 93 undergraduate students to pilot the instrument and used subsequent feedback to refine the instrument for study 3. Study 3 administered the refined instrument to a larger sample across the educational levels mentioned in study 1. Through five different research questions the data was discussed and assessed.

Interestingly, results showed that friends were a significant barrier for both males and females at the middle school level. Lack of inspiration by teachers and inadequate advice from teachers were seen as a barrier by middle school and college females. Finally, test anxiety as a barrier in science was cited by the most high school females

(Fouad et al., 2010). One unanticipated finding was that in the total number of barriers and supports, significant differences by gender were not apparent. This is contrary to the literature of STEM careers and women but may also be the result of a student's lack of awareness of the existence of certain barriers and how that may affect choice (Fouad et al., 2010). Overall, the results of the study indicated differences in perceptions of barriers and supports in pursuing math and science based on gender and developmental differences.

Sandler, Sonnert, Hazari, and Tai (2011) implemented a cohort study to analyze how interest in STEM careers changes during high school to college. Researchers presented a sample 34 students in two- and four-year colleges, who were taking mandatory college English courses. Sandler and colleagues utilized a PRiSE survey, consisting of 50 items, which had many questions drawing from an earlier survey study. Validity of this survey was established through focus groups with STEM education experts, and an open-ended questionnaire response was gathered from 412 practitioners to support content validity. For continuous variables, the correlation coefficient between test and retest answers also served as measure of reliability.

Significant gender differences in career plans were found, with males showing far more interest particularly in engineering, whereas females were more attracted to careers in health and medicine during their high school years (Hill et al., 2010). The key factor predicting STEM career interest at the end of high school was interest at the start of high school; supporting the hypothesis that female interest in STEM should be considered as early as pre-high school. There was an additional effect of gender, indicating both a lower

retention of STEM career interest among females and a greater difficulty in attracting females to STEM fields during high school. These markers further establish the need for research in pre-high school females. During the high school years, the percentage of males interested in a STEM career remained stable (from 39.5 to 39.7), whereas for females it declined from 15.7 to 12.7. The students' initial specific (disciplinary) career interests were found to influence the stability of their interest in a STEM career, with those interested in physics careers at the start of high school having the highest retention in STEM.

Wang (2013) used SCCT and higher education literature to test a conceptual framework for understanding the entrance into STEM majors by recent high school graduates attending 4-year institutions. Wang contends that inadequate attention has been paid to factors relevant to interest in and entrance into STEM fields, which are arguably the first critical steps into the STEM pipeline. He claims the most attention goes to underrepresented populations who have already entered the STEM field. As a result, Wang asserts that it is pivotal to provide rigorous academic programs and support mechanisms that prepare students prior to college, especially directed towards members of traditionally underrepresented groups.

This research study utilized data from the Education Longitudinal Study of 2002, which studies the transition from high school into postsecondary education and then into the workplace. Wang (2013) utilized approximately 14,000 members of the 2004 senior cohort, with about 12,500 (89.3%) then responding to the second follow-up interview. Of the students utilized in the study, approximately 19.3% intended to major in STEM upon

entering college while 80.7% were interested in other fields of study; 15.4% (out of all 6,300 4-year enrollees) declared a major in a STEM field by 2006, compared to 84.6% who then chose different fields of study.

Five variables at the secondary school level were considered: (a) exposure to math and science courses, (b) 12th-grade math achievement, (c) 12th-grade math self-efficacy beliefs, measured on a 4-point Likert scale, (d) 10th-grade math achievement and (e) 10th-grade attitudes toward math, measured on a 4-point Likert scale. Wang also included analysis of context of supports and barriers including academic interaction, receipt of financial aid, and enrollment intensity. A confirmatory factor analysis (CFA) was performed to analyze the measurement model that clearly specified latent factors and corresponding indicator items. Results suggest that choosing a STEM major is directly influenced by intent to major in STEM, high school math achievement, and initial postsecondary experiences, such as academic interaction and financial aid receipt.

This study highlights the importance around how pre-college learning and motivation have significant influence on the student's intent to major in STEM-related majors. Further research, policy, and interventions around understanding perceptions, attitudes, and aspirations of underrepresented populations will benefit from a deeper comprehension of the effects of varied educational experiences (Wang, 2013).

Overall Critique

This review of the literature highlights the lack of convergence of research particular to African American middle schools girls, belongingness, careers and STEM subjects. Despite this, the summarized and critiqued studies offer a valuable asset to

enable further research in this area. The literature highlights the need for the growing participation of individuals from historically underrepresented groups in STEM fields in order to meet the national demand of the growing STEM workforce (Byars-Winston, 2013). The importance of race and gender in the statistics and the narratives underscore a component of STEM education and career development in a school setting that requires further attention. Research demonstrates the many students face powerful identity related constraints.

Conclusively, human beings are fundamentally and pervasively motivated by a need to belong, that is, by a strong desire to form and maintain enduring interpersonal attachments (Baumeister & Leary, 1995), which in turn can affect (both by broadening or narrowing) their interest and pursuit of certain subjects in a school setting. Finally, understanding the under-representation in certain academic domains requires a further analysis of the process precluding interest (Cheryan & Plaut, 2010). In-depth analysis of these concerns may provide an avenue for deeper understanding on the population and potential barriers.

The results reported in this chapter suggest critical next steps in future research. One important trajectory suggests further understanding about pre high-school beliefs, access, and concerns around pursuing STEM subjects and eventually pursuing a STEM career as well. Further training for counselors and teachers on higher levels of belongingness in school settings may contribute to a student's broadening of interest into STEM subjects would be beneficial. Additionally, more research is needed on enhancing contextual supports for students including psychoeducation on STEM for students,

teachers, and parents; assisting students with understanding various career options outside their own scope of knowledge; and recruiting and maintaining women of color in STEM fields.

Chapter III

Methodology

This chapter will present the methods used in this study. First the research

questions will be identified, followed by a description of the research paradigm. The next

section will describe recruitment of participants followed by a description of the research

team and their training. Additionally, data collection procedures, including participant

recruitment and the interview protocol will be described with specific protocol questions

available in Appendix A. Researcher biases and expectations are also addressed in this

chapter. Finally, the procedures for preparing and analyzing the data will be described,

followed by a chapter summary.

Research Question

Despite the wealth of quantitative research, there are a number of unanswered

considerations about the influence, exploration, and consideration of STEM careers

(Bluestein et al., 2013). Essentially, quantitative studies have not been able to reveal how

participants construct meaning about STEM education and career development. The

challenges of moving into STEM careers are even more daunting for students of color

and considerable research has documented that a science academic achievement gap

persists to the disadvantage of non-Asian ethnic minorities (DOE, 2014). The causes of

this achievement gap are multidimensional, including, but not limited to, inadequate

preparation due to poorly resourced schools, and lackluster STEM education (Bluestein et

al, 2013; DOE, 2014).

The purpose of this study was to use qualitative methods to investigate what factors might be related to students' academic self-concept in STEM related subjects, specifically math and science. Of particular interest was students' belongingness, as related to teachers, family, and peers. This study asked the question, do students who view themselves as capable tend to have stronger interpersonal connections and feelings of belongingness, which in turn serve as supports against barriers such as sexism, racism, and other systemic prejudices? Thus, the aim identified how participants discussed belongingness within the context of STEM classes and how it affected their academic self-concept and career aspiration. Additional barriers were also taken into consideration, more, to any other factors or sources that may have surfaced during the interviews.

Qualitative inquiry provided a phenomenological lens through which the development of beliefs and expectancies can be viewed and allowed researchers to examine the different conditions in which participants process and consider their experiences (Usher, 2009).

Paradigm

The study was grounded in a feminist paradigm and utilized consensual qualitative research (CQR) as a methodological format. CQR pairs well with feminist theory because it focuses on formulating conclusions through open conversation (Hill, Thompson, & Williams, 1997). The use of feminist theory paired with CQR will enable the researcher to gather information in a manner that empowers the participant by minimizing power imbalances and viewing the participants as the "experts" of their own experiences (Hill et al., 1997). Similar to feminist theory, CQR states that participants

should be treated with respect, their voices valued, and that equality in the relationship should be strived for (Hill et al., 1997). By exploring participants' experiences, inferences can be derived that inform subsequent research and program development that affirms the cultural context of African American middle school girls and their experiences.

Many feminists have been critical of traditional quantitative research where participants are transformed into 'object-like subjects' (Reinharz, 1992) and voices are silenced or severely constrained by the researcher. Therefore it is arguable that qualitative methods are more appropriate to reveal and understand experiences of marginalized voices in contemporary society. Characterized by non-hierarchal relations, the feminist paradigm is concerned with issues of broader social change and social justice and committed to changing the conditions of those who are marginalized by challenging dominant intellectual paradigms that justified oppression (Ackerly & True, 2008).

Consequently, it is important to address the inherent power dynamics within the interview process itself; including the asymmetrical power relationships within a school setting in addition to the differing identities of the researcher and the researched: including woman and young adult, white and black, etc. There is empowerment within the semi-structured in-depth interview, which is valued for its ability to give presence to voices and experience in a participant's own words. It has been and continues to be a valuable tool for placing a participant and their understandings of their experiences at the center of inquiry (Reinharz, 1992). As a result, the interview process considers and employs many of the same tenants that are present in a therapeutic relationship from a feminist orientation, centering on the belief that the participant is an expert on her own

life. Emphasis will also be placed on educating the participant about the interview process through a discussion about informed consent, confidentiality, power structures, and the researcher's role. Participants will be encouraged to consider the interviews as social action honoring their experiences (Brown, 2009).

Through reflexivity about the research process, feminist qualitative research challenges power and hierarchies (Ackerly & True, 2008). Emphasis is placed on the importance of being reflexive through interpretations of data, role in the process, and pre-conceived ideas and assumptions. CQR offers multiple opportunities to consider and push back on potential bias or use of power. The pilot interview will include in-depth analysis of interview protocol in order to consider bias, power, or leading questions. Furthermore, creation of domains and data analysis will consider raw data and will be continually reviewed for bias by all members of the research team. Researchers will be encouraged to reflect, push back, and locate themselves in social structures in order to understand themselves and others.

Research Design

By utilizing CQR, research team members were able to reach consensus about data classification, since CQR involves in-depth, individual, and cross-case analyses based on data collected through open-ended, semi-structured interviews (Hill et al., 2005). Three steps were followed for data analysis prescribed by CQR (Bluestein et al, 2013; Hill et al., 2005): (a) identifying and coding domains or the general themes derived from the interview transcripts; (b) constructing core ideas or the more specific aspects of a given domain; and (c) completing a cross-analysis, including the creation of categories

from the core ideas and assessing the frequency of domains and categories across all interviews once data were saturated. All interpretation followed these three steps of analysis and an auditor was also utilized, who reviewed each step of the process (Knox, Edwards, Hess & Hill, 2011).

Qualitative inquiry allowed the researcher to be fully immersed in an open, holistic approach to data collection and analysis, where the direction of the study was able to change as a deeper understanding of context was gained (Willis, 2007). The research process was conducted in a manner that sought to describe phenomena by asking broad questions that enabled conclusions to be drawn based on the collected information rather than predetermined hypotheses (Hill et al., 1997). The CQR process allowed for the discovered data to guide the course of the research. This open process lead to the formation and location of new "relationships, concepts, and ideas" and helped holistically describe each participant's experience (Hill et al., 1997). Furthermore, a qualitative design may help fill a gap in the literature by addressing the central questions of the current study: How do expectancies shape African American girls beliefs of about math and science? What influences affect these beliefs? Examining such questions from the participant's perspective is essential and will add important new understandings to the current literature.

Research Team and Training

All interviews were completed by the primary researcher. Identifying information was removed and each participant was given a code number to protect confidentiality. Two additional doctoral level graduate researchers examined and read the resulting

transcripts in order to ensure consistency. Three primary team members (all doctoral level graduate participants, one including the researcher) participated in the formation of domains and core ideas and completed the cross-analysis with one auditor (a doctoral level psychologist) who reviewed the primary teams work (Hill, Knox, Thompson, Williams, Hess, & Ladany, 2005; Bluestein et al., 2013). All team members had previous experience with CQR under supervision of a psychologist.

The following steps were taken to formulate the research design, as outlined by Hill and colleagues (2005): defining the sample, collecting data in an open-ended manner and formulating domains, coding the data into domains by analyzing 'words' not 'numbers' and then extracting the core ideas in each domain, forming categories, and subcategories where appropriate, calculating the number of cases that fit within each emerging category, and describing each finding across the specified domains by analyzing the whole experience not merely specified parts. This process provided the most accurate representation of the information gathered from the participant, as its application did not merely attempt to analyze and interpret numerous data sources (Hill et al., 1997).

Participants

Fourteen 8th grade females took part in this study ranging in ages from 13 to 15 (*M = 13.5, SD = .76).* Ten participants self-identified as African American, 3 self-identified as Native American and African American, and 1 participant self-identified as Black. Participation was voluntary and interviews were in person. In accordance with the Institutional Review Board at the University of Wisconsin-Milwaukee, consent was

obtained with parents/guardians and participants were fully briefed on the purpose and goals of the study prior to beginning the interview process. The 8th grade Math teacher assisted with distributing permission slips. All female participants were given permission slips and asked to return them by the end of the week. Of the 18 permission slips distributed, 14 were returned that granted permission. Of these 14, the sample size was produced. Interviews took place at a low-income middle school in a mid-size Midwestern city.

Interview Protocol and Data Collection

Participants were interviewed for approximately 45 minutes and were semi-structured and recorded. Field notes and follow-up questions were also used for clarification on any questions. Participants were initially asked demographic information including age, gender identification, grade level, and race/ethnicity, and what they wanted to be when they grew up. An interview protocol was developed utilizing published research from Bluestein et al. (2013) and Usher (2009), in addition to consultation with a professional psychologist and the dissertation committee. As reflected in the interview protocol provided in Appendix A, the questions considered post–high school goals, self-perceptions, reactions to and experiences in STEM courses, identification of connection between current interests/experiences and future goals, social support, social identities (gender, race, and ethnicity), perceptions of work, and future expectations. All researchers assisted in providing feedback on the protocol, which was modified based on a pilot interview.

The semi-structured nature of the interview session allowed for a space where

rapport could be built, questions could be asked, and the participant was able to freely discuss the questions being asked. An advantage to this format was that it provided time for trust-building and allowed for observation of nonverbal behaviors in the face-to-face interviews (Hill, Thompson, & Williams, 1997). In most cases, the participant set the pace and directed the flow of the interview (Hill, Thompson, & Williams, 1997). The open-ended nature of the interview process allowed for an open format where the participant and the researcher could interact freely and follow up questions were included based on the nature and the flow of the participants' responses.

Participation was entirely voluntary and in accordance with the Institutional Review Board at the University of Wisconsin-Milwaukee, consent was obtained from the participant's legal guardian upon admission, and participants were fully briefed on the purpose and goals of the study prior to commencement of the interviews. The selection criteria was females ages 12 to 14. Confidentiality was explained thoroughly, and was ensured by storing the data in accordance with HIPAA regulations and destroyed at the end of the study. Before beginning the interview, participants were given the option decline participation and informed that at any time in the interview they could choose to abort participation.

The majority of the female students met the specified criteria, which allowed for the random sample of fourteen participants to be feasibly gathered. Participants were selected based on their availability and willingness to participant. The sampling within the population was random, meaning the individuals selected were taken from a larger subset of identified potential participants (Hill et al., 1997).

Analysis of Data

The data was analyzed utilizing CQR and through a coding procedure that identified various types of comments and emerging themes referred to as "domains" (Hill, Thompson, & Williams, 1997). Team members independently reviewed each interview in order to identify emerging narratives that supported domains (Hill, Knox, Thompson et al., 2005). This study began with 19 domains and ultimately concluded with 11, which fell under three broader axes of "people and programs," "atmosphere," and "personal characteristics." This is consistent with the literature, which suggests modifying domains as necessary in order to avoid repetition and extraneous information (Hill et al., 2005).

The domains were organically formed and stabilized through continuous review of the raw data, rather than derived from literature or from the interview questions (Hill et al., 2005). This facilitated the researcher's ability to form domains utilizing the data rather than manipulating the data to fit prescribed domains. As outlined by Hill and colleagues (2007) consensus was utilized in the domain coding. Team members independently segmented the data into domains then came together and worked to reach consensus on several cases. Once the domain list and coding process had been completed, the remaining domain coding was completed by the primary researcher and another member to reduce repetition. The other team members and auditor continually reviewed data progress.

After domains were formed, each researcher independently extracted the crucial information, i.e., core ideas from each domain and the results were discussed (Hill et al.,

2005). Similar to the domain coding, the development of core ideas used a method where the primary researcher wrote the core ideas and the rest of the team reviewed them, in effect serving as internal auditors who edit and challenge the core ideas (Hill et al., 2005). Upon completion of the core ideas the researchers transitioned to discussing specific categories and utilizing illustrative core ideas in order to accurately portray each domain.

In the cross-analysis, a higher level of abstraction was performed in analyzing the data. As suggested by Hill and colleagues (1997), the cross-analysis was completed with the team generating the categories individually then bringing possible categories to the group for discussion. All primary team members agreed on the wording of the core ideas into the domains and frequency levels. Frequency levels were defined by: typical $= 9 - 14$ cases represented, variant $= 4 - 8$ cases represented, and rare $= 1 - 3$ cases represented. A results chart was created based on Blustein and colleagues' (2013) article, which utilized a domain/core idea approach.

Throughout each stage of the analysis process, (e.g., creating domains, constructing core ideas, and the cross-analysis) the auditor ensured that the data was fully represented, the necessary information was included, and wording was illustrative of the raw data (Hill, et al., 2005). The auditor offered an outside perspective that critically analyzed and confirmed that the domains represented the data, all pertinent data was obtained, the core concepts were succinct and reflective, and the categories and subcategories offered alternative ways to conceptualize data (Hill, et al., 2005). When new data emerged in this process, necessary modifications and corrections were made to accommodate appropriately. The auditor was consulted a second time to ensure a

consensus was achieved (Hill et al., 1997). Finally, the data was rechecked by the coders for inconsistencies and then processed further.

Generalizability and transferability provided information about the participants and the research process to enable the readers to judge if the results could feasibly transfer to another setting (Hill, 2012). This process entailed determining how often the categories and subcategories, determined by analysis of the core ideas, applied and did not apply to the entire sample (Hill et al., 1997). If the data applied to all of, or all but one of the cases, it was termed "general," if the data applied to half of the participants up to the cutoff of the general category it was termed "typical," and if the data applied to four cases up to the cutoff of the typical category it was termed "variant" (Hill, 2012).

This approach was well-matched with feminist theory as it relied on the team to agree through unrestricted methods (Hill et al., 1997). The interpretation of the data could not be fully generalized to this population demographic as a whole, which was acceptable and expected as the intent of the study was to convey the experiences and voices of the particular participants interviewed. However, it is still likely that this data adds a valuable perspective the quantitative literature available on students of color, STEM interest, and readiness factors.

Potential Biases

All researchers had prior experience with CQR. When considering biases and expectations before data collection, the primary team discussed a wide variety of topics including concerns about whether or not participants would know what STEM was, how results may differ in a traditional public school, that participants would not be confident

in math and science, and that girls would not feel supported in their math and science classes. These acknowledged biases were taken into consideration during the domain and coding process and continually reviewed throughout the data analysis.

Additionally, the primary researcher returned to the school and participants were presented with the data and asked to comment about how the findings apply to them personally. The procedure serves as a correction for a major criticism of open-ended questions (Hill et al., 1997). This kind of testimonial validity allows for opportunities of clarification and further consideration of ideas. Participants reported that their viewpoints had been conveyed accurately and did not have any follow-up concerns when presented with the results.

Most follow-up questions centered on the primary researcher's role, own career aspirations, and the school year's progress for the students with new teachers. Three participants mentioned that they reviewed STEM more extensively once the interview process had been completed. Finally, an important reminder to consider is that qualitative researchers do not begin with preconceived hypotheses, but rather they seek to discover them through data collection and analysis. The inquiry is guided by research questions that ask about relationships among or between constructs, but the researchers must remain open to discovering relationships, concepts, and ideas about the topic that were not considered before the data collection process (Heppner, Kivlingham & Wampold, 1992; Hill et al., 1997).

Credibility

In ensuring credibility, theoretical saturation was an important consideration (Hill,

2012). Theoretical saturation is a procedure that analyzed the data to the point that the

researchers became "empirically confident" that no new data was emerging (Hill, 2012).

This procedure has often been referred to as stability of findings. A major component of

this ability was connecting the individual results to the core concepts that emerged during

cross-analysis. This was accomplished by linking the individual results, signified by

participant quotes, to the emerging categories (Hill et al., 1997). This demonstrated that

the emerging concepts were a proper representation of the individual cases.

Ethical Considerations

Parents and/or guardians were sent a permission slip outlining the research project

and the researcher's contact information to answer any questions. Signed permission slips

were gathered and both written and verbal consent for participation in research was asked

of the participants. This ensured a thorough understanding of the project and the ability to

opt out if they wished. Participants were presented with an assent to participate form

before beginning the interview. This document was the foundation for a meaningful

exchange between the researcher and the participant. The participant's signature provided

documentation of agreement to engage in a study, but was only one part of the consent

process. The entire process ensured that the participant and her parent/guardian had

adequate information concerning the study. The assent provided adequate time before the

interview to respond to questions, ensure that the participant has comprehended the

information, and obtained the participant's voluntary agreement to participate.

Summary

This chapter offered an overview of the methods to be employed in this study,

including presenting the research hypothesis, identifying the study design, and presenting recruitment and interview protocols. In summary, CQR is a useful method for examining any question where the research is looking for rich descriptive results. This approach seems particularly valuable for projects supporting empowerment and voice to middle school African American girls as it allows them to examine and comment on context, events occurring over time, and their inner experiences. CQR is well equipped to investigate the complex issues found in expectancy-value theory and STEM interest, in order to gain a fuller and deeper understanding of the participants and their experiences.

Chapter IV

Results

In the following chapter, findings are presented selecting core ideas that reflect high frequency themes that are central to research and theory in STEM career development and interests, belongingness, gender and racial identity, and future ambitions. The study ultimately concluded with 10 domains, which fell under three broader axes of "people and programs," "atmosphere" and "personal characteristics," which are reflected in the three tables created in the cross analysis (see Appendix B). Each section will begin with a summary of the major trends in the interview data, followed by examples of a given student's responses, and pertinence to current research. Major themes resulting from the study are listed below in Table 1.

Table 1. Major Themes receiving "General" label.
• **Teachers support students academically by being encouraging, validating, and showing that they believe in students**
• **Teachers discuss college and encourage students to attend.**
• **Family is supportive (supports and encourages) of college discussion and careers**
• **Family Members not involved in STEM**
• **Community is not a source of support**
• **Participant endorsed positive sense of STEM abilities**
• **Participant finds tests more challenging [than homework] (because of pressure or nerves)**
• **Participant is interested in career in helping profession (e.g. medicine, education, social work)**

This table will be used to guide further discussion in this section. It is important to note that topics, which received the "typical" "variant" and "rare" label will also be discussed.

People and Programs

        Teacher Influence. It has been stated previously that a critical element to success within school is a student developing a close and nurturing relationship with at least one caring adult (Baumeister & Leary, 1995). Similarly, it is paramount that they feel there is someone within the school whom they know, to whom they can turn, and who will act as an advocate for them. Participants in this study consistently discussed what teacher qualities contributed to feelings of success and belongingness in a classroom. Participants positively endorsed teachers who were encouraging, validating, and showed that they believed in their students (10 – Typical).

Most students chose to discuss relationships instead of teacher skills, suggesting that they placed more value on personality traits such as warmth, perceived sense of caring and encouragement; rather than skill based skills such as perceived ability to teach or knowledge of the subject area. This criterion was articulated in a number of different ways. One participant stated, "I think if I mess up or something, they would be like don't doubt yourself and just tell you to keep trying so you can do it." Another participant echoed this thought by stating, "the encouragement that we get from the teachers is that we call each other a team and family. It shows that we can work together like we are a family and work as if we were a team."

An additional core idea that developed in this domain was labeled *Teachers*

provide academic support [by being patient and explaining difficult concepts] in addition

to having warm and funny personalities (11 – Typical). Participants discussed and

considered what teacher qualities had lasting impacts such as setting goals (5 – variant)

and patience (10 – Typical). One participant remarked, "[the teachers] give us

time. They don't rush us and they take time. They don't move ahead unless you get

what they are trying to teach you." Another participant elaborated further by stating: "If

we don't understand something, like make it easier to understand the question and stuff

like that. They want us to ask them questions as possible about if we don't get

something. They make me understand things." Similarly, negative qualities tended to

focus more on relational feelings instead of personal abilities or specific teaching skills.

One participant stated, "every once in a while I do feel like I have been ignored like if my

hand is up and she won't call on me ever, like it will be awhile until she will get to me."

Despite little discussion of STEM in classrooms (3 – Rare), participants believed

that teachers who discussed college also made them more motivated to think about

attending college (13 – General). One student said, "when I started coming to this school,

they were talking about college and stuff and college classrooms and it made me think

about going to college. Before that I wasn't really thinking about college." This was

echoed frequently by different participants who had not previously considered college. It

is important to note that the school used in this study chooses to specifically emphasize

college in their day-to-day curriculum. As one student explained, "I really like the

school. Each classroom has a college and last year our college was UW Madison." As a

result, college is a daily discussion in these classrooms, which may not be the norm in

more traditional schools.

Participants credited their teacher's ability to provide them with opportunities for successive attainments as essential to improving their math and science competency. Participants articulated that teachers who provided both the skill transmission and the social validation (11 – Typical) were instrumental in building their own sense of competence during eighth grade. Teachers were consistently named as a student's greatest source of motivation for doing well in class. Although quantitative and qualitative findings agree on this point, the perspective gained suggests universal ways in which a teacher's pedagogical approach can nurture a young woman's mastery of a subject. It also suggests that teachers play an important role in the development of a sense of belonging and can create a more active engagement and an internal experience of a strong psychological connection to a group.

Peer Influence. Participants typically felt supported emotionally and academically by their peers (10 – Typical), but felt they would be met with mixed feelings on the rare occasion they chose to discuss a STEM career (2 – Rare), although they did sometimes discuss college and careers more generally (6 – Variant). One participant succinctly articulated this analysis by stating, "I would probably be upset because they don't want me to do like I would like to do." Ultimately, they believed that their friends would be supportive of their choice otherwise they would place less emphasis on an unsupportive relationship. Most participants believed that their peers were intelligent and also emotionally available for them, once again placing emphasis on

relationships. Interestingly, the only participant to endorse a lack of STEM interest and overall low self-efficacy in her academics overall stated:

> Sometimes the students make you feel unwanted. In the cafeteria, only the eighth graders when they come down here they can sit anywhere on this side. The have to be at least eight rows back. So if they…whenever they are talking to their best friend and go outside in groups and make you feel like nobody wants to talk to me.

Participants endorsed a preference for close friends whose opinions held the most weight, generally participants felt that if a peer did not support them then they were "not a good friend," but agreed it would be difficult to go against the norm if challenged (10 – Typical). Participants adopted rules and behaviors that were characteristic of the people who, in their estimation, were most significant and influential. As stated "Yeah, it will be like harder [to be motivated in school] if like [friends] aren't really motivated. I would avoid that subject or something like that."

Similarly, participants learned how to react toward those peers who they viewed as having legitimacy. Those learned behaviors were encouraged by positive reinforcements received from their environment, which is reflected in the participants who generally viewed their peers as motivated and intelligent (6 – Variant). As one participant stated "My classmates in math and science, they are really smart. They come up with great ideas. Like for our science fair me and my partner, we came up with the idea about colored paper like to help with the dyslexia and reading comprehension."

Participants adopted behaviors that brought the greatest rewards, advantages or significant benefits and social success, that facilitate their integration into the group of friends, and make them experience feelings of effectiveness and competence.

Family/Parent Influence. Discussions about careers seemed to happen with most frequency at home and rare was not discussed (2 – Rare). Typically, participants endorsed parents or caregivers and generally were not college graduates (5 – Variant) nor involved in a STEM field (13 – General). Despite this, parents highly supported STEM careers and career decisions in general (14 – General). When asked how parents would react if a participant came home and wanted to pursue a career in STEM almost all participants endorsed family members as being highly supportive, "[My mom] would feel good about me [pursuing a STEM career] because she was always fascinated with science and stuff and then to tell her I want to become a scientist, she would like be very happy." Family (11 – Typical), in addition to teachers (9 – Typical), were typically named as a participant's greatest source of motivation for doing well academically, suggesting an important role and influence family members have on participants.

Furthermore, it was evident that social interactions among siblings were important for college and career decision-making. Older siblings' educational choices influenced younger siblings' choices, "I picked Wisconsin Lutheran College because I want to follow my sister's footsteps cause (sic) she is already married and has a job, owns a house, and was having a baby so I want to follow a good positive way." Although participants rarely endorsed STEM discussion at school or among peers, they felt that parents and family members discussed STEM subject matter with more frequency:

Because my sister always told me you are going to do something in

math. Sometimes in school math is so hard. When I get home I be

done with it. My sister says you are going to do something with

math. I love science, I love dissecting stuff. She is like then you are

going to be a scientist.

Siblings in general played an important role in discussion about college and career in

general, "The last time we talked I think she wants to be a doctor still. Her and my sister

want to be doctors." Siblings' positive influence and support of career choices in addition

to participants having a model to view it in action was a belief echoed throughout

interviews. As succinctly stated, "Yeah cause [sic] my sister is a great role model because

she has already done high school. She has been through it."

Prep Programs. Consistently, participants who knew and understood what

STEM was and what it stood for were involved in either an after school program or

summer camp that included a STEM component (Typical – 11). Research has already

shown the positive benefits of these programs such as better attitudes towards school,

lower dropout rates, more frequent completion of homework, as well as higher GPAs and

higher standardized test scores (Ward et al., 2012). Considering these programs' positive

influence participants further highlighted the ability for educators to introduce students to

the possibilities of STEM careers through one of these programs. One participant stated,

"Like in the classes because like we have like three classes. When I was little it was like

STEM class, life skills, and book club. Most of the STEM classes everything they taught

us (sic) was based on some of the math that we learned. And I loved it."

This makes intervention at least by the early middle-school level imperative and possible. If more students, especially girls and students of color, can be inspired to persist in the pursuit of a STEM career as they move through middle school, the nation's STEM workforce will grow and become more diverse. As discussed in the literature review the gender and race gap lies not in capability, but rather in social constructs. What students expect to do later in life and possibly how they perceive their adult responsibilities will affect their careers. As a result, these prep programs can help girls to re-imagine their abilities to include STEM.

Atmosphere

School Atmosphere. As participants described daily life in their math classroom, many explained that they were relatively new to this school and found it different from the school they previously attended.[2] Participants described their current school as better equipped to mediate student behavior and distracting peers whose actions drew attention away from academics (6 – Variant). As one participant explained, "We don't have drama like that here. They tell you not to start this and start that. No drama here." According to participants, disruptive behavior by peers was an important negative factor in the development of math interest. Success in previous school settings and current academic success was attributed to a controlled classroom and a school atmosphere dedicated to

---

[2] The school where interviews were held is also called a voucher school. School vouchers use state funds for students to attend private school rather than public school. These schools must meet minimum standards established by legislatures in order to accept voucher recipients. This specific school has set parameters for student eligibility that target low-income families seeking parochial and college readiness curriculum. Limitations will be discussed in the next chapter.

learning.

This finding underscores the importance of activities that engage all students in the process of learning and of positive classroom management. Effective teachers convey clear behavioral expectations to students at the beginning of the school year that respond to emerging problems without disrupting lessons. Most participants agreed that poorly designed lessons and ineffective classroom management reduced the opportunities to fully engage in content, to develop positive academic self-efficacy, and to have positive goals (8 – Variant):

> This by far be the best school I have gone to just because with the
>
> other schools I didn't care as much. There was nobody telling me you
>
> need to have this done, you can do this, you know expectations. There
>
> was really like no policies. There was really nothing. My grades were
>
> much lower just because no one pushed me and everybody was just
>
> out of control.

However, there also existed a certain dichotomy where participants could acknowledge the increased rules were beneficial for some students, but typically did not or should not apply to them (7 – Variant). Disruption in the classroom typically led to disengagement as participants commented on the difficulties they had in learning when their peers were disruptive, but typically their focus was on more serious offenses, "Sometimes it goes downhill because a lot of things happen in school like temper tantrums and hidden drugs and stuff. It is a good atmosphere other than that." Participants felt they did not need to

be held to such a strict standard for smaller infractions such as not raising your hand or having side conversations (Variant – 7). Overall they believed an atmosphere with less behavioral issues led them to understand that school could be a growth-oriented and challenging space.

Community/Neighborhood Support. Participants found that their community/neighborhood was not supportive of their efforts to achieve (13 – General). Despite this they endorsed that it did not affect their or family motivation for them to go to college and have a successful career, "There is a lot of stuff that has been going on like with the news and stuff . . . It makes me want to stay strong so I won't end up doing something like that or getting hurt. It pushes me to do better." In addition, the participants who lived in disadvantaged neighborhoods were particularly helped if their parents maintain frequent communication with them, supervised their activities, and provided extra learning opportunities:

> I don't want to get shot over something I didn't do or say. So I
> am just going to stay in the house unless my mom goes with me
> or signs me up for a camp or something. It is like I am just
> going to stay home. I won't go outside unless my sister has to
> go to the park and it is like close to our house. I will say 'okay,'
> but basically I just stay home and do my homework and eat.

Most participants experienced harassment in their neighborhood, "I be walking into stores, they calling me nigger, they would be chasing me down and stuff like that."

The two participants who endorsed positive support stated that neighbors encouraged them to go college and they had good relationships with those they lived with. Both participants noted that their neighborhoods were more racially diverse, "I don't live in a bad neighborhood. I live in a white neighborhood. All my neighbors are really nice and I think they would like to see me succeed." This unconscious bias warrants potential further study.

On a larger spectrum, participants found that the city as a whole did not expect them to achieve or find career success. Rarely, could a participant consider community as a source of motivation (1 – Rare). Rather, the majority of participants found that media and news coverage focused on murders, crime, and other negative components when discussing people of color or their communities. Some participants were able to articulate their own goals based on what Milwaukee expected of them and hoped for the opposite, "Not to be like the rest of the girls in [the city] who are getting pregnant and having babies and stuff. Just be different." One participant also noted, "I think [the city's expectations] are lower than it should be because as you look at statistics African American men most go to jail, most don't go to college, most die at a young age and very little go to college. I don't think that should be it."

For the most part participants believed that they would be able to overcome these types of barriers. One participant reported "I think it is like very dumb and that, like, if you want to really get out of [the city] or something or go somewhere in life, that you should actually work hard instead of using excuses." Media portrayals appeared to

influence their attitudes regarding the importance of moving forward and being successful in order to surpass low expectations.

Personal Characteristics

STEM Interest. Many of the participants reported efficacious beliefs about their academic work and indicated they were managing relatively demanding academic work. They held a range of reactions ranging from positive to neutral toward STEM interests (6 – Variant) believing that they would be open to it, but had not really given it much thought (6 – Variant). Almost all students endorsed math or science has their favorite subject (13 – General), "Math. The rules don't change. It is easier because if you learn it and remember it, it will never change." This sentiment was echoed by almost all the participants, who enjoyed the concrete and rule-focused elements of math as opposed to the more abstract components of their English Language Arts class.

Despite this, most participants had not heard of STEM (8 – Variant) while the few that did were those involved in summer or after school programs that specifically focused on or included STEM elements. Most students were unclear about the variety of STEM careers. One student mentioned "watching stuff get fixed on TV" when discussing technology and many mentioned being scientists but perceived that as "mixing chemicals and stuff." Despite the lack knowledge about concrete professions, many of the participants expressed interest in math and science, but were unsure of how that could translate into a career (8 – Variant) other than teaching or something that was attainable. One participant expressed she "used to think about becoming a full time scientist or something. I was like this is kind of hard and complicated." This suggests education is

needed for further clarification for students of what STEM is and how it can be translated

into a career field.

Race and Gender Identity. The narrative data, with respect to ethnicity and race,

revealed that participants acknowledged and understood the existence of racism and

sexism, but conceptualized it more in terms of overt prejudice, which they witnessed in

media and in their neighborhood. Gender inequality appeared to be more of a concern for

most participants who endorsed feelings of unfairness in sports and duties at home (9 –

Typical). Some participants also endorsed economic inequalities that existed between

men and women:

> I was looking at statistics for how much they get paid, they are
>
> very different. For every dollar a man makes, a woman makes
>
> about 77 cents. I think that is unfair if we do the same thing. Why
>
> should they get paid more?

For the most part, participants did not believe that racism (10 – Typical) and sexism (5 –

Variant) would impact their educational lives or career planning. Most participants

believed that the potential for racism or sexism to inhibit their goals did exist, but

generally endorsed a belief that it could be overcome with enough determination and

focus, "I do feel that there is a minority of the people who are still racist and will still

look at you different. But you can't change everyone. I don't think that there is a big

thing about it but it is still there." Additionally, most participants maintained a hopeful

mindset that they believed fueled forward progress and momentum; thereby erasing any

inequalities that currently existed: "Today if I were a grown woman, yes. But as a girl of

my age time is changing. Back in the day a woman couldn't do anything. As we go further we have more options."

Academic Self-Concept. Almost all participants highly endorsed their academic abilities in math and science (14 – General), believing that they were as intelligent if not more intelligent than their peers (12 – Typical). As stated, "To me I think I am one of the smartest people in the class because sometimes I get the highest scores on tests and stuff." Many participants felt these perceptions came from perceptions of what adults think and predict about their current performance (12 – Typical). Participants felt that their teachers, specifically their math teacher, knew them so well that she was able to create goals for the semester that were both achievable and challenging. This echoes teacher influence discussed earlier in this study, which emphasizes the teacher characteristics and influence that impacted participants in a positive manner.

Despite high levels of academic self-concept in the classroom environment, the majority of participants endorsed increased test anxiety (13 – General), which generated poor performance on intellectual and academic ability tests, "I get real nervous because in class I can ask for something but when I take my test I am hurting my goals." Participants frequently believed that they underperformed on difficult tests despite ability. Furthermore they failed to complete the tests due to perceptions connected with nerves and anxiety. Participants believed the tests they were taking could and would adversely affect their future goals for high school and college. Participants believed they were more successful in classroom settings due to the ability to ask clarifying questions from teachers, use notes, and work through problems with others around them. Participants

endorsed a positive classroom environment as something that was extremely important to their success in a subject, "In class we can ask Ms. S. for help and then I know what I am doing, on a test I think if I failed this, I will not pass the grade. That is just a little too much pressure."

Future Ambitions. Participants appeared to be optimistic, ambitious, and hopeful for their futures when discussing career and college. All participants endorsed a desire to attend college and the majority wished to pursue a career in either a helping profession (e.g. social work, teaching, nursing) or law (14 – General). They believed that if they remained focused and disciplined, they will be able to achieve their goals (13 – General), "I want to go to college and be a specialist in my job career. I want to give my children what my mom could never give me." However, some did tend to express concern about losing discipline as a result of poor influences, financing college, or experiencing some unexpected disruptions (6 – Variant), "I hope most that I won't be like my dad and end up in jail and I want to have a good future like living a good life." Many expressed a desire to financially provide for their family members since students felt supported by them throughout their lives and during school (13 – General). All participants showed passion for striving toward a successful career and believed it was attainable. Participants acknowledged existing barriers, but believed that they had the abilities and the motivation to push pass them to attain success.

Chapter V

Discussion

The central goal of this study was to use qualitative methods to investigate how feelings of belongingness can positively impact interest and career development in STEM subjects. For middle school African American girls, their narratives reflected a sense of belonging, which resulted in more active engagement and a strong psychological connection to a group. Participants described the importance of relational resources particularly from family and teachers, a finding that is consistent with research and theory (e.g. Blustein, 2011).

People and Programs

Teacher Influence. Adolescents' need for belongingness suggests that participants were able to find and keep social support from a variety of sources (e.g. family, peer, teachers) and were key to strengthening resiliency and sense of belonging through these supportive relationships (Baskin et al., 2014). As previously reflected in the literature (e.g. Fouad et al., 2010; Rowan-Kenyon et al., 2012) teachers can function either as a top support or barrier. Lack of knowledge or advice from teachers and parents, specifically about STEM subjects impacted participants' abilities to conceptualize careers or going into the field. Test anxiety also negatively affected a participant's academic self-concept in math or science. Conversely, strong feelings of belongingness within the classroom and the perception that teachers wanted them to do well were viewed as a strong source of support for participants. This finding adds to Fouad and colleagues

(2010) who found that teacher perceptions were a strong factor for middle school and high school females, whereas the top support for college women was an interest in the subject, suggesting that subject interests can be cultivated and nurtured during these early years of school.

Parent/Family Influence. Similarly to the literature (e.g. Slaten & Baskin, 2013), family belongingness and perceptions of support on academic motivation strongly infused the narratives, and had an indirect impact on career decision-making. Participants found family members to be very supportive of college and career but unsure of more specific aspects, specifically regarding STEM careers. This conclusion is similar to the previous literature, which suggests that belonging or a relational connection can impact the academic life of students (Goodenow, 1993). Additionally, this study's findings suggests that parent education on college, careers, and specifically STEM careers should begin as early as middle school, especially in schools or areas where many working adults do not attain college degrees since these conversations are already beginning at home.

Sibling influence provided an interesting and unexpected finding. Many participants consistently endorsed siblings as someone they could discuss careers and STEM subjects. Siblings who were already in college also seemed to provide a level of comfort and knowledge for participants who believed they had a model and someone to look to if any questions arose.

Peer Influence. Peer belongingness did not seem as impactful for participants as family and teacher support. Participants echoed a similar belief that a "bad" friend was

"no friend at all" and that they did not believe peers would be unsupportive of decisions to pursue certain careers. As a result, most felt they could easily stop being friends with someone if they were not a good influence. This finding was contrary to previous research that indicates peer relationships can have a significant impact on emotional distress (Goodenow, 1993a). Possible explanations for this variance includes underreporting or the student body and makeup of the school, which is discussed further in the limitations section. Despite this, these findings reflect a study by Slaten and Baskin (2013) who sampled college students, but found similar results. They hypothesized that previous studies have measured constructs such as peer influence and peer support, fundamentally different from peer belonging, which may have occurred in this study as well.

Prep Programs Influence. This study supports previous literature that located prep programs as a major influence. Ward and colleagues (2012) contend that the high percentage of high school graduates among afterschool STEM program participants clearly indicates that the benefits of STEM extend beyond just short-term interest. Students are also more motivated to pursue higher education and careers in STEM fields. Similarly in this study, positive STEM experiences from summer and afterschool programs led participants to consider STEM career paths that they were not aware of prior to the program. By engaging in STEM activities that seemed relevant and interesting, participants reported an increased level of motivation to explore STEM-related careers. Thus career development interventions would be beneficial to assist students with skills in exploring STEM careers.

Atmosphere

School Atmosphere. Previous research suggested that building in-school
community is a means of fostering academic success (Goodenow, 1993a; Goodenow,
1993b; Osterman 2000; Jackson et al., 2011). Students who experience their school as a
caring community consistently become more motivated, ambitious, and engaged in their
learning. Studies consistently reveal that students who experienced a sense of belonging
in educational environments are more motivated, more engaged in school and classroom
activities, and more dedicated to school (Osterman, 2000).

Many of the participants in this study who had attended previous schools found
their current school to be more structured and as a result more geared towards learning.
Participants echoed Jackson and colleagues (2011) findings that suggested classroom
management and a teacher's ability to control a classroom is imperative to their ability to
learn. Interestingly, the majority of participants echoed a sense of detachment from the
overall school community suggesting that although the rules were important they should
somehow be exempt from them. Participants even at times lamented about the rules being
"too strict." This theme should be explored further, but may suggest an acknowledgement
of the need for a safe setting to learn and prosper academically, but also how a "once size
fits all" approach to discipline and day to day school functioning can be interpreted by
students. Additionally, even discussion about school atmosphere tended to center around
favorite teachers and subjects. This highlights the importance of the participants' positive
connections with teachers and the teachers' care about them are what truly stimulate their

effort and engagement.

Community/Neighborhood Atmosphere. Participants generally did not believe that their communities were supportive of their ambitions and desire to succeed academically. Their remarks and insights resonate with researchers who believe that policymakers must also look at the broader picture of school reform and that it should extend to the students neighborhoods Policymakers and future researchers must consider how to increase the community's capacity to support its youth so that experiences outside school will enhance the teaching and learning that goes on inside school. Similarly, parents must be supported in their ability to provide safe options for their children to play and grow. Participants also found that media and the city itself to be unsupportive of their efforts creating an "othering" effect to people in their community. Participants stated that they believed they could get past the barriers that communities and the city had set in place and further research would be useful in helping this population succeed in those endeavors.

Personal Characteristics

STEM Interest. Research shows that girls start losing interest in math and science during middle school and typically become more interested in careers where they can help others (e.g., teaching, child care, working with animals) and "make the world a better place" (Jackson et al., 2011). This study delved deeper and found that although participants did show a high level of career interest in the helping professions, they also maintained a high level of interest in STEM. But when asked about career goals they focused more on doctors, vets and other social service agencies. As a result, even if

participants endorsed an interest in STEM it did not necessarily mean an interest in a STEM career. As interviews progressed, it became clear that many participants simply did not know what someone would do with a STEM career. Specifically the idea of being a "scientist" was enticing but left participants unsure of what that exactly entailed. As a result, more concrete careers were more appealing. This is further complicated with the belief held by most of the participants that their parents would not know what a STEM career was. African American girls are less likely to know someone in a STEM field than their White peers (Wang, 2013). Most participants in this study believed they could picture themselves as a math or science teacher but had difficulty conceptualizing a career in STEM beyond that. This suggests that more intentional teaching about careers in STEM is necessary in addition to having students and parents think about STEM at an earlier age.

Blustein and colleagues (2013) study reveals participants did not endorse actual exploration of careers in general, and STEM careers in a specific systematic way in their school, rather they showed interest based on information that they had heard through Television, classes or the Internet. The only students who endorsed a more specific knowledge of STEM careers in this study were those who had been involved in a prep program. The results of this study also show that participants assess their own mathematical competence higher than most of their peers including males.

Identity and Beliefs. Research has found that African American girls have just as much interest in STEM as White girls, but frequently have had less exposure to STEM, less adult support for pursuing STEM fields, lower academic achievement, and greater

awareness of gender barriers in STEM professions (Correll, 2001; Jackson et al., 2011).

However, their confidence and ability to overcome obstacles are high, pointing to the

strong role of individual characteristics in STEM interest and perceived ability in these

subjects. Consistent with results of this study, research has found African American girls

are confident in their abilities and consider themselves hard workers. Furthermore at the

middle school level, research has found that most girls (regardless of racial/ethnic

background) believe "whatever boys can do, girls can do," (African American—97%,

Hispanic—94%, Caucasian—94%) and "if I try really hard at something, I know I will

succeed" (African American— 93%, Hispanic—92%, Caucasian—92%) (Hill et al.,

2010).

Participants did not believe that racism would inhibit their career plans.

Consistent with belongingness, participants noted that support from notably family

members and teachers provided them with fortitude to manage racism. Students'

reactions to sexism were similar in that they acknowledged it as a social ill, but did not

view it as a major barrier in their educational lives and career planning. Participants

mostly acknowledged a negative view of media portrayals of African American, and felt

they mostly lived in unsupportive communities. Yet felt that this did not negatively affect

them, instead seeing it as motivation to work harder.

An unanticipated finding was that researchers initially hypothesized that gender

and race would be significant factors in levels of interest in STEM for African American

middle school girls. In contrast, results showed that girls would approach STEM subjects

and careers with the same tenacity that they approach other subjects and areas of their

life. The major obstacle had more to do with engagement and education of STEM fields and research. This counters past research and contradicts the stereotype that even girls who perform well academically are not interested in STEM because it is a "boy thing" (Correll, 2011). This research demonstrates that interest among girls is there, it just needs to be primed. This is also consistent with Fouad and colleagues' (2010) research that found in the total number of barriers and supports, significant differences by gender were not apparent. While this is contrary to the literature of STEM careers and women, it may also be the result of a participant's lack of awareness of the existence of certain barriers and how that may affect choice (Fouad et al., 2010).

Academic Self-Concept. These interviews provided an important platform for participants to tell their stories while being extremely informative, but also empowering and encouraging. The participants interviewed were genuine and appeared to take the process seriously. Participants also described their own personal attributes, motivations, and perseverance could help them to overcome barriers and stay the course in their education. However, they also acknowledged external factors that may affect college plans such as community influence, detrimental math and science classroom experiences, test anxiety, and some potentially aversive peer and community relationships. Participants gave voice to the experiences in school and academics, both positive and negative. Several of the participants described feeling as though they had "something to prove" while simultaneously acknowledging their life circumstances were what made them who they are today. It appeared that all the participants wanted to be "better," wanted things to change, but unfortunately it appeared that they felt many in their

community did not feel the same. This sense of feeling othered, highlights the importance of the teachers and families as support systems who believe participants will achieve and be successful.

Test anxiety appeared as a constant yet unexpected theme in the narratives. Participants displayed high levels of academic self-concept in their classwork and classrooms, but this significantly dissipated in a testing environment. Fouad and colleagues (2010) found test anxiety to be a significant barrier for high school females, but may now be more pronounced in younger ages due to high stakes testing for all grades. This anxiety may be the result of unconscious stereotype threat, lack of coping skills or confidence and warrants further research for teachers and students alike. Empowerment practices as outlined by Blustein (2006) would assist in building test related skills and confidence. Blustein (2006) defined empowerment as "the development of goal-directed behaviors that also lead to mastery within relevant domains" (p. 278). By doing this, teachers could build confidence and skills within student before high stakes testing begins.

Future Ambitions. Participants suggested a desire to attend college, have successful careers and families, and to provide support for their families of origins. Participants were able to state these broad goals with confidence and self-assurance, but often struggled to know the smaller steps of achieving them (e.g. selecting a major, class requirements, and graduate degrees). This suggests a need to further educate students and their parents on what the steps entail. The current study adds to the modest amount of literature that considers significant implications for urban middle school students who for

too long have been ignored by researchers and policy makers. The statistics are alarming, for example, "fewer than 20% of the eighth graders in the U.S. are on target to do college-level work by the time they graduate from high school and those who drop-out of high school are likely to lack sufficient financial means to support a family, be unemployed for long periods of time, and have few opportunities for occupational advancement (Blustein, 2006)."

Promoting career progress among middle school students especially those in underrepresented fields would serve as a positive means to helping increase students' academic motivational beliefs and school engagement. Such positive changes can and should remain a social justice initiative for educators, policy makers, and psychologists who seek to prevent school dropout, promote school involvement, and future possibilities for urban youth.

Contrasts

As data collection and analysis progressed it became apparent that a number of contrasts these kind of results suggest that schools and specifically teachers have an enormous influence over career decision making in this population. Contrasts such as teachers frequently speaking about college, but not about STEM. Additionally, math is a favorite subject, but does not appear to be part of the future career. These contrasts in themselves reflect developmental appropriateness in the participants thought processes (Blusten et al., 2001). Participants are exploring and considering careers that may be of interest to them while still unsure of the specific steps or paths that are required to reach that goal. As mentioned in the literature review, African American girls are in the unique

position of developing differing identities that will shape and affect their future career goals (Stevens, 1996). As result, it should be considered that schools implement STEM and other careers into areas such as their guidance curriculum, which allows for further exploration.

Restricted and foreclosed STEM opportunities for certain individuals result in underrepresentation and an inequity due to systematic barriers and obstacles (Byars-Winston, 2013), however, it became apparent that this population had not really developed an expansive knowledge of how these barriers affected them directly. This resulted in a "I can do anything" type of attitude that allowed them to believe that any career was attainable. Despite, their general knowledge of systematic racism the belief was that it would not affect them directly if they worked hard. Personal experiences that affect or change this belief system would be interesting to investigate further and implications for identity development.

Limitations

The self-selection of the sample and the nature of the school does affect findings, suggesting that this study is examining a relatively unique cohort of students who are embedded in a relatively supportive context. As a result, limitations include the finite diversity in student participants (use of one school, with the same female teacher). Further research may be of interest in classrooms with male teachers or classrooms with a wider variety of student ability or interest. Specifically, these interviews were conducted at a school that results in considerable paperwork on the part of a parent or a guardian in order to enroll. One can speculate that in a more traditional public school where parent

and teacher involvement may or may not be as involved could change results, as participants in this study all appeared to have engaged and supportive parents. Additionally, in order to participate parents or guardians were required to fill out and return an additional permission slip. Consequently, selection bias may have affected the sample.

Finally, the authors and coders of this study may have introduced biases into the process of deriving meaning from the narratives. The use of CQR assisted in reducing the impact of these biases, but it is still a possibility. The researcher protected against this by consulting with the research team throughout the interview process. Further, to help control for the potential limitations of allowing favorable impressions and preconceived notions to overshadow the actual data during analysis, the research consulted closely with the research team members who did not have firsthand experiences with the participants. This ongoing consultation process assisted researchers to identify the emergence of, and protect against, attribution of inappropriate inferences about the actual data.

Creating an interview protocol that satisfied the specifications of Hill (2012) was a challenging task due to the nature of the population interviewed. Hill specifies the use of administering a semi-structured interview consisting of open-ended questions. However, a limitation to the interview protocol created was the partial inclusion of closed questions. As a result, the interview protocol was developed with this knowledge in mind and attempted to contain a balance of broad and increasingly targeted questions.

Implications

Research has shown that students are making decisions about their careers as

early as middle school (e.g. Fouad & Smith, 1996). Students at this age may lack exposure to the career possibilities in the STEM fields and therefore may be making decisions about career choices without accurate information. Robinson & Kenny (2003) report that one reason students pursue a STEM career in college is in response to their prior knowledge of what a particular profession in the sciences is and what it does. The narratives presented in this study suggest that increasing student awareness of these careers may increase interest in pursuing careers in the STEM fields in middle school students.

Math and science teachers are critically important in early STEM- related career interest development and equally important is students' perceptions of support and feelings of belongingness within their various settings. The participants in this study reacted positively to teachers' interactions with them. This finding is supported by additional research suggesting that engagement, a sense of belonging, and mattering are critical to academic achievement (Baskin, Wampold, Quintana, & Enright, 2010; Goodenow, 1993). Teachers also would benefit from workshops on motivating students through social incentives, emotional support, guidance, and developing skills to combat test anxiety. Additionally workshops and parenting sessions could be instrumental in ensuring conversations at home that are substantive and informed.

Blustein's (2006) psychology-of-working perspective suggests the need for psychoeducational interventions such as school-to-work or work-based learning programs. Additionally, interventions that promote adaptive work-based learning experiences such as internships, apprenticeships, job shadowing, and on-site

programming may enhance work-based and interpersonal skill development. Furthermore, the importance of work in people's lives should be infused more explicitly into contemporary educational settings. This issue is particularly critical for students who lack access to resources and are at an inherent disadvantage in access to different career fields and experiences.

Overall, this study suggested a developmentally appropriate approach to highlighting the voices of young women who are in the throes of their identity development. The strengths of this include the focus specifically on high levels of math and science efficacy that exist within this specific population. Additionally, it provided a voice for young women within the literature, which reflected an energetic, intelligent, thoughtful and motivated lens to which to view African American middle school girls. Their love for math and science was palpable and should be nurtured and encouraged as they carry on through their academic career.

Additionally, further research should consider the intersecting components of racial identity development, gender identity development and career development. This focus may provide further answers to remaining question from the study include: how does personal experiences of racism and sexism affect career development? How do these personal experiences affect career development or math and science interest? How do different teachers affect belongingness in the classroom?

The results presented here reflect the importance of a STEM-infused educational context during the academic year and the impact of belongingness in a classroom setting specifically for African American middle school girls. This leaves teachers uniquely

positioned to create a learning environment where young women can flourish. The desire

for social bonds and connections with others is echoed in the narratives of the participants

who continually mentioned how teacher and parent support pushed them forward. In

contrast, a focus on testing and related anxiety negatively impacted their perceived sense

of self. The participants' narratives suggest that a STEM-enriched school and home

environment may be important in promoting greater consideration of STEM careers.

References

Ackerly, B. & True, J. (2008). Reflexivity in practice: power and ethics in feminist research on international relations, *International Studies Review*, 10(4), pp. 693–707.

Bandura, A. (1997). *Self-efficacy: the exercise of control.* New York: W. H. Freeman & Company.

Baskin, T. W., Wampold, B. E., Quintana, S. M., & Enright, R. D. (2010). Belongingness as a protective factor against loneliness and potential depression in a multicultural middle school. *The Counseling Psychologist*, 38, 626–651.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497–529.

Blustein, D. L. (2006). *The psychology of working: A new perspective for career development, counseling, and public policy.* Mahwah, NJ: Erlbaum.

Blustein, D.L., Barnett, M., Sheron, M., Depot, M…. Debay, D. (2013). Examining urban students' constructions of STEM/career development intervention over time. *Journal of Career Development,* 40(2), 40-47.

Brickhouse, N. W., Lowery, P. and Schultz, K. (2000), What kind of a girl does science? The construction of school science identities. *Journal of Research in Science Teaching*, 37, 441–458.

Brown, L.S. (2009). Feminist therapy. Washington DC: American Psychological Association.

Byars-Winston, A. (2013). Toward a framework for multicultural STEM-focused career interventions. *The Career Development Quarterly*, 62, 340-357.

Cheryan S. & Plaut, V.C. (2010). Explaining underrepresentation: A theory of precluding interest. *Sex Roles*, 63, 475-488.

Cheryan, S., Siy, J.O., Vichayapai, M., Drury, B.J. & Kim, S. (2011). Do female and male role models who embody STEM stereotypes hinder women's anticipated success in STEM? *Social Psychological and Personality Science,* 1(9), 1-8.

Correll, S. (2001). Gender and the career choice process: The role of biased self-assessments. *The American Journal of Sociology*, 106(6), 1691-1730.

Croity-Belz S., Chapeland V., de Fillipis A., and Garcia M. (2005). Career exploration in adolescents: the role of anxiety, attachment, and parenting style. *Journal of Vocational Behavior* , 67, 153-168.

Deimer, M.A. & Li, C. (2011). Critical consciousness and political participation among marginalized youth. *Child Development*, 82(6), 1815-1833.

Dixon, A. L., & Tucker, C. (2008). Every participant matters: Enhancing strengths-based school counseling through the application of mattering. *Professional School Counseling, 12,*123- 126.

Eccles, J.S. (2004). Schools, Academic Motivation, and Stage-Environment fit. In R.M. Lerner & L. Steinberg (Eds). H*andbook of Adolescent Psychology* (pp. 125-153), 2nd Edition. Hoboken, NJ: Wiley.

Felsman D.E., and Blustein D.L.: The role of peer relatedness in late adolescent career development. *Journal of Vocational Behavior,* 54, 279-295.

Fouad, N. A., & Byars-Winston, A. (2006). Cultural context of career choice: Meta-analysis of Race/Ethnicity differences. *Career Development Quarterly, 53*(3), 223-233.

Fouad, N.A., Cotter, E.W., Fitzpatrick, M.E., Kantamneni, N., Carter, L. & Bernfeld, S. (2010). Development and validation of the family influence scale. *Journal of Career Assessment,* 1B(3), 276-291.

Fouad, N. A., Hackett, G., Smith, P. L., Kantamneni, N., Fitzpatrick, M., Haag, S., & Spencer, D. (2010). Barriers and supports for continuing in mathematics and science: Gender and educational level differences. *Journal of Vocational Behavior*, *77*, 361-373.

Fouad, N. A., & Smith, P. (1996). A test of a social cognitive model for middle school participants. *Journal of Counseling Psychology, 43(3),* 338-346.

Fouad, N.A., Smith, P., & Zao, K.E. (2002). Across academic domains: Extensions of the social-cognitive career model. *Journal of Counseling Psychology, 49,* 161-171.

Fordham, S. (1993). Those loud black girls": (Black) women, silence, and gender "passing" in the academy. *Anthropology & Education Quarterly*, 24(1), 3-32.

Freire, P. (1993). Pedagogy of the oppressed. New York: Continuum.

Ginwright, S., & James, T. (2002). From assets to agents of change: Social justice, organizing, and youth development. *New Directions for Youth Development*, 96, 27–46.

Goodenow, C. (1992). Strengthening the links between educational psychology and the study of social contexts. *Educational Psychologist, 27*(2), 177-196.

Goodenow, C. (1993a). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *Journal of Early Adolescence, 13*, 21-43.

Goodenow, C. (1993b). The psychological sense of school membership among

    adolescents: Scale development and educational correlates. *Psychology in the*

    Schools, 30, 70-90.

Heppner, P.P., Kivlinghan, D.M. Jr., & Wampold, B.E. (1992). *Research design in*

    Counseling. Pacific Grove, CA: Brooks/Cole.

Hill, C., Corbett, C. & St. Rose, A. (2010). Why so few? Women in science, technology,

……….engineering, and math. *American Association of University Women.*

Hill, C. E., Knox, S., Thompson, B., Nutt Williams, E. & Hess, S. (2005). Consensual

    qualitative research: An update. *Journal of Counseling Psychology 2(52).*

    doi: 10.1037/0022-0167.52.2.196

Hill, C. E., Thompson, B., Nutt Williams, E. (1997). A guide to conducting consensual

    qualitative research. *Counseling Psychologist, 25, 517-572.*

Jackson, M., Perolini, C., Fietzer, A., Altschuler, E., Woerner, S., et al. (2011). Career-

    related success-learning experiences of academically underachieving urban

    middle school participants. *The Counseling Psychologist, 39*(7), 1024-1060.

Kenny, M. E., Gallagher, L. A., Alvarez, R., & Sibby, J. (2002). Sources of support and

    psychological distress among academically successful inner-city youth.

    *Adolescence, 37,*161-18.

Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive

    theory of career and academic interest, choice, and performance. *Journal of*

    Vocational Behavior, 45, 79-122.

Lent, R. W., Brown, S. D., & Hackett, G. (2000). Contextual supports and barriers to

career choice: A social cognitive analysis. *Journal of Counseling Psychology, 47,*
36-49.

Marshall, S., McGee, G., McLaren, E., & Veal, C. (2011). Discovering and developing
diverse stem talent: Enabling academically talented urban youth to flourish. *Gifted
Child Today, 34*(1), 16-23.

Nichols, S.L. (2006). Teachers' and students' beliefs about student belonging in one
middle school. *The Elmentary School Jorunal,* 106(3), 255-270.

Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of
Educational Research, 70*, 323-367.

Palombo, J. (1988). Adolescent development: A view from self psychology. *Child and
Adolescent Social Work,* 5,171-186.

Palladino D., Palma T., and Manzi A.J. (2005). Career development in middle childhood:
a qualitative inquiry. *Career Development Quarterly*, 53, 246-262.

Reinharz, S. (1992) Feminist Methods in Social Research. Oxford: Oxford University
Press.

Roeser, R. W., Eccles, J. S., & Sameroff, A. J. (1998). Academic and emotional
functioning in early adolescence: Longitudinal relations, patterns, and prediction
by experience in middle school. *Development and Psychopathology, 10*, 321-352.

Rowan-Kenyon, H., Swan, A. K., & Creager, M. F. (2012). Social cognitive factors,
support, and engagement: Early adolescents' math interests as precursors to choice
of career. *Career Development Quarterly, 60*(1), 2-15.

Sandler, P.M., Sonnert, G., Hazari, Z. & Tai, R. (2011). Stability and volatility of STEM

interestin high school: A gender study. *Science education,* 96(3), 411-427.

Slaten, C.D. & Baskin, T.W. (2014). Examining the Impact of Peer and Family

> Belongingness on the Career Decision-making Difficulties of Young Adults: A

> Path Analytic Approach. *Journal of Career* Assessment, 22, 59-74.

Turner, S. L., Steward, J. C., & Lapan, R. T. (2004). Family factors associated with sixth

> grade adolescents' math and science career interests. *The Career Development*

> *Quarterly, 53,* 41–52.

U.S. Department of Education Office for Civil Rights (2014). *Civil Rights Data*

> *Collection: Data Snapshot (College and Career Readiness).*

Usher, E.L. (2009). Sources of middle school students' self efficacy in mathematics: A

> qualitative investigation. *American Educational Research Journal,* 46(1), 275-

> 314.

Wang, X. (2013). Why students choose STEM majors: Motivation, high school learning,

> and postsecondary context of support. *American Educational Research Journal,*

> 50(50), 1081-1121.

Ward, R., Miller, J., Sienkiewicz, F., & Antonucci, P. (2012). Iteams: Increasing the self

> identification for girls and underserved youth in pursuing stem careers. *Journal*

> *of Systemics, Cybernetics & Informatics*, *10*(1), 95-99.

Stevens, J.W. (1996). African American female adolescent identity development: A

> three-dimensional perspective. *Child Welfare League of America,* 6(1), 145-172.

Westheimer, J., & Kahne, J. (2004). What kind of citizen? The politics of educating for

democracy. *American Educational Research Journal*, 41, 237–269.

Willis, (2007). *Foundations of qualitative research: interpretive and critical approaches.*

Thousand Oaks, CA: Sage Publications, Inc.

Appendix A

Interview Protocol

College/Career Interest

1. A lot of students have an idea of what they would like to do after high school (e.g. military, college, job). Do you have an idea of what you'd like to do after you graduate high school? (Blustein et al., 2013)

2. What are your career goals at this point?

    a. What kind of job would you like after you have finished school?

    b. If you are unsure about a job, what kind of field are you interested in?

3. If you are planning on college, what kind of courses/classes do you think you will take?

    a. What do you think your major will be? (Blustein et al., 2013)

4. If you could do whatever you wanted for a career, regardless of required talents or preparation, what would you do?

Identity as student

5. What/who helps you to do well in school?

6. Do you think there is a connection between who you are now as a student and your life in the future? (Blustein et al., 2013)

7. What would you say your best subject in school is? Why? Which subject is your least favorite? Why? (Usher, 2009).

Reactions and experiences to STEM courses

8. What has been your experience with Science, Technology, Engineering, and Math courses (from now one, we will call those classes STEM)? (Blustein et al., 2013)

9. If you were to rate your ability in math on a scale of 1(lowest) to 10 (highest) where would you be? Why? Has it always been that way? How would you rate your confidence that you will do well on an upcoming math test? (Usher, 2009)

10. What do you like and not like about these courses?

11. How interested are you in exploring or pursuing a STEM career in the future?

School support

12. How would you describe the atmosphere at your school?

    a. What makes you feel like people care about at school?

    b. Is there anything that makes you feel uncared for school?

13. How would you say you compare to the rest of your classmates in your math and science abilities?

14. Tell me about the math and science teachers you've had.

    a. What sorts of things do your teachers tell you about your performance in math and science?

    b. What do you think your current math and science teacher would tell your parents about how you are in those subjects?

    c. Describe the best teacher you've had in either math or science. What made him/her so good?

    d. What could teachers do to help you feel more confident in your

       math/science abilities? (Usher, 2009)

15. What have learned from your teachers about STEM courses and fields?

    a. How do your teachers support you in school and with thinking about

       careers?

Parent/Caregiver Support

16. What sort of conversations do you have with your parents/caregivers about your

    future education and career plans? (Blustein et al., 2013)

    a. How do they help you think about future careers?

    b. What work do your parents do for a living?

    c. Are any family members involved in a STEM-related career? What type

       of work do they do?

17. How do your parents/caregivers feel about STEM fields in general? To what

    extend do you talk about it at home?

18. If you were to express and interest in STEM classes or a career, how would your

    family react? (Blustein et al., 2013)

Peer Support

19. Do you ever feel as though you have to choose between doing well in school and

    maintaining your friends?

    a. If yes, how do you handle those situations? (Blustein et al., 2013)

20. What kind of conversations do you have with your friends about careers? (Blustein et al., 2013)

21. If you were to express an interest in STEM classes or a career, how would your friends react?

    a. How would you respond if your friends told you NOT to explore STEM fields?

    b. How would you respond if they did not think it was cool? (Blustein et al., 2013)

22. If your friends thought you should focus so much on school, how would you respond?

Race and Gender

23. How do you think your family's expectations about your future plans are shaped by the fact that you are female? (Blustein et al., 2013)

24. How does your sense of self as a woman affect your career exploration and options? (Blustein et al., 2013)

25. How does your sense of yourself racially and ethnically affect your career exploration and options? (Blustein et al., 2013)

    a. What are your family, school and community expectations about what you are going to do in the future as a person from (insert identification) background?

26. When you think about the future (a few years from now?) what do you most hope that you will do or that will happen? (Blustein et al., 2013)

a. When you think about the future, is there anything that you are afraid you

   might do/not do? (Blustein et al., 2013)

NOTE: Female interviewees (N = 14), general = 13-14 cases represented, typical = 9 – 12 cases represented, variant = 4 – 8 cases represented, and rare = 1 – 3 cases represented.

The occurrence of each domain and core idea within individual interviews was noted, and the number of interviews in which each theme was present across the data set was determined. After this was determined the researcher then applied the frequency descriptions detailed in the CQR model. Table model reflected the table created in Blustein et al. (2013).

TABLE 1 – PEOPLE

Domain/Core Idea	Frequency
TEACHER INFLUENCE	
Teachers challenge participants to grow	4 - Variant
Teachers provide academic support [by being patient and explaining difficult concepts].	10 - Typical
Teachers provide emotional support and compassion to students	11 - Typical
Students like teachers with warm, funny, or caring personalities	10 - Typical
Teachers help set goals	5 - Variant
Students do not always feel that their teachers attend or actively listen to them	4 - Variant
Teachers discuss college and encourage students to attend.	13 - General
Teachers discuss STEM	3 – Rare
Teachers (greatest source of motivation)	9 - Typical
PEER INFLUENCE	
Peers are emotionally and academically supportive	10 - Typical
Peers are perceived to be intelligent	8 - Variant
Peers discuss STEM careers	2 – Rare

Peers do discuss college and/or career	6 – Variant
Peers that are not as academically-oriented are not good friends and do not value education	10 - Typical
Peers (greatest source of motivation)	3 - Rare
FAMILY/PARENT INFLUENCE	
Family is supportive (supports and encourages) of college discussion and careers	14 - General
Family can be discouraging	3 – Rare
Family does not discuss college nor career	2 - Rare
Parent is a college graduate	1 - Rare
Parent is not a college graduate	5 – Variant
Family Members not involved in STEM	13 - General
Participants' parents involved in a variety of vocations	12 - Typical
Parent does not work	2 – Rare
Family (greatest source of motivation)	9 - Typical
PREP PROGRAM INFLUENCE	
Prep programs positively influence STEM interest	11 - Typical

TABLE 2 - ATMOSPHERE

Domain/Core Idea	Frequency
SCHOOL ATMOSPHERE	
The rules and consequences are too rigid and harsh	7 - Variant
School is a peaceful, non-dramatic and trustworthy environment	6 - Variant
School is like family	3 – Rare

School is growth-oriented, stimulating, and challenging	8 - Variant
School discusses STEM	3 – Rare
School (Greatest source of motivation)	6 - Variant
COMMUNITY/NEIGHBORHOOD ATMOSPHERE	
Community is a source of support	3 – Rare
Community is not a source of support	13 - General
Community (greatest source of motivation)	1 - Rare

TABLE 3 – PERSONAL CHARACTERISTICS

Domain/Core Idea	Frequency
STEM INTEREST AND ACADEMICS	
Stem is discussed in college prep program	3 - Rare
STEM is not emphasized at school	8 - Variant
Participant has not considered a STEM career	6 - Variant
Participant is interested in a STEM career	7 - Variant
Math is favorite academic subject	11 - Typical
Science is favorite academic subject	3 – Rare
English Language Arts is favorite academic subject	3 – Rare
Math is least favorite academic subject	5 - Variant
Science is least favorite academic subject	3 - Variant
English Language Arts is least favorite academic subject	9 - Typical
IDENTITY & BELIEFS	
Race is a potential barrier to having a successful career	4 - Variant

Race is not a potential barrier to having a successful career	10 - Typical
Gender is perceived to be a potential barrier to having a successful career	9 - Typical
Gender is not perceived to be a potential barrier to having a successful career	5 - Variant
ACADEMIC SELF-CONCEPT	
Surpassing the expectations of others as motivation	5 - Variant
Participant has positive sense of performance	12 - Typical
Participant has negative sense of performance	2 - Rare
Participant believes she does better than her peers	12 - Typical
Participant believes she does the same or worse than her peers	2 - Rare
Participant endorsed positive sense of STEM abilities	14 - General
Participant endorsed some negative sense of STEM abilities	3 – Rare
Participant finds tests more challenging [than homework] (because of pressure or nerves)	13 - General
FUTURE AMBITIONS	
Participant is interested in career in helping profession (e.g. medicine, education, social work)	14 - General
Participant is interested in career in the arts	5 - Variant
Participant is interested in career in law	7 - Variant
Participant is interested in a career in "other"	3 – Rare
Participant connects college with career goals	8 - Variant
Participant wants to go to college	10 - Typical
Unsure about where to go to college and/or which major to declare	7 - Variant

Success as a student is important for the future	4 - Variant
Future goals are important	13 - General
Fears of not fulfilling goals	2 – Rare
No fears about the future	6 – Variant
Fears about college and academic failure	4 – Variant

CURRICULUM VITAE

ANYA WORONZOFF VERRIDEN

EDUCATION

University of Wisconsin-Milwaukee
Department of Educational Psychology, **Milwaukee, Wisconsin**
Ph.D. Candidate in Counseling Psychology
Expected: May 2017

Harvard University
Graduate school of Education, **Cambridge, Massachusetts**
Ed.M Risk and Prevention, Counseling
June 2008

Smith College, Northampton, Massachusetts
B.A. Honors in English and Russian Language and Literature
Honors Thesis: *Patronage and Audience in 19th Century Poetry*
May 2004

LICENSES AND CERTIFICATIONS

   CPR/AED Certification (2015)
   WI Licensed Professional Counselor Training License #1702, (2012)
   Certificate in Trauma Counseling, (2013), University of Wisconsin-Milwaukee

DISSERTATION

Perceptions of belongingness in STEM subjects and career development for middle school African American girls.

APA ACCREDITED INTERNSHIP EXPERIENCE

Rogers Memorial Hospital, West Allis, Wisconsin
Child and Adolescent Day Treatment and Adolescent Partial Hospitalization Unit
August 2016-August 2017
- Oversaw patient care provided in the clinical unit.
- Supervised 2 masters levels clinicians individually and in a group setting.
- Supported and implemented the clinical program in conjunction with multidisciplinary staff.
- Participated in weekly supervisory meetings conducted by licensed psychologists.

- Developed treatment plans and effective interventions.
- Participated in hospital committees, meetings and team projects.
- Conducted diagnostic evaluations to determine patient statue and appropriateness for admission.
- Provided individual therapy for patients.
- Provided therapy for patients in a group setting utilizing DBT and PCIT orientations.
- Conducted ongoing safety checks and stabilization.
- Provided psychological assessment on a continual basis.
- Coordinated services with physicians and other healthcare providers.
- Conducted family therapy sessions for patients.
- Participated in in-services/seminars/didactics and other meetings such as DBT consult group.

PRACTICA EXPERIENCE

Advanced Correctional Healthcare Inc., Sheboygan, Wisconsin
February 2015 – June 2016
- Conducted intakes for male, female, and juvenile inmates.
- Provided short term counseling using solution-focused and cognitive behavioral interventions.
- Co-led men's and women's groups.
- Worked with inmates for psychological issues such as depression, anxiety, adjustment disorder, Oppositional Defiant Disorder, Borderline Personality Disorder, and Bipolar Disorder.
- Provided crisis counseling and conducted suicide assessments.
- Completed weekly isolation rounds.
- Worked as part of an interdisciplinary team with medical team security, and administration to ensure the safety and well-being of all inmates.

Marquette University Counseling Center, Milwaukee, Wisconsin
August 2014- May 2015
- Psychological counseling involving many conditions including; career concerns, transition issues, mood disorders, anxiety disorders, eating/body image issues, ADHD issues, alcohol/substance abuse issues, and interpersonal issues.
- Career counseling involving use of the Strong Inventory and Meyers-Briggs Personality Test
- Crisis intervention including as on-call crisis therapist
- Co-facilitator for DBT skills based group

- Participation in Awareness Weeks and outreach programs such as "Mindful Minutes"
- Training in Biofeedback, ADHD Screening tools, and CCAPS

St. Rose Assessment Center, Milwaukee, Wisconsin
September 2013- June 2014
- Conducting, interpreting, and communicating psychological assessment such as trauma and risk assessments.
- MMPI-A and WISC-III for both inpatients and outpatients at St. Rose Center and Lad Lake.
- Formulating treatment plans through integration of: psychopathology observed, psycho-social background, daily functioning, available support systems, level of activities, physical and legal status of client.
- Preparing and maintaining records and reports as they relate to client treatment and correspondence.

Wisconsin Lutheran Child and Family Services, Milwaukee Wisconsin
August 2012- June 2013
- Provided psychological services such as individual, family and group outpatient services to low income youth and families in a school setting
- Performed assessments to screen clients, ages 4-13, targeting anxiety, depression, grief, ADHD, and PTSD
- Utilized a life history intake questionnaire to gather background information with family
- Evaluated family and client needs; implemented treatment plans to meet those needs; followed prescribed clinical casework procedures using a family systems approach.
- Regularly interfaced with clients and families presenting wide range of conditions, including physical and mental abuse, family issues, behavior disorders, and persistent mental and physical illnesses

Counseling and Intervention Center, Boston, Massachusetts
Practicum Internship Experience at Harvard University
August 2007- June 2008
- Led group and individual counseling sessions in a unique, short-term, non-residential program for k-12 students in the Boston Public Schools

- Addressed the social, behavioral, emotional, and academic needs of students assigned to the center through client intakes, outtakes and referrals, taught anti-violence and conflict resolution classes, assistance to the program director, and client follow up
- Prepared and wrote assessments for the Service Delivery Plans, interfaces with the court system, law enforcement and social service agencies as a team member in meetings

PROFESSIONAL EXPERIENCE

Suicide Prevention Project, University of Wisconsin – Milwaukee, Wisconsin
September 2014 – December 2015
Graduate Student Screening Assistant
- Screened all medical clinic patients for Tier 2 screening for depression and suicidal ideation (Tools: PHQ-9 and C-SSRS).
- Appropriately triaged patients based on screening scores and established triage criteria.
- Taught patient depression self-management skills to students
- Collected data related to pilot screening project
- Attended Chancellor's Advisory Committee on Mental Health

HOPE Christian Schools: Fortis, Milwaukee, Wisconsin
June 2011- June 2012
Staff Member
- English and Religion instructor middle school grades.
- Assisted in developing procedures and systems for developing middle school

YES Prep Public Schools, Houston, Texas
Student Support Counselor
August 2009- June 2011
- Counseled youth in grades 6 through 8, using cognitive behavioral and solution based approaches to address depression, anxiety, poor academic performance, and retention
- Counseled youth in short-term crisis situations such as bullying, suicidal, abusive or behavior issues
- Led girls and mixed groups weekly on social skills, academic issues, grief, behavioral issues, bullying and sexual harassment

- Developed a Comprehensive Middle School Conference Program, which included gender specific workshops on topics such as bullying, cyber-bullying, healthy relationships, nutrition, and hygiene
- Contributed to weekly school leadership team meetings

Adoption and Foster Care Mentoring, Boston Massachusetts
June 2008- June 2009
Program Coordinator
- Expanded the one-to-one non-profit mentoring program which matches youth in care with positive adults who provide friendship and consistency to 40 new mentors.
- Created and implemented a policy and procedures manual that included an operational plan with measurable goals and objectives.
- Led a variety of volunteer training sessions for youth and adults involved with the program.
- Interviewed potential volunteered, maintained their filed and ensured high quality matches in the program.
- Led initial, closure and anniversary match meetings for all matches on caseload.
- Carried a caseload of about 20 matches while also creating and matching new volunteers and mentees.

Hyde School, Woodstock, Connecticut
August 2004- June 2007
Faculty Member
- Implemented school's three-part focus of character development, family renewal, and college preparation for at-risk youth.
- Dorm parent for a wing of 20 female youth in alcohol and drug recovery.
- Led groups dedicated to character and emotional development involving families.
- Co-led parent seminars, family retreats, and student wilderness expeditions with focus on personal and family growth.

SUPERVSION EXPERIENCE

University of Wisconsin-Milwaukee Masters in Counseling
Milwaukee, Wisconsin
Fall 2014

- Responsibilities included, direct supervision of two student clinicians in masters in counseling program placed in community counseling settings for practicum
- Monitored activities of students to assure policies and guidelines were observed.
- Developed and implemented assessment measures for supervision evaluation

RESEARCH EXPERIENCE

University of Wisconsin-Milwaukee, Milwaukee, Wisconsin
2012 – 2016
Research Assistant to Dr. Thomas Baskin
- Administered high school quantitative study examining self-concept and achievement of low income urban youth in STEM subjects
- Co-designed, interviewed and coded a qualitative study examining best practices for teachers working with youth with Autism
- Administered quantitative study examining anger and forgiveness in low income urban youth

CONFERENCE PRESENTATIONS

Woronzoff-Dashkoff, A., Reiland, M., & Baskin T. (May, 2013). "Investigating Anger, Forgiveness, and STEM Achievement in Youth." Poster Presentation at the first annual School of Education Doctoral Student Poster Session at the University of Wisconsin-Milwaukee, Milwaukee, WI

Woronzoff- Dashkoff, A. (October, 2011). "Benchmarking Standards: Techniques for Student Mastery in English Language Arts and Math." Presenter at the annual Urban Teaching Conference, Milwaukee, WI

Woronzoff-Dashkoff, A. & Javors A. (April, 2008). "Self-Injury in the Adolescent Female Population: An In-School Group Therapy Model." Poster presentation at the annual Massachusetts School Counselors Association, Hyannis, MA

VOLUNTEER EXPERIENCE

Hydrocephalus Association, Wisconsin
Community Network Chair
2015-Present

- Worked with the Network Co-chair to raise the awareness, understanding and needs of the particular network issue or constituency.

- Facilitated network activities during annual conferences, including but not limited to a Network meeting, educational session or roundtable discussion.
- Communicated current issues and other topics relevant to the network with network members at least twice a year.
- Promoted membership recruitment and Network participation for both professionals and students at the annual conference and at the regional level.

Bo's Place, Houston Texas
Group Facilitator
2009-2011
- Volunteer facilitator at a bereavement center offering multiple grief support services for children, families, and adults in their grief journey, and providing education and resources for those who assist people in grief.
- Led evening support groups for children ages 3-18 and their families.

MEMBERSHIPS

The American Psychological Association of Graduate Students
The American Psychological Association Division 54: Pediatric Psychology
The American Psychological Association Division 17: Counseling Psychology