

## ABSTRACT

MCELVEEN, TAMIIKA. Profiles of Communal Socialization: African American Students' Perceptions of the Communal Values Taught in Mathematics Classrooms. (Under the direction of Dr. DeLeon L. Gray).

Studies have primarily identified the positive associations between students' communal values and teachers' culturally relevant pedagogy and practice in separate investigations that lead to students' increased academic engagement, psychological well-being, and sense of social responsibility. The current study proposed to explore mathematics teachers' pedagogy and practice specifically related to the transmission of communal values, *communal socialization*, through the lens of African American students. *Communal socialization* is the transmission of implicit and explicit messages, models, and experiences that teach, honor, and reinforce students' values of social connectedness, interdependence, and common purpose. Three hundred and eight high school students were recruited to participate in this study. Exploratory Factor Analysis was used to examine the dimensionality of communal socialization. Latent Profile Analysis was used to construct profiles that reflect the varied experiences of African American students in secondary mathematics. Multiple regression analyses examined the associations between communal socialization and students' academic (i.e., academic engagement and academic grades), psychological (i.e., communal values, attainment value, racial/ethnic identity,), and social responsibility outcomes. Results validated the Communal Socialization scale and supported the multi-dimensional nature of the scale including three factors with distinct indicators of communalism: Personal Responsibility, Community Utility, and Global Responsibility. In addition, four latent profiles emerged from the student data, each with distinct levels of communal socialization in the areas of personal responsibility, community utility, and global responsibility: *Highly Communal*, *Moderately Communal*, *Cooperatively Communal*, and

*Least Communal.* Students in the *Highly Communal* socialization profile: (1) reported significantly more relevance and engagement in mathematics, (2) expressed more communal value, ethnic pride, and racial centrality, and (3) perceived a higher sense of social responsibility.

Communal Socialization, as a culturally relevant practice, has practical and theoretical implications for teaching and learning in high school mathematics classrooms. Communal socialization can be utilized as a mechanism to increase students' engagement with their academic content in ways that are relevant and meaningful to their cultural backgrounds and values.

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Profiles of Communal Socialization: African American Students' Perceptions of the Communal  
Values Taught in Mathematics Classrooms

by  
Tamika McElveen

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APPROVED BY:

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DeLeon Gray  
Committee Chair

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Jessica DeCuir-Gunby

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Crystal Chen

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Elan Hope

## **DEDICATION**

To my children, Gregory, Leah, and Gabrielle McElveen.

## BIOGRAPHY

Tamika LaShaye McElveen was born in Elizabeth City, North Carolina on September 11, 1980. She was raised by her grandparents, the late Ervin Griffin Sr. and Betty P. Griffin, and parents, Arlanda and Nellie Mitchell. After graduating from Northeastern High School in 1998, she attended the University of North Carolina at Chapel Hill in Chapel Hill, NC. Tamika received her Bachelor's degree in Psychology and Master's degree in School Counseling. Upon graduation, she served as the 7<sup>th</sup> Grade School Counselor at Ligon Magnet Middle school in Wake County Public School System. During this time, she married Gregory McElveen Jr. and they have been happily married for sixteen years.

Tamika received her NC Real Estate license and assisted families in buying and selling real estate for several years. From 2006-2016, she worked in North Carolina Mental Health and Substance Abuse Community-based service agencies in different positions, ending as Program Manager of mental health, substance abuse, and developmental disability services in Johnston County. During these years, Tamika and her husband welcomed their three children – Gregory III, Leah, and Gabrielle.

Tamika began her doctoral studies in 2016 and pursued a Doctor of Philosophy in Educational Psychology at North Carolina State University. During this time, she served as President of the Graduate Student Association for Teacher Education and Learning Sciences program in the College of Education from 2017-2019. She also engaged in various service opportunities including volunteering for the Youth Conference at the 2018 and 2019 American Education Research Association Conferences and serving as a committee member of their Equity & Inclusion Committee. Her conference presentations and first publication were centered on her experiences as a Research Assistant for *iScholar*, a university-school collaborative examining

African American and Latinx students' achievement motivation for STEM. Tamika McElveen also worked with Dr. Christy Byrd and the #PasstheMicYouth program coordinators to develop a Social Justice curriculum for secondary and undergraduate students.

Tamika has additional invaluable research and teaching experiences to note including her work with the multidisciplinary research team engaged in developing a framework and observation protocol for Belonging-Centered Instruction in Mathematics classrooms. She also contracted with Wake County Public School's Data, Research, and Accountability department to support program evaluations through data collection, analysis, and reporting. In addition, Tamika was the Instructor of Record for Educational Psychology and Applied Child Development courses for three semesters. Lastly, Tamika was co-founder of iEmpower, Inc., a non-profit organization with a mission to enrich and empower youth through education, leadership, service, and civic engagement opportunities. This experience has led to the development of partnerships with families, faith-based and community organizations, the school district, and local government leaders to improve academic and social engagement outcomes for underserved children and communities.

Upon graduation, Tamika will serve as Postdoctoral Research Associate for the *Our Mathematical World* research project at Purdue University. She will also continue to pursue community-engaged research with the aim of contributing practically and theoretically to the communities she is most passionate about.

## **ACKNOWLEDGMENTS**

I thank God for the path he has placed me on throughout my life. From Elizabeth City to Chapel Hill, Raleigh, and beyond, I am eternally grateful for all of the people I met along the way. This includes my husband, large and tight-knit family, friends from Northeastern High School, UNC Chapel Hill, NC State University, as well as co-workers and supervisors who are so much more than the titles suggest. My life is a reflection of the grace of God and the strength and benefits of living in community with others who love and support you in all of your endeavors. I am truly blessed.

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I leave North Carolina State University with a grateful heart and an eye towards exciting collaborations, research opportunities, and meaningful work in the future.

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## **Chapter 1: Introduction**

### **Background of the Study**

Educators and researchers have pursued the goal of equity in mathematics education for African Americans, females, and other marginalized students for decades. However, recent reports on the proficiency of African American students in mathematics, 20% of fourth graders and 14% of eighth graders (National Assessment of Educational Progress, 2019), are a clear indication that different approaches are necessary. Data further suggest that African American students do not regain their interest or motivation to pursue mathematics in post-secondary education. According to the Digest of Education (2017), 8.5% of science, technology, engineering, and mathematics (STEM) degrees were obtained by African Americans. Although these statistics show a significant underperformance of African American students overall, and a decline in mathematics performance and motivation during adolescence, they do not reflect their mathematical ability or mathematical potential.

Test performance is traditionally found to be an indicator of students' achievement, with implications on students' access to college preparatory courses in high school, their motivation, and identification with mathematics. More importantly, test performance serves as a reflection of a pervasive pedagogical and instructional disconnect between what motivates African American students and what they learn in their classrooms. There are alternative indicators to be considered in mathematics education, especially as statistics indicate a need to focus not only on African American students' achievement, but also on their opportunities to learn (Jackson & Wilson, 2012). In considering the components of an equitable mathematics learning environment that can systemically influence the academic outcomes of African American students, Gutiérrez (2012) offered two indicators as, identity and power. Both are achieved by the implementation of

culturally relevant pedagogy in mathematics education. First, assessment of students' identification with mathematics would allow policy makers, educators, and researchers to gauge the level of importance, relevance, and interest African American students place on their academic content. Second, the assessment of how well mathematics content fosters students' sense of power and purpose would indicate if students were motivated to achieve by connecting mathematics to their sense of social responsibility and social justice. The implementation and evaluation of these indicators could improve the significance of mathematics for African American students, not just for their personal interests and goals, but also for the communities and broader social issues that they value. The improvements in identification and sense of purpose for African American students in mathematics have broader implications for the U.S. system of education as well. As African American youth constitute 15% of the public school population in elementary and secondary education (Digest of Education Statistics, 2019), STEM fields are negatively affected when the knowledge, skills, and perspectives of these students are not represented.

Underlying the current state of mathematics education is the reality that the social construction of race in the United States and the historic and present-day oppression of African Americans have resulted in physical, psychological, and social barriers for African American students. To address the persistent disparities that African American students face in mathematics, researchers have explored various avenues that point to the contextual importance of race in understanding African American students' achievements in mathematics. The first is the examination of school racial composition as an institutional factor impacting student achievement. African American students are increasingly attending racially segregated schools. According to the Digest for Education Statistics (2019), 58% of African American students

attend schools with at least 75% minority populations, which is a 9% percent increase between 2000 and 2017. Racial composition studies have consistently found that students in majority-minority schools have lower academic achievement, despite their academic potential (Brown-Jeffy, 2009; Hanushek et al., 2002; Michelson et al., 2013).

Secondly, instructional factors including teachers' characteristics, qualities, and beliefs have been associated with students' learning outcomes including teaching experience, pedagogical and subject matter knowledge, and standard-based practices (Bolyard & Moyer-Packenham, 2008; Love & Kruger, 2005; McDonald et al., 2013). Research has found that factors such as higher verbal skills, over nine years of teaching experience in secondary school, a degree in mathematics (in contrast to an education degree), and belief in the capacity of all students are significant factors in students' academic achievement (Bolyard & Moyer-Packenham, 2008; Love & Kruger, 2005). These factors have implications for teachers' *pedagogy*, philosophy or theory of learning, themselves, and students who shape how they approach mathematics learning, and *practice*, the interactions teachers have with their students and the curriculum that support students' engagement and identification with mathematics (Jackson & Wilson, 2012).

Lastly, research has attempted to investigate the effects of mainstream education, standardized curricula, pedagogy, and testing not standardized for culturally diverse students, (Abdulrahim & Orosco, 2020), on African American students by examining the associations between racial identity and mathematical identity (English-Clarke et al., 2012) and offering adaptations to standard curriculum through the interactive approach of learning mathematics through everyday contexts and tasks (Nasir, 2002). Martin (2009) recommended a structural approach to mathematics teaching and learning that (1) recognizes the voice of students and their

supporting community as important components within the classroom and (2) engages students in sense-making processes about how race (and social context) influence their lives and their mathematical experiences. This area of research highlights the importance of mathematics that connects with and fosters students' identities by responding to their developmental, cultural, and socio-political needs.

Even with these contributions to the understanding of factors influencing African American students' mathematical achievement, a research gap exists in connecting the need for pedagogies and practices that are identity- and culturally relevant to specific approaches that teachers can utilize in their classrooms to productively link mathematics content to students' values, interests, and strengths. One way to address this gap is to consider a student-centered approach, one that examines students' perceptions of their teacher's use of communally-focused instruction as a specific culturally relevant pedagogy and practice in schools with varying racial compositions. Using this approach, this proposed study can provide greater insights into how mathematics teachers can influence the academic, psychological, and social outcomes of their students through culturally and motivationally supportive practices.

## **Theoretical Framework**

Meaningfulness at its essence is connection (Baumeister & Vohs, 2002). Thus, culturally and motivationally supportive teachers offer pedagogy and practice that connect to students' values in a way that heightens their sense of self and sense of purpose. In the current study, the socialization of communal values in mathematics classrooms is explored as a culturally and identity relevant way to motivate African American students' academic and social engagement. *Communal values*, beliefs in the social connectedness and interdependence of people that lead to a prioritization and duty toward social aims can serve as a mechanism to connect students'

identities with mathematics. Communal values, grounded in the Afrocentric principle of communalism are passed down intergenerationally as a cultural value for African Americans. The socialization of communal values by mathematics teachers can help to align students' motivations with their academics in ways that make mathematics more meaningful and critically engaging.

Educational Psychology and Culturally Relevant Pedagogy is integrated to consider the values, pedagogies, and practices that influence students' engagement in mathematics. Theories of achievement motivation have examined *task values*, the extent to which students value an activity or domain (Wigfield & Eccles, 2000) as relevant and congruent with their personal and social identities. Primarily through quantitative methods, scholars have explored what influences students' academic engagement and performance. Models of culturally relevant pedagogy and practice have been established through qualitative methods, mainly to identify the components necessary for responding to and sustaining the identities, cultures, values, and interests of African American students. Meaningfulness is at the intersection of culturally relevant pedagogy and achievement motivation research as it supports the achievement and identity-related benefits of teaching academic content as relevant and congruent with students' values, interests, and culture.

Gutiérrez (2012) identified four dimensions of mathematics instruction that create equitable learning environments for African American students. The first dimension, *access*, refers to resources (e.g., high quality teachers, adequate technology, materials, quality curriculum, and clean and safe learning environments) that provide students with the opportunities to experience the second dimension, *achievement* or positive academic outcomes (e.g., grades, test scores, and rigorous mathematical pathways necessary for college preparation).

The third dimension, *identity*, allows for students to find mathematics relevant, important, and interesting to their lives currently or in the future. Identity, with its theoretical alignment to meaningfulness and cultural competence from Educational Psychology and Culturally Relevant Pedagogy, respectively, centers students' values as motivation for their behavioral engagement. The fourth dimension, *power*, extends beyond traditional educational psychology to consider students' critical engagement in their social world. Culturally Relevant Pedagogy's conception of cultural critique (Ladson-Billings, 1995) can be used to examine critical awareness and reflection connecting to the sense of purpose of African American adolescents in the face of incongruent negative messages.

### **Purpose Statement**

The purpose of this dissertation is to examine African American students' perceptions of their teachers' pedagogy and practices that connect mathematics to communal values. This is important to African American students because it investigates instructional beliefs and practices that have the potential to make mathematics more meaningful to them. The increase in meaningfulness and relevance is hypothesized to be associated with an increase in students' academic engagement, psychological well-being (values and identities), and their sense of social responsibility.

Communal socialization is an emerging conceptualization of the specific culturally relevant pedagogy and practice that emphasizes the priorities students place on social connections and their sense of responsibility to their communities and broader societal challenges (i.e., equity and justice) as motivations to achieve. Integrating psychological and educational research provides an opportunity to leverage the strengths of each field. Psychological research, including Expectancy-value theory and Identity-based motivation,

provide support for students' motivations for tasks and domains that present meaningfulness to and congruency with their personal and social identities. Educational research from the fields of teacher education and critical mathematics emphasize the need for teachers' pedagogy and practice to align with, teach, and reinforce students' academic achievement, their sense of cultural congruence, and the need for critical engagement in the issues impacting their communities and society more broadly.

This study extends prior research to focus on the role of communal values on the academic and social motivations of students, specifically concentrating on pedagogy and practice that students experience in the mathematics classroom. By going beyond experimental and intervention research, this study focuses on the culturally relevant and sustaining content that teachers use to socialize students toward engaging in mathematics for the purpose of contributing to their social world.

### **Goals of the Research**

There are three aims of this study. First, through development and validation of a measure, this study operationalized communal socialization and explored its dimensionality. I proposed three dimensions of communal values (i.e., personal, community-focused, and equity-focused), each addressing a unique component of the construct. The *personal-focused* dimension of communal socialization was characterized by the development and enactment of values that guide adolescents' choices, create a sense of purpose, and reflect care, integrity, honesty, responsibility, restraint, and equity (Benson et al., 1999). The *community-focused* dimension of communal socialization was characterized by the beliefs and actions that are focused on the welfare or improvement of communities. The *equity-focused* dimension of communal socialization refers to the transmission of explicit and implicit messages that convey broader

principles of equality and justice. The communal socialization of students' most recent mathematics teacher was measured to gain an understanding of students' perceptions of their teachers' pedagogy and practices that affirm and/or reinforce these values. The dimensionality of communal values was examined using exploratory factor analysis.

Second, latent profile analysis was used to understand the variation in students' perceptions of their teachers' pedagogy and practice, as well as their classroom experiences. Latent profile analysis is a person-centered, quantitative method that identifies clusters of students with similar perceptions and experiences. This method assisted in capturing the perceptions of a larger sample of students while recognizing their unique experiences. Since contextual factors outside of classroom experiences could affect students' perceptions, analyses included examination of individual and contextual factors (e.g., age/grade, SES, geographic location, school racial composition, and neighborhood racial composition) to better understand students' unique experiences.

Third, this study sought to examine how communal socialization affected students' academic, psychological, and social outcomes. The academic variables measured in this study include academic engagement (i.e., cognitive, behavioral, emotional, and social) and self-reported academic performance for the current school year. Psychological variables included students' communal values, mathematics attainment values, ethnic pride, and racial centrality. Students' sense of social responsibility was measured to understand students' perceptions and interests in socially responsible behaviors.

### **Significance of the Study**

The proposed study is significant in the field of educational psychology in various ways. First, there is an identified need for educational psychology research to utilize race-reimaged

constructs to broaden the understanding of the motivational process that impact teaching and learning (DeCuir-Gunby & Schutz, 2014). This study will integrate achievement motivation with culturally relevant pedagogy through the conceptualization of meaningfulness.

Second, this study investigates ways in which teachers' pedagogy and practice affirm and sustain students' values. This specific mechanism, which is communal value, is grounded in students' social identities, such as their ethnicity and/or gender. Exploring the dimensionality of communal socialization provides educators and researchers with information on the values that are and can be incorporated in mathematics classrooms.

Lastly, this study helps to fill the research gap in better understanding what and how specific teaching practices can contribute to students' identification with mathematics and other subjects (Abdulrahim & Orosco, 2020; Miller & Wang, 2019). Students' perceptions of teachers' practices are needed (Martin, 2009). Person-centered quantitative methodology will capture patterns of students' perceptions of the communal socialization they receive from teachers during mathematics instruction.

## **Chapter 2: Literature Review**

For educators and educational researchers, the importance of meaningful learning and learning environments for African American students presents a responsibility to provide learning that is central to, congruent with, and sustaining of their values and identities. In this study, communal socialization is proposed as a process which includes implicit and explicit messages, models, and experiences that teach, honor, and reinforce students' values of social connectedness, interdependence, and common purpose. This specific type of socialization acknowledges the triple quandary that African American adolescents face in US schools and society and addresses it by affirming cultural strengths and countering threats to adolescents through the development of their critical engagement. To articulate the distinct role for communal socialization to these adolescents, first I explored the concept of socialization, its process broadly, and the content of socialization that influences African American adolescents. Next, I identified theoretical insights from previous literatures to pose new questions about how the socialization of communal values can motivate the academic engagement, psychological well-being, and social responsibility of African American adolescents.

### **The process of socialization**

Socialization is the transmission of the formal and informal rules about how the world works to shape our beliefs and our behavior during interactions with family, friends, schools, places of worship, and other people and institutions (Kaplowitz et al., 2019). The aim of socialization is holistic adolescent development with particular foci of moral development, learning social roles, and acquiring skills necessary to function competently and successfully as a member of a community and society at large (Hillard, 1998; Lee, 2008; Smetana et al., 2014).

Prior literature has revealed socialization as a bi-directional, reciprocal, and dynamic process. Since parents and caregivers are the primary socializers in early childhood, much of the socialization literature examined the socialization roles of parents and caregivers, who they are and what they do to influence academic (Taylor et al., 2004) and social outcomes (Higgins & Parsons, 1983). As the sphere of influence expands during middle childhood and throughout adolescence, experiences in different learning contexts with a diversity of peers, teachers, and meaningful adults in adolescents' communities (i.e., religious leaders, afterschool personnel, sports or extracurricular coaches) adds complexity to their perceptions of academic and social roles, relationships, and motives (Higgins & Parsons, 1983). Adolescents play an active role in their socialization (i.e., self-socialization) by interpreting, negotiating, and responding to adult and peer influence, thereby accepting the values, beliefs, and models presented or challenging or resisting values that are not congruent with their ideal or future selves (Oyserman & Destin, 2010), or ones they deem inappropriate, immoral, or illegitimate (Smetana, et al., 2014).

### **The Complexity of Socialization for African American Adolescents**

Though socialization is a normal developmental process for all adolescents, the oppression and marginalization of African Americans in America creates a complexity in the content of socialization for African American adolescents. The content of the socialization of African American adolescents can be characterized as a triple quandary, the recognition that there are mainstream, minority, and cultural contexts and messages (Boykin, 1986) that African American adolescents navigate simultaneously and, that oftentimes, have contradictory influences on their values and motivations. The *mainstream* dimension of Boykin's triple quandary theory (1986) reflects American and western ideals of individualism, capitalism, and other Eurocentric values that benefit the individual at the expense of the whole society and

regards all other values or systems as illegitimate. Self-directed values focused on agentic needs, goals, and interests are typically expressed in this context. African American adolescents are commonly exposed to mainstream contexts, as 90% of teachers in K-12 schools are White (National Center for Education Information, 2005), and school norms, classroom structures, and academic content privilege Whiteness (Gray et al., 2018; Martin, 2009).

Adolescents experience the *minority* dimension of the triple quandary when they receive social, economic, or political messages that are implicitly or explicitly oppressive. Due to the racially oppressive history, systems, and practices in the United States, African American students experience oppressive messages within their schools that obstruct their instructional opportunities to belong and are intellectually, academically, culturally, and socially devaluing, particularly in mathematics (Berry et al., 2011; Gray et al., 2018; Martin, 2009). African American adolescents also receive minority socialization messages surrounding their other marginalized identities as well (e.g., female, LGBTQ, and low wealth).

The cultural dimension of Boykin's triple quandary theory (1986) for African American adolescents affirms their cultural strengths as well as counters the oppressive messages they receive. Two specific types of socialization (e.g., ethnic and racial) contribute to students' sense of pride and centrality related to their ethnic/racial identities. *Ethnic socialization* refers to messages that teach youth what it means to be a member of an ethnic group through the transmission of values, history, and ethnic pride. Ethnic socialization and dimensions of African American culture highlight the importance of connecting youth to their heritage knowledge and the principles of an African worldview including: *Collective Consciousness*, a mutual essence, energy, and excellence among those with African roots; *Collective Responsibility*, the reciprocal and interconnectedness of service; *Self-determination*, maintaining control of one's life within

the context of considering the needs of others; *Subjects with agency*, having the will and capacity to act as an individual toward a common purpose; and *Collective Humanity*, the understanding that all groups of people equally belong to the human race (King & Swartz, 2016).

Ethnic socialization promotes cultural retention, identity achievement, and in-group membership in the face of assimilation pressures (Brown & Krishnakumar, 2007; Hughes et al., 2006) and research has found that cultural messages provide a protective function for African American adolescents and positively influence group attitudes, self-esteem, and effectively coping with prejudice and discrimination, and academic goals and achievement (see review Hughes et al., 2006). *Racial socialization* is also important to this dimension as it conveys explicit messages to increase the awareness of adolescents on race as a socially constructed identity and encourage their development of coping strategies, such as skills necessary to thrive in mainstream culture and to lessen the impact of racism and negative interracial interactions (Brown & Krishnakumar, 2007).

The third type of socialization, *communal socialization*, is proposed to extend ethnic and racial socialization to academic settings in ways that connect students' values and identities to mainstream messages and practices. This conceptual and practical shift in the mainstream context reflects an increasing recognition that culturally relevant practices are necessary in American schools. According to prior research, a pedagogical shift to transmit communalism in mathematics classrooms, as opposed to individualism, has practical implications on students' academic, psychological, and social outcomes (Hurley et al., 2019; Priniski & Thoman, 2020; Simpson, 2011). Communalism, which is the value of social connectedness and an awareness that social bonds and responsibilities transcend individual privileges (Boykin, 1986), is a specific cultural value that is traditionally passed intergenerationally, a culturally informed principle, and

an emancipatory pedagogy. Communalism is one of at least nine culturally informed principles, along with spirituality, harmony, verve, and oral tradition that are grounded in an African worldview (Boykin, 1986) and is reflective of collective consciousness and responsibility, self-determination, and agency. It extends beyond ethnic messages, values of in-group connectedness, and racial messages of coping in group interactions to intersect with other ways in which individuals are socialized into marginalized positions in society (i.e., gender, low-wealth). As an emancipatory pedagogy, communalism is a philosophy of freedom continued through the development of knowledge (King & Swartz, 2016), critical thinking, and an understanding that individual actions reflect in the communities (Lewis et al., 2006) and contribute to the social justice, equality, and the empowerment of others (McLaren, 2015). The socialization of communalism in schools can elicit a positive response from students who are motivated by calls to action toward social conditions that are humanizing, democratizing, and empowering for the collective.

### **Communal socialization**

Communal socialization conveys messages and practices that explicitly and/or implicitly teach values of interdependence and social connectedness and the importance of prioritizing the well-being of the group or society. Social Interdependence Theory helps in explaining how powerful a motivator working toward a common goal can be. Individually contributing or working collaboratively with others toward a common purpose positively impacts one's individual performance, cognition, and moral reasoning (Johnson, 2003). Collaborative experiences also positively impact one's self-esteem as a result of enjoying the experience and/or interacting with and receiving feedback from others.

Though communal messages and practices can be transmitted through multiple sources, including parents and family, teachers and schools, as well as through one's interactions with peers, media, local communities, and the broader society; the focus of this study is on the practices the mathematics teachers. The dynamic nature of socialization leads to three dimensions of communal values, (i.e., personal-, community-, and equity-focused) that are theoretically aligned with distinct values expressed within the fields of psychology and teacher education.

The dimensionality of communalism has been explored as one's social orientation, belief in social connectedness and dependence, and commitment to community (Scott, 2003). As a personal value (i.e., an orientation and belief in social connectedness and interdependence), communalism positively influences the development of adolescents' moral reasoning through the development of character, caring and empathy, and connection with others as a primary consideration in their thoughts and actions (Humphries & Jagers, 2009; Woods & Jagers, 2003). Thus, communal socialization can be fostered through culturally relevant social and emotional learning practices that emphasize strengthening bonds and belonging as well as appealing to students' positive emotions to foster a shared experience of social warmth and connectedness (Hoffman et al., 2009). This approach motivates students to contribute to and share responsibility for the communal well-being the group (King & Swartz, 2016) through *collaborative* communal purposes, working together to solve academic tasks (Boykin & Bailey, 2000), and high regard for mutual responsibility, physical proximity, and giving and receiving care, resources, and help from others (Hurley et al., 2019).

In the community-focused dimension of communalism (i.e., commitment to community), communal values and orientations were associated with greater prosocial beliefs and

engagement. Prior studies found adolescents preferred *prosocial* communal purposes, those involving the internal motivation to achieve and function in a manner that reflected one's beliefs about community, political, and social justice responsibilities (Humphries et al., 2000; Gooden & McMahon, 2016; Grills et al., 2016). By extension, the community-focused dimension of communal socialization is characterized by the transmission of messages, models, and experiences that foster (1) beliefs that prioritize the welfare or improvement of one's community, and (2) the importance of using mathematics to better understand or contribute to problems in one's community.

Although communal values have been described as a three-dimensional construct reflecting orientations, beliefs, and commitment to the community, I propose communal socialization as a three-dimensional construct that extends prior literature to include equity-focused values as an additional component. The equity-focused dimension of communal socialization is proposed to convey the transmission of explicit and implicit messages that prioritize equality and justice. This dimension aligns with the concepts of universalism and collective humanity (King & Swartz, 2016; Schwartz, 1992). Values in this dimension include equity for all people, social justice, and environmental justice. McGee and Bentley (2017) uses the term *equity ethic* to describe concern for others that extends beyond individuals that share a group membership, but also to benefit marginalized people and promote fairness in situations such as digital and high-speed internet access in poor and rural areas, environmental racism, and health disparities. Educational research on mathematics has also found that equity and justice motivate students' academic engagement and sense of purpose (Gutstein, 2016; Winter, 2007).

## **Meaningfulness as a Conceptual Framework**

Given the complexity in the socialization that African American adolescents receive, it is important to empower students academically and motivationally through meaningful school experiences that connect to and support students' identities, values, and interests.

Meaningfulness refers to the value students place on learning and engaging in classrooms, particularly when the pedagogy and practices of teachers legitimize their cultural background and align with their individual and cultural modes of learning (Kumar et al., 2018).

Meaningfulness, as a theoretical construct, can be positioned at the intersection of culturally relevant pedagogy and achievement motivation research as it (1) reflects the relevance to and congruence with students' identities, values, and interests; and (2) supports the importance of communal socialization in classrooms.

Expectancy-Value Theory captures meaningfulness in the characterization of student behavior as motivated by tasks and domains that are important, interesting, useful, and the costs are worth the effort or risk (Kumar et al., 2018; Wigfield & Eccles, 2000). Of the four task values that align with meaningful action, attainment value and cost require adolescents to consider their identities. *Attainment value* is the pursuit of or engagement in actions that are consistent with one's self-image, personal identities, and/or social identities. Specifically, students' mathematics identity, their dispositions, and beliefs about their ability to "participate and perform effectively in mathematical contexts and use mathematics to change the conditions of their lives" (Martin, 2009), are crucial to their performance, persistence, and achievement in mathematics (Miller & Wang, 2019). In the face of challenge, students will evaluate the costs of participating and performing, and are more likely to persevere in situations in which the perceived costs, effort, resources, or social capital an action required do not outweigh benefit, or

if the action is reflective of and/or congruent with their current or future selves (Oyserman & Destin, 2010).

Within classrooms, teachers' pedagogy and practice have an influence on African American students' perceptions of the meaningfulness of mathematics as well as their subsequent academic engagement and achievement. Four equity-driven instructional practices have been implemented in mathematics classrooms: standardized-based mathematics instruction, complex instruction, culturally relevant pedagogy, and critical mathematics (Rubel, 2017), each with a distinct emphasis that align with one or more of dimensions from Gutiérrez's (2012) framework. *Standard-based mathematics* is an access and achievement aligned practice that prioritizes conceptual understanding and mathematical thinking over simple and rote learning. This instructional approach grants students access to complex, higher order thinking and problem solving to promote their academic achievement (Rubel, 2017). Students are given autonomy over their mathematical strategies and mistakes are seen as tools of learning instead of for stigmatization. *Complex instruction* aligns with the access and achievement dimensions as the focus is on students' active participation in mathematics in a way that builds their competency through multidimensionality. This is a multiple-practices approaches to learning as opposed to the traditional one-size-fits-all approach. These two pedagogical practices increase the mathematical rigor and expectations of students and promote equitable mathematical learning, yet they are insufficient for historically marginalized students (Wilson et al., 2019) as they do not address nor focus on the cultural values or practices of students.

*Culturally relevant pedagogy* alleviates the cost of participating and performing in mathematics by providing a way for students to maintain their cultural integrity while pursuing academic achievement (Ladson-Billings, 1995). In addition to the emphasis on access and

achievement, culturally relevant pedagogy (CRP) connects mathematics to students' cultural values, practices, and experiences, thereby focusing on the cultural context of teaching and learning to increase students' utility for and interest in mathematics (Rubel, 2017). Ladson-Billings (1995) identified three components of CRP as: student achievement, cultural competence, and cultural critique. Cultural competence is the practice of honoring students' cultural beliefs and practices while providing access to a wider culture. Cultural critique is the practice of developing students' socio-political consciousness, to increase their recognition, understanding, and critique of the inequities in their social world (Aronson & Laughter, 2016).

CRP research has provided several insights into the instructional practices that support African American students. Wilson et al. (2019) compared conceptually-oriented classrooms from which students performed above expectations or below expectations. High performance classrooms were reflective of the presence of teachers' high expectations for students to be active participants in the classroom. Students were coached to explain their work and collaborate with others, thereby giving them authority over their mathematical knowledge. In addition, students' local context, language, and sense of community were attended to within these environments. Joseph et al. (2019) found that students positively responded to their teachers' ethic of care which made them feel visible in the classroom and to the collective learning experiences that connected them to their peers. Battey (2012) found that students perceive "good" mathematics teaching as relational opportunities in the classroom, including teachers' acknowledgement of students' abilities and contributions, as well as teachers' application of connections to everyday contexts that scaffold mathematics. These studies highlight a social and relational aspect of the mathematics classroom that connects students to their teachers, to one another, and bridges their learning contexts (e.g., school, home, and community).

## **African Americans Students' Need for Critical Engagement**

As reflected in the three equity-driven instructional practices mentioned thus far, meaningfulness can be extended not only to consider African American adolescents' personal identities, but their social identities as well. Whether tied to race, ethnicity, or other marginalized identities, the impact of minority messages can be lessened by an increasing students' sense of awareness and action toward equity for their communities and broader society. Self-determination theory literature espoused three psychological needs for optimal psychological functioning: *relatedness*, one's perceived of being personally accepted, respected, included, and supported by others in their learning environment (Goodenow, 1993); *competence*, one's perceived ability to produce desired effects by their actions (Bandura, 2005); and *autonomy*, the perception that one's actions are based upon one's own choices and not external factors (Deci & Ryan, 1987). Eccles (2007) recognized the experience of purpose and meaning in one's social world as an additional universal need that can influence students' attention, investment of cognitive and affective resources, and identification with academic goals and aims.

The sense of purpose developed through the recognition, understanding, and critique of historical and current-day social inequities which is described as cultural critique in teacher education literature, psychological empowerment in psychology, and critical consciousness in critical theory (Freire, 1970; Ladson-Billings, 1995; Zimmerman, 1995), can serve a dual function of strategy for coping with structural inequalities (Travis & Leech, 2014) and motivating academic and social engagement and action. Thus, a sense of empowerment developed through classroom experiences that connect to African American adolescents' communities or broader justice challenges (e.g., educational, racial, environmental, health,

juvenile, immigration, and gender-related) (Travis & Leech, 2014) can positively impact adolescents' perceptions of their roles in creating social change.

*Critical mathematics*, the fourth equity-driven instructional practice, extends culturally relevant pedagogy to analyze and respond to social injustices through mathematics (Rubel, 2017). Teachers have the capacity to empower students through their emphasis on mathematical knowledge, connections to their personal and social identities, and the action-oriented nature of asserting power over injustice and inequity. Winter (2007) taught undergraduate students to apply mathematical concepts within the context of a real-world equity issue of water rights in Botswana. Discussions about social conditions were a part of the lesson which assisted the students within the experimental condition to score higher on general knowledge post-tests. These students also received significantly higher grades than their peers in the control condition. Rubel et al. (2016) examined the instructional practice of teaching a financial literacy curriculum within the context of spatial justice, a type of social justice in urban areas where equity in access to public services is a challenge. Gutstein (2016) engaged his high school African American and Latinx students in mathematics within the context of several social justice issues including displacement due to predatory loans and criminalization of young and people of color. The goal of these studies was to equip students with a deep understanding of mathematics and of their social reality so that they could analyze cases of injustice and prepare to address them. Students in these classrooms reported feelings of academic and personal empowerment through their co-constructed knowledge and understanding of the mathematics they learned throughout the course.

CRP and critical mathematics aligned with the identity and power dimensions of Gutiérrez's (2012) framework; these link mathematics with adolescents' developing sense of self

by providing opportunities to connect mathematics to their lives, communities, and interests in equity and justice more broadly. The pedagogy and practice of the teachers within these two instructional practices, the transmission of messages, models, and experiences that teach, affirm, or reinforce students' sense of connectedness within the classroom and their social world, are reflective of the personal, community-focused, and equity-focused dimensions of communal socialization.

### **The Influence of Communal Value on Students' Academic, Psychological and Social Outcomes**

Culturally relevant research has highlighted teachers' efforts that are beyond honoring and affirming culture, to integrating communal values (i.e., social connectedness, community-focused, and equity-focused values) into teacher pedagogy and practice in a sustaining and meaningful way. Mathematics content has been connected to the lives and communities of students by developing learning communities, embedding mathematics concepts in cultural, social justice, and personal experiences, and addressing the problems facing local communities (Aronson & Laughter, 2016). Study findings indicated that students improved their mathematics learning in addition to gaining greater confidence and increasing awareness of how important mathematics is in their everyday lives in these culturally rich learning environments. In psychology, experimental studies have engaged African American students in problem-solving tasks that examined academic performance and preference for communal-, individual-, and/or competitively- conditioned activities. Boykin and Bailey (2000) found that students within the communal condition preferred working in groups; as a result, they significantly experienced better cognitive performance, persistence during tasks, and care in their peers' learning. Hurley et al. (2019) reinforced these findings, African American students' communal orientations

predicted better performance on experimental mathematics tasks taught in a communal setting.

In an experimental course that promoted Afrocentric principles and practices, Lewis et al. (2006) found that African American students who received the cultural empowerment intervention experienced more positive change in their motivation to achieve, as well as their communal orientation and school connectedness than students who received the control intervention.

**Communal value.** It is important to note from the findings of each of the experimental studies, that even with perceived homogeneity in the communal value and orientation of African American people, students were heterogeneous in their reported communal and individualistic orientation and preferences. Several factors could have contributed to these findings including, the saliency of the present cultural orientation in the lives of students (Boykin & Bailey, 2000), the role of self-empowerment or an increased focus on students' academic excellence (Lewis et al., 2006), and the importance of other contextual variables (i.e., family or community related) to students' values and actions (Hurley et al., 2019). For example, socialization of gender biased expectations (Salgado, 2018), community connectedness (Whitlock, 2007), and economic and social conditions (Park et al., 2014) were examined as specific contextual factors that impacted communal orientation and preference. Therefore, an examination of students' value of communalism in addition to considering the relationship between their values and the communal socialization experiences in mathematics classrooms would not include assumptions based on race, ethnicity, or culture.

**Academic engagement.** To privilege the use of culturally relevant practice such as communal socialization in mathematics classrooms, it is important to reference students' achievement (Sleeter, 2012). Academic engagement, which entails the active involvement in academic activities, fosters commitment and persistence toward academic achievement

(Fredricks et al., 2005; Fredricks et al., 2018). The four engagement components (e.g., behavioral, cognitive, emotional, and social) dynamically interact within individuals (Wang & Peck, 2013; Skinner et al., 2009) and are influenced by contextual factors including teachers' instructional practices and learning tasks (Fredricks et al., 2018). Behavioral engagement refers to participation in learning activities, including the presence of positive conduct, and absence of disruptive behavior within school or class (Wang & Peck, 2013). Cognitive engagement refers to the investment in and use of self-regulated strategies to learn new material, including exerting mental effort to understand and master knowledge (Wang and Peck, 2013; Zimmerman, 1989). In a classroom setting, students' motivation to engage cognitively is demonstrated by actively engaging with the content they are learning and using their organizational, analytical, investigative, and comprehension skills to complete their work. Wang and Eccles (2011) examined the developmental trajectories of adolescents' behavioral, emotional, and cognitive engagement between their seventh and eleventh grade years to understand their changes and influence on student academic achievement and educational aspirations. They found positive correlations between behavioral and cognitive engagement and academic grades and future aspirations.

Emotional engagement encompasses the positive affective reactions (e.g., happy, bored, and excited) associated with presence in the class, where school connectedness, teacher support, and peer relations have been influential factors (Chung-Do et al., 2015). In a longitudinal study, Chase and colleagues (2014) examined the relationship between emotional engagement and GPA and found lasting effects of students' engagement on their grades a year later. Social engagement is an indicator of group functioning and can provide insight into how students' perceptions of their group interactions (e.g., working cooperatively, building on one another's ideas, and

helping others through difficulties) influence their overall academic engagement. Fredricks et al. (2018) found that students generally engaged more in academics when working with their peers during hands-on and personally relevant tasks. In addition, females preferred collaborative and real-world connected learning. These findings support the importance of considering academic engagement as an indicator of academic achievement, as well as an outcome associated with meaningful and relevant instruction.

**Grades.** Mathematics has been characterized as a “gatekeeping” course, as evidenced by Douglas & Attewell’s (2017) longitudinal analysis of students’ performance in mathematics. Performance in this study, measured using standardized tests and the highest level of mathematics studied in high school, had a significant relationship with students’ college enrollment and degree attainment. With regard to grades, analyses showed that overall, high school grades were significantly lower and the percentage of failing grades was much higher (9.5% compared to 5.3%) in mathematics when compared to grades and failure rates in non-mathematics courses. More specifically, African American students have experienced persistently low academic performance in mathematics, and mathematics has become associated with nerdiness, white males, and innate ability (Ladson-Billings, 1997). Grades, as an indicator of students’ progress in mathematics throughout the semester, are an important consideration for how communal socialization (and culturally relevant pedagogy more broadly) influence academic achievement.

**Attainment value.** Attainment value is the subjective task value from Expectancy Value Theory that reflects the importance students place on academic content when it is relevant and congruent to their identities, values, and interests. Prior research on the relationship between communalism and task values have focused on the utility or usefulness of academic content,

courses, and careers for their future goals. Examination of this research is helpful when considering ways in which students' academic interests are related to their social orientations toward helping others. Scholars in the fields of educational psychology and social psychology scholars have examined how STEM-focused majors and careers can be portrayed as congruent with and ascribing communal value to marginalized students who are typically underrepresented in these fields. Utility-value interventions designed to influence students' perceptions of STEM fields, though predominately science-focused, have supported their *communal utility value* or value in domains or activities in which they work with, help, or develop relationships with others (Brown et al., 2015). Study findings consistently supported the hypothesis that exposing students to the communal benefits of biomedical science, statistics, engineering, chemistry, and environmental engineering careers significantly impacted their communal value, interest, and motivation (Allen et al., 2015; Brown et al., 2015; Fuesting et al., 2017; Steinberg & Diekman, 2017). Further, in examination of the theoretical distinction between prosocial and collaborative communal purposes, Allen et al. (2015) found that pro-social communal goal purposes predicted greater science interest for first generation college students than the collaborative ones.

These brief and psychologically powerful interventions have also been used to influence students' relevance for STEM. Gaspard et al. (2015) discovered that exposing students to psychoeducational material about the relevance of mathematics and active engagement with related quotations had positive effects on their sense of relevance for mathematics. Though these interventions lacked emphasis on the influence of teachers' practices and students' mathematics attainment, this area of study is particularly impactful for African American students. Miller & Wang (2019) showed that teachers' practices (e.g., emotional support, classroom management, and instructional support) contributed significantly to an increase in African American secondary

students' mathematics identities. This study contributes to the research that assesses the influence that teachers wield to strengthen students' relevance for STEM, personal and social identities, and their interests in contributing to their communities or society more broadly.

**Ethnic and Racial Identity.** Ethnic and racial socialization have been previously discussed as components of the cultural dimension of Boykin's triple quandary theory (1986) as messages and practices that affirm the cultural strengths of African American students and counters oppressive experiences. Whereas students' ethnic identities can comprise of heritage knowledge (e.g., values, history, and traditions) in relation to being of African American descent, their racial identities are tied to the social construction of race and the level to which being African American is central to their self-definition. Both are recognized as identities that can be hierarchically important to students' broader sense of self. Using culturally relevant practices, specifically emphasizing communal value as an associated cultural value, these identities can be connected to students' relevance and identification with mathematics.

Through qualitative analysis, McGee and Bentley (2018) identified an equity ethic that motivated underrepresented college students' academic motivation and engagement in STEM-related fields. Participants were motivated to use their STEM careers to help their communities and promote social justice for those in broader society who were experiencing inequities. Matthews (2017) found similar motivations in a group of African American and Latinx middle and high school students. Using qualitative inquiry to explore African American and Latino students' experiences as teachers connected mathematics to their real-world experiences, findings indicated African American students were motivated to achieve in mathematics to protect their collective identity and contribute to the "Black experience".

Utilizing a mixed methods approach, Gray et al. (2020) found that African American and Latinx middle school students were more engaged in STEM-related activities when lessons were framed and scaffolded by their teachers as serving one another, serving their communities, and/or serving humanity. Case studies were used to explore students' and teachers' perceptions of a communally-focused instructional unit. Students acknowledged the significance of collaborating and helping one another while individually contributing to their communities. Teachers who facilitated highly engaged classrooms acknowledged that providing cultural continuity through instructional and curricular opportunities supported students' identities as agents of change. These three studies, which focused on minority student populations, illustrated the level of mathematics connectedness that can be achieved when academic content is presented in a way that students find relevant to their academic, racial, and ethnic identities, as well as to development of their critical awareness and social responsibility.

**Social Responsibility.** Social responsibility is an orientation toward civic engagement (e.g., helping, community, and political) that positions students to think about themselves as contributors to their local communities and broader society (Hope, 2016). Social responsibility includes the development of responsible behaviors, problem solving skills, persistence, and awareness of one's social conditions can have academic and social implications for the individual and the community (Wentzel, 1991). Students' sense of responsibility is fostered through their physical and social learning environments (e.g., home, school, and media), particularly through the transmission of customs and beliefs (Guillaume et al., 2015). Wray-Lake et al. (2017) found a relationship between a decline of social responsibility beliefs during middle adolescence and a decline in the relational climate of students' learning environments. In contrast

to this, students' value for an equitable and just society (e.g., democratic principles) and volunteering increased their sense of social responsibility.

In summary, communal value research, though diverse in approach, consistently supports the notion that (1) meaningfulness plays a key role in students' motivation to engage tasks, activities, and domains that are congruent with their values of social connectedness; and (2) meaningfulness can be fostered through messages, models, and practices that integrate academic content and students' identities, values, interests. This research also leaves a few points to be explored such as the dimensionality of communal values espoused in mathematics classrooms and their impacts on students' academic engagement, psychological well-being, and sense of social responsibility. Also, in recognizing the heterogeneous nature of the African American student population, it is important to consider what student and context-based characteristics contribute to the experiences they have in mathematics classrooms. Understanding these key points will also make student outcomes more interpretable and directive for educators and educational researchers.

### **The current study**

Given that research supports instructional practices that promote the academic achievement, cultural continuity, and empowerment of African American students, it is important to address the call for examinations into "what" and "how" teaching practices contribute to students' mathematics identities and act as motivational mechanisms for students (Frenzel et al., 2012; Miller & Wang, 2019). To address the "what", I conceptualize communal socialization as an emerging framework that is relevant to African American adolescents' achievement, identity, and motivation in mathematics. By extending the socialization literature to the concept of communal socialization, African American adolescents are centered within their

school experience through opportunities to identify the value of mathematics as congruent with their own, *interpersonally*, through social connections among peers and with teachers, *instructionally*, through scholastic activities that affirm their cultural values and systems, and *institutionally* (Gray et al., 2018), through ideas and actions to make systems around them more equitable and just.

To address the “how”, I leverage the strengths of teacher education and educational psychology literatures. Mathematics education literature, including those utilizing culturally relevant and critical pedagogies, typically employ qualitative methods (Dee & Penner, 2016; Kumar et al., 2018) to provide descriptive accounts of individual or small groups of classrooms, detailing teachers’ pedagogies, instructional practices, and/or students’ perceptions of mathematics experiences. Though these studies provide rich data on a selective group of teachers and students, the findings provide limited insights into the effectiveness of these practices out of their original context. In contrast, educational psychology literatures typically utilize quantitative methods to understand perceptions and motivational processes, yet this research often lacks examinations of race-focused or race-reimaged constructs (DeCuir-Gunby & Schutz, 2014).

I propose the use of latent profile analysis as a person-centered quantitative approach, one that will allow for a deeper understanding of the heterogeneity in African American students’ communal socialization experiences within their mathematics classes through the sampling of students from different regions, schools, and classrooms. Latent profile analysis, as an exploratory quantitative method, will be used to identify students within the sample who have similar responses across communal socialization dimensions. Analysis will produce results of students clustered together into profiles or groups so that variability between groups can be further explored. Latent profile analysis has been used to examine the heterogeneity in African

American students' perceptions of their parents' academic socialization (Metzger et al., 2020) and ethnic/racial socialization strategies (Byrd & Ahn, 2020; Seaton et al., 2012), revealing varying patterns of message timing, content, and level of intensity.

The use of profiles to examine school-based ethnic/racial socialization (Byrd & Ahn, 2020) and teachers' instructional practices within mathematics classrooms (Yi & Lee, 2016) reflect the potential for this method to capture the range of communal socialization strategies employed in mathematics classrooms. Profiles of students' beliefs and attitudes about mathematics and science (Berger et al., 2020; Rangel et al., 2020) revealed four and six distinct profiles, respectively, that indicated a complexity in students' interest and values in the domains that were associated with a broad range of factors from academic performance to parent education level. In this study, once latent profiles are constructed, additional analysis will be conducted to better understand variations, such as associations between communal socialization in mathematics, individual and contextual factors, and student outcomes. While analysis of variance (ANOVA) was predominately used in the above-mentioned studies as a subsequent analysis to examine the associations between latent profiles and student characteristics (i.e., age, gender, socioeconomic status) and students' outcomes, (i.e., academic, identity development, psychological well-being), regression methods such as logistic regression were also employed.

The following research questions will be used to address these points in this study:

1. What are the dimensions of communal socialization and how are they empirically distinguishable from one another?
2. What profiles emerge to explain the variation in the communal socialization that African American adolescents experience in their classrooms?
3. What, if any, individual or contextual factors are significant in the profiles?

4. What is the association between adolescents' communal socialization and their academic engagement, psychological well-being, and sense of social responsibility?

## **Chapter 3: Method**

### **Sample**

Participants included 308 high school students (74% female) who self-identified as African American (Table 1). Participants were classified by age group: 11-13 years old (2%), 14-17 years old (81%), and 18-19 years old (17%). Twenty-four percent of the total sample of students were freshmen, 24% sophomores, 25% juniors, and 27% seniors. Students were enrolled in one of 16 mathematics courses: 3% in Basic math (e.g., general, business, essential, and consumer math), 55% in Algebra (e.g., pre-algebra, algebra I and II, trigonometry, financial algebra), 20% in Geometry (e.g., geometry, analytic geometry), and 21% in Advanced Math (e.g., integrated math I and II, statistics and probability, pre-calculus, calculus, and college algebra). Seventy-one percent of participants reported a current grade point average of 80% or above.

Participants were recruited from across the United States (Table 2). The highest participation per state was in Florida (26%) and Texas (11%). Students identified their racial composition of their neighborhoods: 39% live in African American-majority neighborhoods, 31% live in racially diverse neighborhoods, and 30% live in African American-minority neighborhoods. School lunch information was gathered as an indicator of socioeconomic status. Forty eight percent of students reported receiving free lunch, 23% reduced-price lunch, and 29% full-priced lunch.

### **Procedure**

After approval by the university Institutional Review Board, recruitment was conducted through a nationwide Qualtrics panel. This recruitment strategy supported the examination of the in-group differences of a racially homogenous sample and provided greater insights into what

factors significantly impacted students' perceptions of their mathematics teachers' communal socialization and related outcomes. The demographic information collected included individual (i.e., grade/age, gender), family (i.e., SES, neighborhood racial composition), and school information (i.e., name of school and state of residence). Sampling continued until 310 participants who met all criteria completed the survey.

Surveys were administered electronically, and participants were compensated by Qualtrics for their full participation in the study. The first page of the study contained a recruitment script followed by the consent and assent forms as appropriate for the age groups (Appendix B). Next, participants were prompted to complete demographic questions to determine inclusion in the study. Those who met the inclusion criteria were between ages 13 and 19, were in grades 9-12, and self-identified as African American. Participants who did not consent to completing the study or did not meet the inclusion criteria were directed to the end of the survey. In an effort to ensure quality data, participants were excluded if they failed one of two attention checks: completing the survey in less than 10 minutes or responding to the survey by providing consistently high or low scores, even with the presence of reverse coded items.

## **Measures**

### ***Scale Refinement***

The Communal Socialization scale was developed through a process of literature review and compilation, adaptation, and creation of items (Table 3). To evaluate the content and face validity of the measure prior to the study, the items were assessed by scholars with expertise in communalism, resulting in further distinctions between the dimensions and item clarity. To determine usability of the survey measure (via smartphone and computer), as well as whether items were consistently understood by the sample population, a focus group of African American

students completed the survey. A debriefing session followed in which the group reviewed the experiences of responding to the questions and made recommendations to further improve the clarity and readability of the measure.

### ***Profile Indicators***

*Communal socialization* was measured by the Communal Socialization Scale to assess the perceptions of adolescents regarding their mathematics teachers' pedagogy and practice that implicitly and explicitly communicate awareness and/or commitment to social bonds and responsibilities over individual privileges. This socialization was assessed in three dimensions of communal values: personal, community-focused, and equity-focused. Since few scales included multiple items specific to the transmission of communal values on these three dimensions, this scale was developed using constructs and items drawn from multiple sources including: Schwartz's theory of basic human values (1992), the Communal Learning Opportunities scale (Gray et al., 2020), Gutstein's (2003) qualitative study, the Citizenship subscale of the Socially Responsible Leadership Scale (Tyree, 1998), and Developmental Assets (Search Institute, 2011). The prompts, "How often does your mathematics teacher emphasize or stress your responsibility to", "My teacher...", or "How often does your mathematics teacher emphasize or stress the importance of..." were used to assess items on each dimension (Table 3). Participants indicated the frequency of each statement on a scale from 1 = Never to 5 = Always.

Teachers' implicit and explicit actions can help to guide students' moral reasoning, empathy, choices, and sense of purpose. The transmission of messages and models that fostered the development of students' values of care, responsibility, restraint through respect and accepting traditions and norms, and commitment to others were assessed on the personal values dimension. *Personal values* items include, "traditions, customs, and group norms/rules",

“helping others”, “respecting authority figures like teachers and elders”, and “being a part of a group effort”.

The community-focused dimension of communal socialization is characterized by the transmission of messages, models, and experiences that foster (1) beliefs that prioritize the welfare or improvement of one’s community, and (2) the importance of using math to better understand or contribute to problems in one’s community. Community-focused values items included, “students have the power to make a difference in their community”, “connecting math to problems in my community”, and “using math to address community and student concerns and interests”.

The equity-focused dimension of communal socialization is the transmission of messages, models, and experiences that convey equity for all people, social justice, and environmental justice. Equity-focused value items included, “understanding the world using mathematics”, “participating in activities that contribute to the common good”, “show how my actions can protect the lives of humans, animals, or plants”, and “focus on issues of justice and equity”. Participants will indicate the frequency of each statement on a scale from 1 = Never to 5 = Always.

### ***Academic Outcomes***

The academic outcomes assessed in the study included participants’ report of their cumulative grade point average as well as their academic engagement (Table 4). The *academic engagement* scale consisted of four subscales and eighteen items adapted from student engagement measures (Phan et al., 2016; Suárez-Orozco et al., 2009; Wang et al., 2016) to assess students’ cognitive, behavioral, emotional, and social engagement in school. Cognitive items included “I enjoy learning new things in class” and “I study at home even when I don’t have any

homework". Behavioral engagement items included "I always pay close attention in class" and "I usually spend hours on homework after school". Emotional engagement items included "I feel happy in class" and "I feel excited by the work in my class". Social engagement items included "I build on others' ideas" and "I try to help others who are struggling in class." Items were assessed on a scale from 1 = Not true at all to 5 = Very true of me.

An Exploratory Factor Analysis of the *academic engagement* scale revealed variance from its previously reported structure. Bartlett's test of sphericity was statistically significant,  $\chi^2(120) = 2091.65, p < 0.001$ . The results supported a multi-dimensional construct of engagement, supporting four factors with eigenvalues higher than 1.0, CFI = 0.94, TLI = 0.89, and RMSEA = 0.001. Factor One resulted in a three-item measure comprised of behavioral and cognitive engagement items. The items indicated students' academic engagement with homework with item factor loadings ranging from 0.41 to 0.80. Factor Two resulted in a seven-item measure comprised on cognitive and emotional engagement items. These items indicated students' emotional engagement with mathematics with item factor loadings ranging from 0.54 to 0.80. Factor Three resulted in a three-item measure comprised of behavioral engagement items with item factor loadings ranging from 0.43 to 0.95. Factor Four is a three-item factor comprised of social engagement items with item factor loadings ranging from 0.47 to 0.70. Two items from the original measure were eliminated from subsequent analyses due to loadings on all three factors ranging less than 0.40. Cronbach's alpha for the total scale was 0.88.

### ***Psychological well-being outcomes***

The psychological and identity-related outcomes assessed in this study included adolescents' communal values, ethnic pride, racial centrality, and attainment value of mathematics (Table 4). The adolescent Communal Values measured utilized items drawn from

the Theory of basic human values (Schwartz, 1992), Pre-Adolescent Civic Engagement Scale (Nicotera et al., 2010), a values measure (Park et al., 2014), and the Personal Responsible Citizen scale (Flanagan et al., 2007). The measure consisted of six items that measured the communal and self-transcendent beliefs of adolescents, their sense of communal responsibility to the communities with which they identify, and their sense of communal responsibility with a focus on equity and justice for the society and/or environment more broadly. Students were prompted to select the answer that best described them on the following items: “I value traditions, customs, and group norms/rules”; “I value helping others even when I’m not being paid”, “I value working with others toward a common goal”, “I value opportunities that allow me to contribute to my community”, “I value thinking about social problems and about how they might be solved”, and “I have a role in making the world a better place” on a scale of 1 = Strongly Disagree to 5 = Strongly Agree. Cronbach’s alpha for the scale was 0.85.

The *Ethnic pride* subscale of the Adolescent Racial and Ethnic Socialization Scale (ARESS) developed by Brown and Krishnakumar (2007) was adapted to measure adolescents’ positive feelings about being African American. Three items, “I have been taught to have pride in my culture”, “I am encouraged to be proud of my background”, and “I am encouraged to be proud of the accomplishments of African Americans/Blacks” were assessed on a scale from 1 = Strongly Disagree to 5 = Strongly Agree. Cronbach’s alpha for the scale was 0.83.

*Racial centrality* was measured using items from the Multidimensional Inventory of Black Identity-Teen (MIBI-Teen) from Scottham et al. (2008) to examine the extent to which adolescents identify racial group membership as part of their overall sense of self. Three items, “I feel close to other Black people”, “I have a strong sense of belonging to other Black people”, and “If I were to describe myself to someone, one of the first things I would say is that I’m

Black” were assessed on a scale from 1 = Strongly Disagree to 5 = Strongly Agree. Cronbach’s alpha for the scale was 0.77.

*Attainment value* was measured using items from Conley (2012) and Part et al. (2020) to assess students’ perceptions of mathematics as being important to their sense of self. Five items, “Being someone who is good at math is important to me”, “Being good at math is an important part of who I am”, “It is important to me to be a person who reasons mathematically”, “Thinking mathematically is an important part of who I am”, and “It is important for me to be someone who is good at solving problems that involve math” were measured from 1 = Not at all true” to 5 = Completely true. Cronbach’s alpha for the scale was 0.83.

### ***Social Responsibility Outcome***

To assess adolescents’ sense of *social responsibility*, items from the Personally Responsible Citizen subscale of a civic engagement measure (Flanagan et al., 2007) and the Social Justice Orientation measure (Westheimer & Kahne, 2004) were combined to examine African American adolescents’ perceptions of socially responsible behaviors (Table 4). The items assessed participants ratings of agreement on five items, each beginning with the stem “It is important for young people to...”, a) help when they see people in need, b) be kind to other people, c) help their community through fundraising, volunteering, or service, d) donate food or used items, and e) participate in protests, marches, or demonstrations. Items were assessed on a scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Cronbach’s alpha for the scale was 0.85.

### ***Covariates***

Individual and contextual variables included age, grade level, mathematics subject, school lunch status as a proxy for socio-economic status, region of the country, and

neighborhood and school racial composition. National Center for Education Statistics data from 2018-19 was used to measure school racial composition. The racial composition of students' home and school settings provided an opportunity to explore additional contextual factors that have the potential to influence the communal socialization students received in their mathematics classrooms.

### **Analysis Plan**

Preliminary analyses included descriptive statistics and correlations. To address Research Question #1, exploratory factor analysis (EFA) was conducted to examine whether there are three distinct dimensions of communal values (i.e., personal, community-focused, and equity-focused) present in the data. EFA is the recommended method of analysis during scale development to explore the dimensionality as well as unexpected factors and correlations between items (Flora & Flake, 2017). The process of understanding the relationships, patterns, and common variance between the measures (Yong & Pearce, 2013) led to determining the appropriate number of common factors and the fit of each indicator variable within the latent dimensions (Brown & Moore, 2012). To further validate the model fit and use of this scale to investigate communal socialization in mathematics classrooms, additional analyses were conducted, including Cronbach's alpha and Root Mean Square Error of Approximation (RMSEA). MPlus 8.0 (Muthén & Muthén, 2017) was used to conduct these analyses.

To address Research Question #2, this study examined the distinct latent profiles that modeled the unique subgroups of communal socialization based upon adolescents' perceptions of the communal messages and models received from their teachers. Latent Profile Analysis (LPA) is a person-centered approach to identify patterns of students' responses to questions about the communal messages, models, and tasks they receive in their classrooms. Based on my

interest in exploring whether heterogeneity exists in African American adolescents' experiences of communal socialization in their classrooms, this method was used to determine the distinct profiles of values (i.e., personal, community-focused, and equity-focused) and communal tasks perceived by these youth. Profiles indicated the presence of low-high communal socialization in the three dimensions confirmed through the EFA.

Model retention was determined by testing five models each with increasing numbers of profiles. LPA was conducted in Mplus using maximum likelihood estimation with robust standard errors. Based on Ferguson et al.'s (2020) guidelines, model fit was evaluated using Bayesian Information Criteria (BIC) and Akaike Information Criteria (AIC). Sample Size Adjusted BIC (SSABIC) was not included in the criteria since the sample size was consistent in all models. In addition, higher entropy values (i.e., approaching 1) indicated better probability for the successful classification of participants in a latent class. The Lo, Mendell, and Rubin (LMR) test was used to compare the likelihood ratio between models – a non-significant result indicated when additional profiles did not improve the model. Therefore, the best fit solution found low BIC, AIC, high Entropy, and the highest number of profiles with a statistically significant LMR value.

To address Research Questions #3 and #4, this study further analyzed how latent profiles can be used to: (1) understand the roles of gender, age, or other individual and contextual factors within these profiles and (2) predict adolescents' academic, personal identity and well-being, and social-related outcomes. Once communal socialization profiles were identified, chi-square analyses were conducted to examine the variations within categorical variables including age, grade level, math subject, lunch status as a proxy for socioeconomic status, region of the country, and neighborhood and school racial composition.

Multiple regression was used to examine the relationships between profile membership and students' academic (e.g., academic engagement and academic grades), psychological well-being (e.g., communal values, racial and ethnic identity, and attainment value), and sense of social responsibility. Analyses were conducted with each psychological, academic, or social outcome serving as the dependent variable, while profile membership served as the independent variable (Pastor et al., 2007). In addition, the individual and contextual variables that were previously identified to be significant between profiles (e.g., age, math subject, and neighborhood racial composition) were added to the analyses as control variables.

## **Chapter 4: Results**

### **Preliminary Descriptive Statistics**

Bivariate correlations were examined between demographic (individual and contextual) and outcome variables (Table 5). An alpha level of 0.05 was used for all statistical tests. Overall, there were small correlations between the demographic variables. Grade level and course were positively correlated as expected,  $r(308) = 0.20, p = 0.001$ . There was a negative correlation between enrollment in schools with predominately African American student populations and higher socioeconomic status,  $r(255) = 0.19, p = 0.003$ . There was a positive correlation between neighborhood and school racial composition. Students living in neighborhoods with more African American households were more likely to attend racially diverse or predominately African American schools,  $r(255) = 0.19, p = 0.003$ . There was a negative correlation between enrollment in predominately African American schools and region of residence,  $r(255) = 0.18, p = 0.003$ .

In addition, there were small correlations between demographic characteristics and student outcomes. Students in lower grade levels reported higher communal value,  $r(307) = 0.11, p = 0.05$ . With regard to gender, there was a positive correlation between female students and their levels of ethnic pride,  $r(307) = 0.12, p = 0.04$ , and social responsibility,  $r(307) = 0.15, p = 0.01$ . Students with higher socio-economic status were more likely to report having higher grades,  $r(307) = 0.17, p = 0.003$ , and higher academic engagement,  $r(308) = 0.18, p = 0.001$ . Students from schools with lower African American school populations reported higher levels of academic engagement,  $r(255) = 0.13, p = 0.04$ . Also, there was a negative correlation between region of residence and students' attainment value in mathematics. Students from the Midwest,

Northeast, and Southeast reported higher levels of attainment values in mathematics,  $r(296) = 0.12, p = 0.05$ .

Finally, there were small to moderate correlations between student outcomes. Students' communal values were positively correlated with all other academic, psychological, and social outcomes: ethnic pride,  $r(308) = 0.57, p = 0.001$ ; racial centrality,  $r(308) = 0.31, p = 0.001$ ; academic engagement,  $r(308) = 0.36, p = 0.001$ ; mathematics attainment value,  $r(308) = 0.17, p = 0.002$ ; social responsibility,  $r(308) = 0.64, p = 0.001$ ; and higher grades,  $r(308) = 0.12, p = 0.04$ . Similarly, academic engagement was positively correlated with all other outcomes: ethnic pride,  $r(308) = 0.14, p = 0.02$ ; racial centrality,  $r(308) = 0.16, p = 0.004$ ; mathematics attainment value,  $r(308) = 0.64, p = 0.001$ ; social responsibility,  $r(308) = 0.29, p = 0.001$ ; and higher grades,  $r(308) = 0.29, p = 0.001$ . Students' sense of social responsibility was positively correlated with most outcomes: ethnic pride,  $r(308) = 0.50, p = 0.001$ ; racial centrality,  $r(308) = 0.30, p = 0.001$ ; mathematics attainment value,  $r(308) = 0.13, p = 0.03$ . Lastly, students' mathematics attainment value and higher grades were positively correlated,  $r(308) = 0.23, p = 0.001$ .

**Research Question 1: What are the dimensions of communal socialization and how are they empirically distinguishable from one another?**

I conducted an exploratory factor analysis (EFA) on the Communal Socialization Scale using MPlus 8.0 (Muthén & Muthén, 2017) to identify distinct dimensions of communal socialization in U.S. high school mathematics classrooms. This process included preliminary analysis, factor extraction, and evaluation of the data. The EFA included the responses of 306 students from multiple courses (Table 6) responding to 25 items. The 12:1 ratio of respondents to items is theoretically and practically consistent with guidelines in prior literature that suggest that

analysis should include over 100 respondents (Reise et al., 2000; Williams & Kibowski, 2016) or a 10:1 ratio between respondents and items (Costello & Osborne, 2005; Diemer et al., 2017).

Bartlett's test of sphericity was conducted as the preliminary analysis and significant results ( $p = 0.001$ ) indicated there was sufficient data to conduct the EFA. The Kaiser-Meyer-Olkin (KMO) test was not conducted since this analysis is recommended when the respondent to variable ratio is less than 1:5 (Williams et al., 2010). Factors were extracted using Weighted Least Squares (WLSMV) estimation for all categorical indicators. An Oblique-Oblimin rotational method was used to identify the optimal number of latent factors that accounted for common variance within the observed variables (Reise et al., 2000; Preacher et al., 2013).

A factor solution was identified through the process of (1) retaining factors with eigenvalues greater than 1, (2) visually examining a scree plot of the data, and (3) conducting a Root Mean Square Error of Approximation (RMSEA) to confirm that the model fit is within the recommended levels of less than 0.08 and more than 0.05 for a reasonable to close fit (Browne & Cudeck, 1992). Using an iterative process of analyses, two items were individually removed since they (1) they failed to load at 0.40 or higher on any factor or (2) the cross-loadings were 0.32 or higher on two or more factors (Costello & Osborne, 2005; Diemer et al., 2017). A three-factor solution was determined to be the best model fit of the 23 items; this was confirmed by the RMSEA = 0.076,  $p = .001$  (Table 6, Figure 2).

A three-factor solution supported the conceptualization of Communal Socialization as a three-dimensional scale to measure students' perceptions of the communal messages espoused by mathematics teachers. The first factor, *Personal Responsibility* (PR), consisted of eight items that measure the extent to which students felt their teachers taught or reinforced the value of contributing to others through one's personal actions. The second factor, *Community Utility*

(CU), consisted of eight items that measured the extent to which students felt their teachers taught or reinforced the usefulness of mathematics to connect to or improve one's community. The third factor, *Global Responsibility* (GR), consisted of seven items that measured the extent to which students felt their teachers taught or reinforced one's contributions to equity and justice in society. Each subscale was internally consistent, with Cronbach's alpha scores of 0.87, 0.92, and 0.93 for Personal Responsibility, Communal Utility, and Global Responsibility respectively. Each subscale has moderate to strong positive correlation with one another – Personal Responsibility and Communal Utility ( $r = 0.51$ ), Personal Responsibility and Global Responsibility ( $r = 0.50$ ), and Communal Utility and Global Responsibility ( $r = 0.72$ ), as further support for the multidimensionality of the Communal Socialization Scale (Table 7).

### **Communal Socialization Scale – Preliminary Results**

Overall, students reported moderate levels of communal socialization in their mathematics classrooms ( $M = 2.90$ ,  $SD = 0.96$ ) with higher ratings of socialization of Personal Responsibility ( $M = 3.34$ ,  $SD = 0.98$ ) than Community Utility ( $M = 2.59$ ,  $SD = 1.14$ ) or Global Responsibility ( $M = 2.73$ ,  $SD = 1.21$ ). Preliminary analyses that examined the association between each dimension and students' demographic characteristics indicated few but significant differences. The racial composition of students' neighborhoods was significantly associated with each dimension of the Communal Socialization Scale. Students from racially diverse neighborhoods reported higher levels of socialization on the Personal Responsibility ( $F(2, 303) = 7.55$ ,  $p < 0.001$ ) and Global Responsibility ( $F(2, 303) = 5.68$ ,  $p = 0.004$ ) dimensions when compared to students from African American minority neighborhoods. Students from predominately African American neighborhoods reported more Community Utility socialization ( $F(2, 303) = 3.73$ ,  $p = 0.03$ ) when compared to students from African American minority

neighborhoods. Also, lunch status, as an indicator of socio-economic status, was found to be significantly associated with the socialization of Community Utility ( $F(2, 304) = 5.46, p = 0.004$ ). Students with moderate incomes reported higher Community Utility when compared to students of lower incomes. There were no significant associations between lunch status and Personal Responsibility ( $F(2, 304) = 0.26, p = 0.77$ ) or Global Responsibility ( $F(2, 304) = 1.00, p = 0.37$ ).

The non-significant demographic characteristics included gender, grade level, math subject, or region. Male and female students did not differ in their ratings of Personal Responsibility ( $t(305) = 0.99, p = 0.32$ , two-tailed), Community Utility ( $t(305) = 0.30, p = 0.76$ , two-tailed), or Global Responsibility ( $t(305) = 0.93, p = 0.35$ , two-tailed). There were no significant differences in the ratings of students by grade level on the Personal Responsibility ( $F(305) = 0.30, p = 0.76$ ), Communal Utility ( $F(3, 304) = 0.35, p = 0.57$ ), or Global Responsibility ( $F(3, 304) = 0.03, p = 0.99$ ) dimensions. There were no significant differences in the ratings of students by math subject on the Personal Responsibility ( $F(15, 292) = 1.34, p = 0.18$ ), Community Utility ( $F(15, 292) = 1.50, p = 0.10$ ), or Global Responsibility ( $F(15, 292) = 1.21, p = 0.26$ ) dimensions. There were no significant differences in the ratings of students by region of residence on each dimension – Personal Responsibility ( $F(4, 291) = 0.95, p = 0.44$ ), Community Utility ( $F(2, 291) = 1.66, p = 0.16$ ), and Global Responsibility ( $F(4, 291) = 1.79, p = 0.13$ ). There were no significant differences in the ratings of students by school racial composition on the Personal Responsibility ( $F(3, 251) = 1.82, p = 0.14$ ), Community Utility ( $F(3, 251) = 1.67, p = 0.17$ ), and Global Responsibility ( $F(3, 251) = 1.19, p = 0.31$ ) dimensions.

**Research Question 2: What profiles emerge to explain the variation in the communal socialization that African American adolescents experience in their classrooms?**

Results of the Latent Profile Analysis identified a 4-profile solution as the optimal fit (AIC = 21359.67; BIC = 21799.82; Entropy = 95; LMR *p*-value = 0.002). As found in Table 8, four profiles reflected the lowest BIC and AIC while maintaining a significant LMR. In addition, a high entropy score indicated high probability that participants had been successfully classified in the most appropriate profile. As it is recommended that retained profiles contain more than 5% of the sampled population (Ferguson et al., 2020), the lowest percentage in a four-profile solution is 16%.

Item- and aggregate-level means were analyzed to interpret the pattern of each communal socialization profile (Table 9). The four communal socialization profiles were: (1) *Least Communal* ( $n = 64$ , 21%); (2) *Cooperatively Communal* ( $n = 51$ , 16%); (3) *Moderately Communal* ( $n = 122$ , 40%); and (4) *Highly Communal* ( $n = 71$ , 23%). The mean for each dimension of the Communal Socialization Scale and each profile is provided in Table 9. Students in the *Least Communal* profile experienced the lowest communal socialization in Personal Responsibility ( $M = 2.07$ ), Communal Utility ( $M = 1.36$ ), and Global Responsibility ( $M = 1.41$ ), relative to students identified in the other three profiles. Students in the *Cooperatively Communal* profile experienced high socialization in the Personal Responsibility dimension ( $M = 3.80$ ), yet they received lower levels of socialization in the Communal Utility and Global Responsibility dimensions ( $M = 1.89$ ;  $M = 1.53$ , respectively). Students in the *Moderately Communal* profile received mid-levels of socialization in each dimension – Personal Responsibility ( $M = 3.26$ ), Communal Utility ( $M = 2.69$ ), and Global Responsibility ( $M = 3.05$ ). Students in the *Highly Communal* profile received the highest levels of socialization in Personal Responsibility ( $M = 4.33$ ), Community Utility ( $M = 4.05$ ), and Global Responsibility ( $M = 4.27$ ), relative to students in the other profiles.

**Research Question 3: What, if any, individual or contextual factors are significant in the profiles?**

Chi-square tests of goodness-of-fit were conducted to examine the demographic variations of categorical variables (e.g., gender and math subject) between profiles (Table 10). Analyses of students' gender ( $\chi^2(4) = 0.60, p = 0.90$ ), SES ( $\chi^2(5) = 11.89, p = 0.06$ ), school racial composition ( $\chi^2(6) = 11.95, p = 0.22$ ), and region of residence ( $\chi^2(7) = 16.83, p = 0.16$ ) indicated no significant demographic variations between profiles. However, statistically significant variations were found for age ( $\chi^2(5) = 15.81, p = 0.02$ ), mathematics subject ( $\chi^2(18) = 61.48, p = 0.05$ ), and neighborhood racial composition ( $\chi^2(6) = 19.20, p = 0.004$ ). Specifically, more students in the 14-17 years old age group were found in the *Least Communal* Socialization profile than expected, and less were found in the *Moderately Communal* Socialization and *Highly Communal* Socialization profiles than expected. More students in the 18-19 year old category were found in the *Moderately Communal* and *Highly Communal* Socialization profiles than expected, and less were found in the *Least Communal* Socialization profile than expected. This indicates that older students reported higher Communal Socialization in their mathematics class than 14–17 year-olds.

For mathematics subjects, the marginally significant results indicated that more students in Basic Math, Pre-Algebra, and Algebra I were found in the *Moderately Communal* and *Highly Communal* Socialization profiles than expected. Students in Integrated Math I and II, Geometry, and Analytic Geometry were found in the *Moderately Communal* profile more than expected. Students in Advanced Math (e.g., Pre-Calculus and Calculus) and Algebra II were found to be in the *Least Communal* and *Cooperatively Communal* groups than expected. These findings suggest

that students have fewer communal socialization experiences in the higher-level mathematics classes.

With regard to the racial composition of students' neighborhoods, students from majority-AA neighborhoods were found in the *Moderately Communal* and *Highly Communal* profiles more than expected. Students from racially diverse neighborhoods were found in the *Cooperatively Communal* and *Highly Communal* profiles more than expected. Students from minority-AA neighborhoods were found in *Least Communal* profile more than expected, and the *Highly Communal* profile less than expected.

**Research Question #4: What is the association between adolescents' communal socialization and their academic engagement, psychological well-being, and sense of social responsibility?**

Multiple regression analyses were performed to examine the relationships between profile membership and students' academic, psychological, and social outcomes (Table 11). The regression model controlled for the significant demographic characteristics (age, and neighborhood racial composition) and positioned the *Highly Communal* profile as the reference category. Findings indicated that *Highly Communal* Socialization was predictive of most of the student outcomes when compared to the alternative profile memberships.

For students' academic outcomes (e.g., academic engagement and grades), *Highly Communal* was significantly associated with students' academic engagement in their mathematics classrooms (e.g., behavioral, cognitive, emotional, and social) when compared to students in other profiles. The overall model for increased academic engagement was significant,  $R^2 = 0.24$  (adjusted  $R^2 = 0.23$ ),  $F(4, 301) = 19.28, p < 0.001$ . Students in the *Highly Communal* profile reported higher academic engagement when compared to students in the *Moderately*

*Communal* profile ( $b = -0.74$ ,  $SE = 0.09$ ,  $p < 0.001$ ), *Cooperatively Communal* ( $b = -0.76$ ,  $SE = 0.12$ ,  $p < 0.001$ ), and *Least Communal* profiles ( $b = -0.96$ ,  $SE = 0.11$ ,  $p < 0.001$ ). Students' grades were higher for students in the *Cooperatively Communal* profile when compared to those in the *Highly Communal* profile ( $b = 0.47$ ,  $SE = 0.22$ ,  $p = 0.03$ ). For the academic outcomes only, neighborhood racial composition as a covariate was statistically significant. Students from majority African American neighborhoods reported higher GPAs than students from minority African American neighborhoods ( $b = 0.33$ ,  $SE = 0.17$ ,  $p = 0.05$ ), however they reported lower academic engagement ( $b = -0.17$ ,  $SE = 0.09$ ,  $p = 0.05$ ).

Students' psychological outcomes were significantly associated with higher levels of communal socialization as well. The overall model for increased communal value was significant,  $R^2 = 0.16$  (adjusted  $R^2 = 0.15$ ),  $F(4, 300) = 11.77$ ,  $p < 0.001$ . Students in the *Highly Communal* profile reported higher communal values when compared to students in the *Least Communal* Socialization ( $b = -0.55$ ,  $SE = 0.14$ ,  $p = 0.001$ ), *Cooperatively Communal* ( $b = -0.46$ ,  $SE = 0.14$ ,  $p = 0.002$ ), and *Moderately Communal* profiles ( $b = -0.85$ ,  $SE = 0.12$ ,  $p < 0.001$ ). The overall model for increased attainment value was significant,  $R^2 = 0.20$  (adjusted  $R^2 = 0.19$ ),  $F(4, 301) = 15.22$ ,  $p < 0.001$ . Students in the *Highly Communal* profile reported higher attainment values when compared to the *Least Communal* ( $b = -1.25$ ,  $SE = 0.15$ ,  $p < 0.001$ ), *Cooperatively Communal* ( $b = -0.89$ ,  $SE = 0.16$ ,  $p < 0.001$ ), and *Moderately Communal* profiles ( $b = -0.74$ ,  $SE = 0.13$ ,  $p < 0.001$ ). The overall model for increased ethnic pride was significant,  $R^2 = 0.13$  (adjusted  $R^2 = 0.12$ ),  $F(4, 301) = 8.98$ ,  $p < 0.001$ . Students in the *Highly Communal* profile reported higher ethnic pride when compared to students in the *Moderately Communal* profile ( $b = -0.76$ ,  $SE = 0.16$ ,  $p < 0.001$ ). The overall model for increased racial centrality was significant,  $R^2 = 0.07$  (adjusted  $R^2 = 0.05$ ),  $F(4, 301) = 4.48$ ,  $p = 0.001$ . Students in the *Highly Communal*

profile reported higher racial centrality when compared to the *Least Communal* ( $b = -0.58$ ,  $SE = 0.17$ ,  $p = 0.001$ ) and *Moderately Communal* profiles ( $b = -0.60$ ,  $SE = 0.15$ ,  $p < 0.001$ ).

In relation to students' sense of social responsibility, findings indicated a significant association with higher levels of communal socialization when compared to students in other profiles. The overall model for increased social responsibility was significant,  $R^2 = 0.14$  (adjusted  $R^2 = 0.12$ ),  $F(4, 300) = 9.50$ ,  $p < 0.001$ . Students in the *Highly Communal* profile reported higher social responsibility when compared to students in the *Moderately Communal* profile ( $b = -0.80$ ,  $SE = 0.12$ ,  $p < 0.001$ ), *Cooperatively Communal* ( $b = -0.39$ ,  $SE = 0.15$ ,  $p = 0.01$ ), and *Least Communal* profiles ( $b = -0.34$ ,  $SE = 0.14$ ,  $p = 0.02$ ).

## **Chapter 5: Discussion**

Research on the academic achievement and motivation of African American students in mathematics has considered school racial composition, teachers' pedagogy, and culturally relevant practices to be contributing factors in improving students' mathematics achievement and identification with mathematics. In the current study, the concept of communal socialization was introduced and operationalized through the development of the Communal Socialization Scale. Communal socialization, which is the transmission of communal values (e.g., social connectedness, interdependence, and prioritizing group over individual needs and goals) in mathematics classrooms, was proposed as a specific culturally relevant practice that can be explored to understand how communally-focused mathematics instruction can influence students' achievement and identification in mathematics. The Communal Socialization scale measured the frequency of messages and practices used by teachers to teach or affirm communalism by emphasizing personal responsibilities to one another, one's community, and to issues of equity and justice more broadly.

The Communal Socialization scale was validated through an Exploratory Factor Analysis. Findings from the analysis supported the multi-dimensional nature of the scale including three factors with distinct indicators of communalism: Personal Responsibility (PR), Community Utility (CU), and Global Responsibility (GR). Each dimension is reflective of or congruent with Afrocentric theoretical concepts identified by King and Swartz (2016). The Personal Responsibility dimension is reflective of *Self-determination*, the ability to maintain control of one's life within the context of considering the needs of others. Socialization of personal responsibility in the classroom consisted of collaborating with and helping others, respecting authority figures, and following cultural norms and traditions. The Community Utility

dimension is reflective of *Subjects with agency*, the intent and ability to act as an individual toward a common purpose. Teachers socialized students toward the utility of mathematics by connecting math to problems in the community or demonstrating how students can use mathematics to contribute to their community. The Global Responsibility dimension is reflective of *Collective Responsibility*, the commitment of equity and justice for all groups of people, with an extension to environmental justice as well. Teachers taught or reinforced the importance of understanding how individuals can impact their environment and society. Correlation analysis conducted to examine the association between the three factors indicated a moderate to strong correlation which indicates a positive relationship between three unique dimensions (Table 7).

Findings of students' overall perceptions of the communal socialization received in mathematics classrooms indicated that messages or practices that taught or affirmed one's Personal Responsibility was more frequently experienced ( $M = 3.45$ ). Since socialization in this area can be reflected in classroom rules or expectations during group work, it is possible that the reports of higher frequency in this dimension can contributed to these experiences. Students in Integrated math II, Basic mathematics, and Algebra I reported the highest levels of this dimension, while students in Essential mathematics, College Algebra, Pre-Calculus, and Calculus reported the least.

The socialization of communal values related to issues of equity and justice, Global Responsibility, was experienced at lower levels of frequency level when compared to Personal Responsibility ( $M = 2.73$ ). Socialization of one's Global Responsibility offers a broader connection between mathematics and communalism – it fosters the development of critical consciousness in its focus of social conditions and the actions (individually and collectively) that can contribute to equity and justice (Diemer et al., 2017). Students in AP Calculus, College

Algebra, and Pre-Algebra reported the highest frequencies in this dimension, while students in Essential mathematics, Financial Algebra, Pre-Calculus, and Calculus reported the least.

Community Utility was the least experienced type of communal socialization ( $M = 2.59$ ).

Community Utility is the dimension of Communal Socialization that most specifically connected mathematics to real-world contexts in ways that empowers students to imagine how mathematics can be used to positively impact their communities. Practically, the utility of communalism has emerged as an effective approach to developing and sustaining students' interest and engagement in STEM content and careers. Scholars have found that students became more interested and engaged when STEM content and careers were associated with helping others, one's community, or to increase equity for minoritized groups (Allen et al., 2016; Boucher et al., 2017; Brown et al., 2015; Gray et al., 2020; McGee & Bentley, 2018). Students in Basic mathematics, Algebra I, and College Algebra reported the highest levels of Community Utility while students in Essential math, Pre-Calculus, and Calculus reported the lowest levels.

Based on scale development and validation, the measure was used to identify latent profiles of African American high school students' experiences of communal socialization received from their most recent mathematics teacher. Latent profiles have been used to identify variations in a seemingly homogeneous population to understand patterns of behavior and their practical, theoretical, or policy implications (Williams & Kibowski, 2016). From a psychological perspective, person-centered approach to quantitative analyses such as latent profile analysis allows for greater understanding of the conditions that facilitate targeted behaviors and outcomes. Rogers (1979) formulated the premise of person-centered approach on the ideals of an individual continuing to strive and grow despite challenges (e.g. actualizing tendency) while increasing conscious and informed choice as they become more self-aware (e.g. formative

tendency). Thus, for students who are learning new and more complex mathematical concepts in high school, their potential for academic and identity development can be nurtured in an environment that is (1) congruent with their values, prior knowledge, and prior experiences, (2) demonstrate care and acceptance, and (3) recognize the importance of empathetic understanding. These components are compatible with the socialization of personal responsibility, community utility, and global responsibility that students experienced in their mathematics classrooms.

Using this person-centered approach, four latent profiles emerged from the student data, each with distinct levels of communal socialization in the areas of personal responsibility, community utility, and global responsibility. Students in the *Highly Communal* Profile had consistently high ratings of their teachers' communal socialization in all three dimensions. Students in the *Moderately Communal* Profile experienced communal socialization consistently across dimensions, though at lower frequencies. Students in the *Cooperatively Communal* Profile had high ratings of their teachers' communal socialization on the Personal Responsibility dimension (a reflection of the importance of cooperation, helpfulness, and respect of others, cooperation), but low ratings on the other two dimensions. Lastly, students in the *Least Communal* Profile reported low ratings consistently across the three scale dimensions.

Examination of students' profile membership offered two key insights. First, by examining the demographic variations between profiles, perspective is gained on variations that exist in teaching mathematics using culturally relevant practice. Second, the usefulness of Communal Socialization as a mechanism toward improving the mathematics achievement, identification, and sense of empowerment for African American students is validated. Once the profiles were established, demographic data were used to determine significant variations between the profiles. Of the demographic characteristics examined in this study, the most

significant were students' age, mathematics subject, and their neighborhood racial composition.

With regard to age, older students (18-19 year old) expressed higher levels of communal socialization when compared to younger students. Also, students in general mathematics, algebra, and geometry reported higher levels of communal socialization, while students in advanced mathematics (e.g., Pre-Calculus and Calculus) reported lower levels. Prior research has supported the use of interventions that teach or reinforce the communal utility of STEM to connect academic content to students' values and orientations toward helping and cooperation (Brown et al., 2015; Gray et al., 2020; Smith et al., 2015). The findings of this study could be further evidence for education practitioners and scholars to strongly consider whether the disconnect from students' interests and values (e.g., communal) is a contributing factor to the enrollment gap that persists between minority and majority students' course (particularly advanced mathematics), major, and career selections.

Another key variation in students' profile membership was the racial composition of their neighborhood. This demographic characteristic was measured as an exploratory variable. Previous research on racial achievement gaps between minority and majority groups has found significant associations with the racial composition of students' schools. The relationship between students' school and neighborhood racial composition was unclear, though previous research has found increasing racial segregation in the US public school system (Digest for Education Statistics, 2019). In relation to the variation in profiles, students in predominately African American or racially diverse schools reported higher levels of communal socialization in their mathematics classrooms. Students from minority-AA neighborhoods fell within the low to moderate levels of communal socialization. These findings indicated that the use of communal socialization is common for students with varying neighborhood compositions, though more so

when students' neighborhoods (and possibly their schools) are more racially and ethnically diverse.

Prior research on neighborhood racial composition have examined the influence of the "educational norms, values, and resources" (National Bureau of Economic Research, 2006) available to students outside of school. The intersection of neighborhood racial composition with the socio-economic contexts of neighborhoods has been discussed, even suggesting that socioeconomic status had stronger associations to student achievement (Benson & Borman, 2010) and students' racial identities (Byrd & Chavous, 2009). Although this interaction between neighborhood racial composition and socioeconomic status was not supported by additional analysis in this study, the relationship between neighborhood racial composition, socio-economic status, and school communal socialization (and culturally relevant practice more broadly) is an area for future study.

It should be noted that although gender was not a significant demographic factor affecting profile membership, the sample in this study was predominately female (74%). This warrants consideration of the intersectionality of race and gender that African American female students experience that extends the triple quandary that African American student males face to create a "more complex phenomenon" (Crenshaw, 1989). Similar to race, gender is a social construct that categorizes individuals and produces a system of inequality based on categorical differences (Ridgeway & Correll, 2004). Prior research examined the role of communal values with predominately female samples (Allen et al., 2016; Brown et al., 2015; Fuesting et al., 2017; Steinberg & Diekman, 2017). This has led scholars to leverage the value of communalism without emphasizing the ethnic and racial aspects or the fundamentals of the value. In contrast, this study has emphasized the importance of race and ethnicity while also recognizing the

implications of gender. The choice of latent profile analysis was useful to dispel the notion of heterogeneity within the African American male and African American female high student populations in the US and consider the influence of intersectional identities.

In addition, the relationship between students' profile membership and their psychological, academic, and social outcomes were also examined to better understand the role of communal socialization in creating meaningful social, community, and global connections in mathematics content and classrooms. Findings indicated that students' academic engagement, communal values, and their sense of social responsibility were all positively correlated. Communal value, the belief in one's role to help others, work with others toward a common goal, give back to one's community, and consider social problems and how they might be solved, was moderately correlated with ethnic pride and social responsibility. Academic engagement, an indicator of students' academic achievement, was moderately and positively correlated with students' attainment value in mathematics. Social responsibility, which entails the importance that students place on personal and community actions, was also moderately correlated with ethnic pride. These findings support the components of culturally relevant and sustaining pedagogy (e.g., academic achievement, cultural competence, and critical engagement) and reflect the ways that mathematics can be a humanizing and a meaningful cultural practice (Gutiérrez, 2012) for African American students.

This study found that all psychological, academic, and social outcomes were significantly predicted by high levels of communal socialization. Students in the *Highly Communal* socialization profile, those with the highest level of socialization toward personally, community, and global responsibilities in their mathematics classrooms (1) reported significantly more relevance for and engagement in mathematics, (2) expressed more communal value, ethnic pride,

and racial centrality, and (3) perceived a higher sense of social responsibility. Students with higher levels of communalization, particularly in the Personal Responsibility dimension, had significantly higher grades. These findings contribute to prior literature that revealed positive relationships between students' value, interest, and engagement in communal tasks and their academic engagement (Boykin & Bailey, 2000; Brown et al., 2015; Gray et al., 2020), psychological well-being (Gooden & McMahon, 2016; Grills et al., 2016), and sense of social responsibility (Hope, 2016). Beyond a uni-dimensional approach to considering the value of sustaining communalism in mathematics classrooms, this study considers the dynamic nature of its influence.

With regard to the aims of this study, the additional analysis conducted to assess the measurement equivalence of the outcome measures revealed that the original structure of the multidimensional Academic Engagement Scale was not supported by this sample of African American high school students. The behavioral, cognitive, and emotional engagement subscales developed by Phan and colleagues (2016) were adapted from Fredricks et al. (2005) and Suárez-Orozco et al. (2009). The social engagement subscale was previously validated by Wang et al. (2016). These measures were validated for international students (Phan et al., 2016), recent immigrant to the US (Suárez-Orozco et al., 2009), and a US student population of 24% African American students (Wang et al., 2016). Additional studies by the Wang et al. (2016) also found a lack of equivalence when sampling larger African American student populations (Bae et al., 2020; Wang et al., 2019). This measurement non-equivalence is important to note as the academic engagement of minority students is often regarded as a contributing factor to their academic behaviors (preparation, persistence, achievement) and future course and career selections (Fredricks et al., 2018; Wang et al., 2016). Thus, future examination of the current

engagement scale and measurement with it is necessary to further validate the measures with a focus on both structural and measurement equivalence (Byrne et al., 2009). Emphasis should be placed on cultural differences that shape student perception including demographic characteristics such as age, race, ethnicity, and gender.

### **Limitations and Future Directions**

Although this study contributes to the understanding of meaningful and culturally sustaining teacher practices, it is not without limitations. With regard to the demographic variables collected and used in the analyses, age and school racial composition contributed least to the understanding of communal socialization in African American high school mathematics students. First, age was found to be a significant factor in the assessment of demographic characteristics between profiles. However, age was broadly categorized for parental consent purposes which led to a large age range (14-17 year old). Students also indicated their grade level, which reduced some of the difficulty in interpretation; however, future research should be more intentional in gathering this demographic information. Second, 17% of the school racial composition data was missing due to the method of merging students' report of their school with the NCES school racial composition data. This missing data made it difficult to examine the relationship between school and neighborhood racial composition and assess the impact of this contextual factor on the variation of students' profile membership or on the relationship between communal socialization and students' outcomes. Future research should utilize a different method of collecting this information.

While this study found no significant variations between profile memberships based on gender, the sample of African American high school students was predominately female. A smaller sample of male students (26%) presented a limitation of the study as it left uncertainty

about whether the experiences of African American male students were broadly captured. Future studies on communal socialization from the student perspective could balance the representation of male and female students, privilege male students' voices, or investigate African American male and female student experiences separately.

Although there are benefits to capturing quantitative data from a broad sample of African American high students across the US, there are limitations as well. It is difficult to capture the details of specific academic content and teachers' socialization and practices using this method. In addition, students' perceptions of mathematics teachers' practices alone may not fully reflect that practice. Still, it is important to understand the student perspective and their perceptions and beliefs influence their academic and social actions. Future research should triangulate student and teachers' perceptions of communal socialization in mathematics classrooms by surveys, interviews, or focus groups with students and teachers.

Due to COVID-19, the pedagogy and practice of mathematics teachers across the US shifted to virtual or hybrid learning in varying degrees in Spring 2020 and Fall 2020. Therefore, it is difficult to determine how the utilization of communal socialization was impacted by the shift in increased technology-based learning, decreased project-based and cooperative learning experiences, and unforeseen curriculum adaptations. It will be important to assess students' and teachers' perceptions of communal socialization in mathematics during more traditional classroom experiences and while using more socially engaged methods, including classroom observations, focus groups.

### **Implications and Study Conclusions**

Despite the limitations, this study answers the call of scholars seeking research that systematically documents the impact of culturally relevant practices on students' academic

achievement (Sleeter, 2012) while engaging students' perceptions in the processes of how race (and social context) influenced their lives and mathematical experiences (Martin, 2009). The broad sampling of this study and the exploratory approach to concepts and outcomes has provided a solid foundation to support communal socialization as a culturally relevant practice.

The use of latent profile analysis, as a person-centered approach, illustrates the heterogeneity in the experiences, values, and outcomes within a sample of African American high school students. Related to students' experiences, this study revealed that communalism is currently being transmitted through teacher practice to varying degrees and levels of effectiveness on the academic, psychological, and social outcomes of students. Students who experienced higher levels of communal socialization increased their academic engagement, achievement, and attainment value in mathematics, strengthening their motivation to achieve. This approach to teaching mathematics also aligns with and affirms students' ethnic and racial identities, which theoretically decreases any perception that academic and ethnic/racial identities are opposing ones.

Findings suggest that though educators and education researchers may undervalue or underestimate the value of culturally relevant practice, there are clear and significant implications for student achievement and motivation. This culturally relevant approach to teaching mathematics can have implications for mathematics teachers and teacher preparation programs that are accountable for the academic improvement of African American students. The three dimensions of communal socialization validated in this study can be implemented in any classroom as a framework, and not a prescription for instruction. For education researchers, these profiles indicated that further research should explore the influence of communal socialization

within the different mathematics courses and within other disciplines as well without comparison to student populations who do not experience the same triple quandary as African Americans.

The positive and significant relationship between high communal socialization and students' academic, psychological, and social outcomes has practical implications for the use of culturally relevant practice in mathematics. Culturally relevant practice includes academic content, instructional practices, and socialization that emphasizes academic achievement, cultural competence, and critical engagement. Findings of a positive relationship between communal socialization and academic engagement (e.g., behavioral, cognitive, emotional, and social) have strong implications for the use of cooperative, community-engaged, and equity-focused learning to connect academic content to students' values and interests in a meaningful and relevant way. Findings of a positive and significant relationship between high communal socialization and students' own communal values as well as their mathematics, racial, and ethnic identities have strong implications for the importance of teaching and reinforcing communalism in practice. Findings of a positive and significant relationship between high communal socialization and students' sense of social responsibility is evidence that critically engaging students in their community (e.g., local and global) can influence their sense of empowerment as a counter measure to oppressive messages or conditions. Lastly, as opposed to socialization specific to one's ethnic and racial identities, communal socialization may have broader applicability in mathematics classrooms across the US. Communalism, as a value or orientation that is transmitted as an ethnic, gender, national norm, can be connected to academic content with the use of this multidimensional structure. While findings have indicated high levels of socialization in personal responsibility, community utility, and global responsibility yield positive results,

there are indications that higher levels of personal responsibility are important for students' academic achievement as well.

Theoretically, the conceptualization and significant relationship between communal socialization and students' academic, psychological, and social outcomes provides support for increased focus on attainment value and cost as two task values that contribute to students' achievement motivation. Findings support the use of communal socialization as a mechanism toward increasing students' engagement and identification with their academic content in ways that are relevant and meaningful to their cultural backgrounds and values. The social connections with their peers, communities, and issues of equity and justice more broadly may lessen the cost of engaging in such meaningful action. Future refinement of the communal socialization (construct and measurement tool) should continue to incorporate best practices of established culturally relevant practice, whether at the subject (e.g., ethnic studies) or educator level.

Future research could strengthen the conceptualization of communal socialization by examining students' experiences in multiple contexts (e.g., home, school, and community) to capture additional dimensions or indicators of the construct. Also, the results of this study validate the Communal Socialization scale for African American high school student populations throughout the U.S. with access to the internet and the social networks from which Qualtrics recruited participants. It should also be noted that the largest subgroups of participants were female students in middle adolescence. Continued assessment and validation in student populations will not only enrich the methodology, but the conception of communal socialization as well. This study and future research will conceptualize and operationalize communal socialization provide excellent opportunities for educators and education researchers to support

the academic achievement, psychological well-being, and sense of social responsibility of African American students as they persist and excel in their mathematics classrooms.

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## **APPENDICES**

## **Appendix A**

### **Tables & Figures**

**Table 1**

## Participant Demographics – Individual Characteristics

	Total Sample (N = 308)	Profile 1	Profile 2	Profile 3	Profile 4
	Mean (SD) or N (%)				
Age (years)					
11-13	7 (2%)	1	2	3	1
14-17	248 (81%)	60	44	92	52
18-19	53 (17%)	3	5	26	19
Gender (% Female) (n = 307)	226 (74%)	64	51	120	72
Grade					
Freshman	73 (24%)	13	16	27	17
Sophomore	73 (24%)	15	10	33	15
Junior	78 (25%)	18	13	26	21
Senior	84 (27%)	18	12	35	19
Subject					
Basic math	10 (3%)	1	2	3	4
Algebra	170 (55%)	33	29	64	44
Geometry	61 (20%)	9	11	30	11
Adv. Math	64 (21%)	19	9	23	13
Other	3 (1%)	2	0	1	0
GPA (n = 306)	2.10 (1.18)				
100-90	119 (39%)	26	20	42	31
89-80	99 (32%)	24	14	38	23
79-70	48 (16%)	10	4	22	12
69-60	23 (7%)	3	4	11	5
< 60	19 (6%)	1	9	8	1
Lunch (% subsidized) (n = 307)	218 (71%)	41	37	89	51

Note. Female is the reference category for gender. Subsidized lunch (free or reduced-priced lunch) is the reference category for lunch. GPA measured students' grades on a scale of 1 (100-90) to 5 (<60).

**Table 2**

## Participant Demographics – Contextual Factors

Total Sample (N = 308)	Profile 1	Profile 2	Profile 3	Profile 4
Mean (SD) or N (%)				
<b>Neighborhood Diversity</b> (n = 306)				
Majority-AA	120 (39%)	21	13	54
Racially Diverse	95 (31%)	13	21	34
Minority-AA	91 (30%)	29	17	32
<b>School Diversity</b> ( n = 255)				
Majority-AA	66 (26%)	12	8	25
Majority-WH	71 (28%)	18	12	23
Majority-HI	32 (13%)	2	8	14
Racially Diverse	86 (34%)	21	15	36
<b>Region (n = 296)</b>				
Midwest	44 (15%)	7	6	15
Northeast	51 (17%)	10	10	18
Southeast	138 (47%)	29	25	56
Southwest	40 (14%)	13	6	13
West	23 (8%)	0	3	14

*Note.* Majority-AA = school or neighborhood with a predominately African American student population; Minority-AA = neighborhood with African American residents in the minority; Majority-WH = school with a predominately White student population; Majority-HI = school with a predominately Hispanic student population.

**Table 3**

## Communal Socialization Scale—Dimensions &amp; Items

<i>Personal Responsibility</i> “How often does your math teacher emphasize or stress the importance of...”	Citation of Original Item
Helping others	Benson et al., 1999
Respecting authority figures like teachers and elders	Schwartz, 1992
Being a part of a group effort	Grayman-Simpson & Mattis, 2017; Boykin et al., 1997
Group rules and norms, traditions, and/or customs	Schwartz, 1992
Assisting people in your life who are in need of help	Flanagan, et al., 2007
Being willing to act for the rights of others	Citizenship scale (SRLS)
Working with others for a common goal	Nicotera et al., 2010
Helping other students learn	Johnson & Norem-Hebeisen, 1979
<i>Community Utility</i>	
“How often does your math teacher emphasize or stress the importance of...”	
Connecting math to problems in my community	Gray et al., 2020
Using math to address community and student concerns and interests	Dover, 2013
Students having the power to make a difference in their community	SRLS
Working with a group to solve a problem in the community where you live	Flanagan et al., 2007
Working with others to make a positive change in my community	Doolittle & Faul, 2013
Using math to give back to your community	McGee & Bentley, 2018
Using math to meet the needs of people you are connected to	McGee & Bentley, 2018
Activities/projects that make my neighborhood a better place	Nicotera et al., 2010
<i>Global Responsibility</i>	
“How often does your math teacher emphasize or stress the importance of...”	
Understanding the world using math	Gutstein, 2003
Participating in activities that contribute to the common good	Tyree, 1998
Showing how my actions can protect the lives of humans, animals, or plants	Gray et al., 2020
Focusing on issues of justice and equity	Dover, 2013
Understanding there are things that we can do as individuals to solve the world’s problems	Lenzi et al., 2013
Thinking about the social problems of the nation and world, and about how they might be solved	Park et al., 2013
Math as a good way to address problems/disparities around the world	McGee & Bentley, 2018
The whole human race as “one big family”	McGee & Bentley, 2018
Learning about people and groups who work to make society better	Flanagan et al., 2007

**Table 4**

## Academic, Psychological, and Social Outcome Measures

<i>Academic Outcomes</i>	
Behavioral engagement	I always finish my mathematics work on time I always turn my mathematics homework in on time I always pay close attention in mathematics classes I usually spend hours on homework after school
Cognitive engagement	I enjoy learning new things in mathematics I get bored easily with school work in mathematics (RC) I feel good when I learn something new in mathematics even when it is hard I study at home even when I don't have any mathematics homework I read extra books to learn more about things we do in mathematics classes
Emotional engagement	I feel happy when in mathematics classes I feel bored when I'm in mathematics classes (RC) I feel excited by the work in my mathematics classes I like being in mathematics classes My mathematics classroom is a fun place to be
Social engagement	I build on others' ideas I try to understand other people's ideas in class I try to work with others who can help me in class I try to help others who are struggling in class
<i>Psychological Outcomes</i>	
Communal values	I value helping others even when I'm not being paid I value traditions, customs, & group rules/norms I value working with others toward a common goal I value opportunities to give back to my community I enjoy working with a group to solve a problem in the community where I live I value thinking about the social problems of the nation and world, and about how they might be solved
Ethnic pride	I have been taught to have pride in my culture I am encouraged to be proud of my background I am encouraged to be proud of the accomplishments of African Americans/Blacks
Racial centrality	I feel close to other Black people I have a strong sense of belonging to other Black people If I were to describe myself to someone, one of the first things I would say is that I'm Black
Attainment value	Being someone who is good at math is important to me Being good at math is an important part of who I am It is important to me to be a person who reasons mathematically Thinking mathematically is an important part of who I am

**Table 4 (continued)**

It is important for me to be someone who is good at solving problems that involve math

*Social outcome*

Social Responsibility

It is important for young people to...

Help when they see people in need

Be kind to other people

Help their community through fundraising, volunteering, or service

Donate food or used items

Participate in protests, marches, or demonstrations

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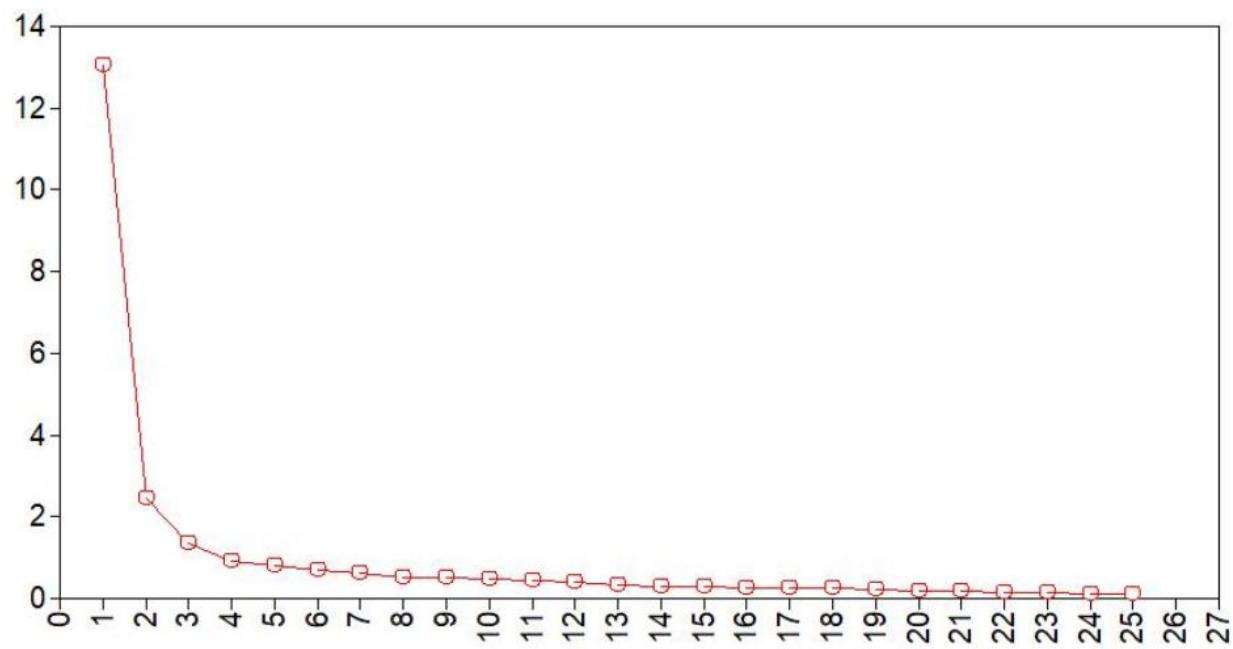
**Table 5** Correlation between Demographic & Outcome Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Grade	—													
2. Course	0.20***	—												
3. Gender	0.00	0.04	—											
4. Lunch	-0.05	0.10	-0.05	—										
5. Home	0.10	-0.07	0.06	-0.10	—									
6. School	0.00	0.05	0.02	-0.19**	0.19**	—								
7. Region	0.00	0.01	0.00	0.06	-0.04	-0.18**	—							
8. C.Value	-0.11*	-0.01	0.06	0.02	-0.09	-0.12	-0.09	—						
9. E.Pride	-0.05	0.05	0.12*	0.07	-0.09	-0.09	-0.04	0.58***	—					
10. R.Centr	-0.05	-0.04	0.05	0.03	0.06	0.04	-0.02	0.31***	0.43***	—				
11. Engage	-0.06	0.01	-0.03	0.18***	-0.03	0.13*	-0.08	0.36***	0.14*	0.16**	—			
12. Attain	-0.06	-0.04	-0.02	0.07	0.07	0.06	-0.12*	0.17**	-0.02	0.08	.64***	—		
13. S.Resp	-0.04	0.03	0.15**	0.07	-0.01	-0.09	-0.03	0.64***	0.50***	0.30***	.29***	.13*	—	
14. GPA	-0.01	0.02	-0.01	0.17**	-0.10	-0.05	-0.07	0.12*	0.04	-0.05	.29***	.23***	.00	—

**Note.** Grade: 9<sup>th</sup>-12<sup>th</sup>. Course: Basic Math – Advanced. Gender – Female is coded as 1. Lunch = higher value indicates full priced lunch. Home (neighborhood racial composition) – ordered minority to majority African American neighborhood. School (school racial composition) - ordered high to low African American school populations. Region – coded as Midwest (0), Northeast (1), Southeast (2), Southwest (3), and West (4). Variables 8-13 ordered Strong Disagreement – Strong Agreement. GPA order low to high grades. \*p < .05; \*\*p < .01; \*\*\*p < .001

**Figure 1**

Communal Socialization Scale – Exploratory Factor Analysis Scree Plot



**Table 6**

## Communal Socialization Scale – Exploratory Factor Analysis Results

		Factor Loading		
		1	2	3
Eigenvalue 1	10.915			
Eigenvalue 2	2.320			
Eigenvalue 3	1.310			
RMSEA	.073			
CFI	.93			
TLI	.91			
SRMR	.03			
<i>Factor 1: Personal Responsibility</i>				
M = 3.45, SD = .98, $\alpha = .87$				
PR1	<b>.47</b>	.18	-.02	
PR2	<b>.54</b>	-.01	.02	
PR3	<b>.77</b>	-.01	.01	
PR4	<b>.60</b>	.18	-.05	
PR5	<b>.59</b>	-.09	.26	
PR6	<b>.61</b>	-.04	.22	
PR7	<b>.79</b>	.02	-.06	
PR8	<b>.70</b>	-.01	.01	
<i>Factor 2: Community Utility</i>				
M = 2.59, SD = 1.14, $\alpha = .92$				
CU1	.19	<b>.68</b>	-.11	
CU2	.04	<b>.85</b>	-.12	
CU3	.01	<b>.75</b>	.05	
CU4	.16	<b>.67</b>	.01	
CU5	.01	<b>.61</b>	.20	
CU6	-.06	<b>.74</b>	.13	
CU7	-.01	<b>.67</b>	.16	
CU8	-.07	<b>.70</b>	.18	
<i>Factor 3: Global Responsibility</i>				
M = 2.73, SD = 1.21, $\alpha = .93$				
GR1	.07	-.02	<b>.81</b>	
GR2	.00	.03	<b>.84</b>	
GR3	.06	-.03	<b>.83</b>	
GR4	.02	.03	<b>.80</b>	
GR5	.05	.23	<b>.54</b>	
GR6	-.04	.27	<b>.58</b>	
GR7	.06	.27	<b>.56</b>	

**Table 7**

## Factor Correlation in Exploratory Factor Analysis

	Personal Responsibility	Community Utility	Global Responsibility
Personal Responsibility	1.00		
Community Utility	.506*	1.00	
Global Responsibility	.498*	.723*	1.00

*Note.* \* significant at 5% level

**Table 8**

## Latent Profile Analysis - Model Fit Summary

Model	Log Likelihood	AIC	BIC	Entropy	LMR p-value	Smallest class %
1	-12412.61	24917.22	25088.80			
2	-11202.40	22544.79	22805.90	.96	.001	50%
3	-10771.52	21731.05	22081.68	.95	.001	24%
<b>4</b>	<b>-10561.84</b>	<b>21359.67</b>	<b>21799.82</b>	<b>.95</b>	<b>.002</b>	<b>16%</b>
5	-10420.53	21125.07	21654.74	.96	.24	12%

*Note.* Bold font indicates best fitted model. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; LMR = Lo-Mendell-Rubin Likelihood Ratio

**Table 9**

## Four-Profile Model Results

Item	Profile 1 Least Communal (n = 64, 21%)	Profile 2 Cooperatively Communal (n = 51, 16%)	Profile 3 Moderately Communal (n = 122, 40%)	Profile 4 Highly Communal (n = 71, 23%)
<i>Personal Responsibility</i>				
Help others	2.07	3.80	3.26	4.33
Respect authority figures like teachers and elders	2.44	3.99	3.44	4.24
Be a part of a group effort	2.25	3.94	3.34	4.42
Follow group rules and norms, traditions, and/or customs	2.18	3.98	3.50	4.46
Assist people in your life who are in need of help	1.77	3.54	3.36	4.31
Act for the rights of others	1.68	3.71	3.21	4.46
Work with others for a common goal	2.10	4.21	3.30	4.50
Help other students learn	2.35	4.13	3.39	4.52
<i>Communal Utility</i>	1.36	1.89	2.69	4.05
“My teacher...”				
Connects math to problems in my community	1.54	2.31	2.77	4.00
Uses math to address students’ community-related concerns and interests	1.50	1.90	2.66	3.81
Uses math to highlight students’ power to make a difference in their community	1.36	1.73	2.69	3.90
Shows how math involves working others to solve problems where you live	1.40	2.55	2.85	4.31
Shows how math involves working with others to make a positive change in my community	1.34	1.92	2.85	4.24
Teaches me to use math to give back to my community	1.23	1.55	2.76	3.93
Teaches me to use math to meet the needs of people I am connected to	1.28	1.65	2.40	4.16
Uses math activities/projects to make my neighborhood a better place	1.26	1.49	2.56	4.05
<i>Global responsibility</i>	1.41	1.53	3.05	4.27
Showing how my actions can protect the lives of humans, animals, or plants	1.49	1.51	3.00	4.29
Focusing on issues of justice and equity	1.31	1.36	3.20	4.40

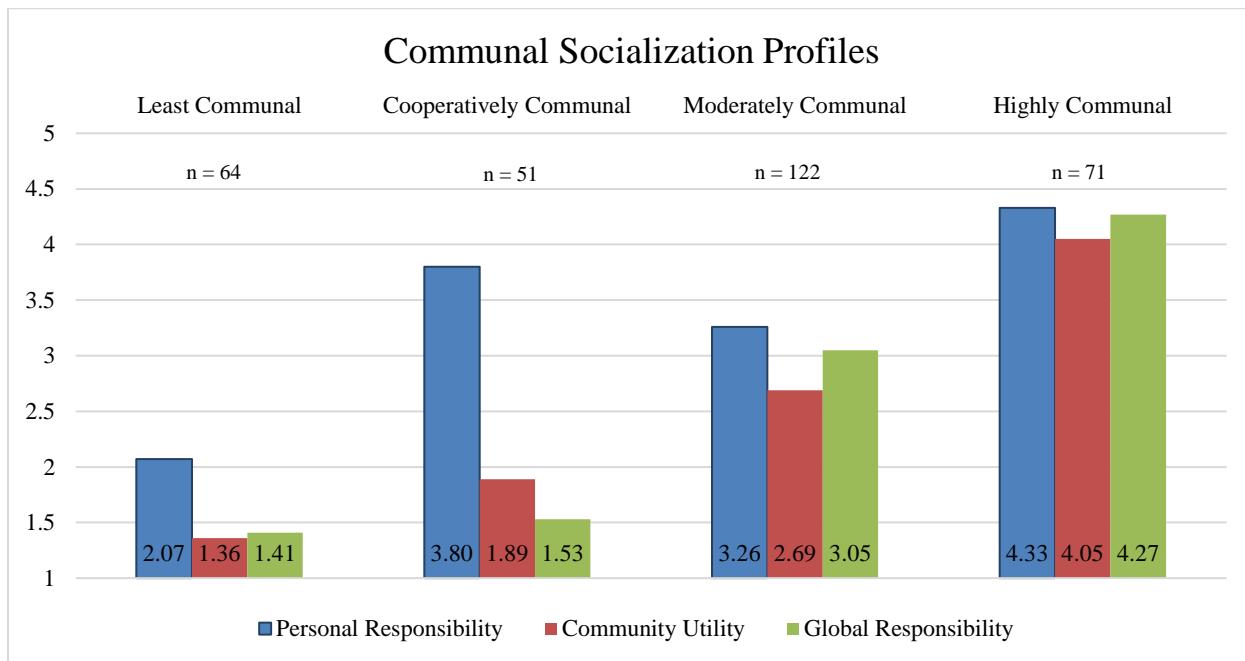
**Table 9 (continued)**

Understanding there are things that we can do as individuals to solve the world's problems	1.45	1.71	3.26	4.33
Thinking about the social problems of the nation and world, and about how they might be solved	1.44	1.47	3.12	4.24
Math as a good way to address problems/disparities around the world	1.53	1.78	3.05	4.11
The whole human race as “one big family”	1.38	1.44	2.81	4.25
Learning about people and groups who work to make society better	1.27	1.47	2.93	4.27

*Note.* N = 308

**Figure 2**

Communal Socialization Profiles



**Table 10**

Variation in Student Demographic Variables by Communal Socialization Profile

Demographic Variable	$\chi^2$	df	p
Gender	0.60	4	0.90
<b>Age</b>	<b>15.81</b>	<b>5</b>	<b>0.02</b>
<b>Course</b>	<b>61.48</b>	<b>18</b>	<b>0.05</b>
Grade level	4.68	6	0.86
SES	11.89	5	0.06
<b>Home-Race</b>	<b>19.20</b>	<b>6</b>	<b>0.004</b>
School-Race	11.95	6	0.22
Region	16.83	7	0.16

*Note.* Significant results are bolded. Gender is coded as Male = 0, Female = 1. Age is categorized: 11-13 years old, 14-17 years old, 18-19 years old. Grade level is ordered from Freshman to Senior. SES is indicated by self-reported lunch status with Free Lunch = 0, Reduced-price lunch = 1, Full-priced lunch = 2. Home-Race = Neighborhood racial composition. School-Race = School racial composition. Region is coded as Midwest = 0, Northeast = 1, Southeast = 2, Southwest = 3, and West = 4.

**Table 11**

Academic, Psychological, and Social Outcomes by Communal Socialization Profile

Predictor	$\beta$	SE	t
<i>Academic Engagement</i>			
Least Communal			
Cooperatively Communal	-0.96	0.11	-8.77***
Moderately Communal	-0.76	0.12	-6.55***
Moderately Communal	-0.74	0.09	-7.96***
<i>GPA</i>			
Least Communal	-0.03	0.21	-0.15
Cooperatively Communal	0.47	0.22	2.15*
Moderately Communal	0.30	0.17	1.71
<i>Psychological Communal Value</i>			
Least Communal	-0.55	0.14	-4.03***
Cooperatively Communal	-0.46	0.14	-3.20**
Moderately Communal	-0.85	0.12	-7.35***
<i>Attainment Value</i>			
Least Communal	-1.25	0.15	-8.14***
Cooperatively Communal	-0.89	0.16	-5.55***
Moderately Communal	-0.74	0.13	-5.76***
<i>Ethnic Pride</i>			
Least Communal	-0.08	0.19	-0.41
Cooperatively Communal	0.18	0.20	0.87
Moderately Communal	-0.76	0.16	-4.68***
<i>Racial Centrality</i>			
Least Communal	-0.58	0.17	-3.36***
Cooperatively Communal	-0.27	0.18	-1.46
Moderately Communal	-0.60	0.15	-4.12***
<i>Social</i>			
<i>Social Responsibility</i>			
Least Communal	-0.34	0.14	-2.37*
Cooperatively Communal	-0.40	0.15	-2.62**
Moderately Communal	-0.80	0.12	-6.65***

*Note.* Highly Communal (Profile 4) is reference category. Control variables are Age and Neighborhood Racial Composition. \*p < .05; \*\*p < .01; \*\*\*p < .001

**Appendix B**

**Study Protocols**

## **Recruitment Script** **Qualtrics Recruitment Panels**

This survey is being conducted by Tamika McElveen, doctoral candidate at North Carolina State University.

You are being asked to complete a survey for research purposes. This is a study about the messages and experiences you receive from your math teacher about ways to be socially connected to others in the classroom or in the community more broadly. To participate in this study, you must (1) self-identify as African American, (2) be in 9<sup>th</sup>-12<sup>th</sup> grades and currently enrolled in a math course, and (2) have your parent(s) permission to participate (if under 18). Anyone who does not meet the criteria listed is not eligible to participate in the study.

The survey should take you approximately 15-20 minutes to complete. Completing this survey is voluntary and you can stop at any time by exiting the web browser.

Compensation is only offered to those that complete the survey. You will be compensated the amount you agreed upon before you entered the survey. Your payment will be processed within three to four weeks. This study contains a number of checks to make sure that participants are finishing the survey honestly and completely. As long as you read the instructions and complete the survey and checks, your survey will be approved. If you fail these checks, your survey will be rejected.

There are minimal risks associated with your participation in this research. Please note that if you agree to participate, the data you provide may be collected and used by Qualtrics as per its privacy agreement. Additionally, if you (1) do not self-identify as African American, (2) are not in 9<sup>th</sup>-12<sup>th</sup> grades and currently enrolled in a math course, and/or (2) do not have your parent(s) permission to participate (if under 18), please do not complete this survey.

If you have any questions about the survey itself, how it is implemented, or survey compensation, please contact Tamika McElveen, (919) 280-2192, [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu). Please refer to study number 23617 when contacting anyone about this study.

If you have questions about your rights as a participant or are concerned with your treatment throughout the research process, please contact the NC State IRB (Institutional Review Board) Director at [IRB-Director@ncsu.edu](mailto:IRB-Director@ncsu.edu), 919-515-8754, or [fill out this confidential form online](#).

### **Instructions**

If you consent to complete this survey, please click on the below survey link that will direct you to the consent and survey on Qualtrics.

**Complete the consents and survey by clicking on this link:**  
[Qualtrics link will be posted here]

## **Assent Form for 11 to 13 years old**

**Title of Study:** Profiles of Communal Socialization: African American Students' Perceptions of the Communal Values Taught in Mathematics Classrooms (**eIRB # 23617**)

**Principal Investigator(s):** Tamika McElveen, [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu), (919) 280-2192

**Funding Source:** College of Education Doctoral Dissertation Research Continuity Grant

**Faculty Point of Contact:** DeLeon L. Gray, [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu), (240) 432-1077

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I am inviting you to participate in a research study about "if" and "how" your math teacher connects math to how students can be socially responsible in their lives, classrooms, and communities.

Your parent(s)/guardian(s) know I am talking with you about the study. This form will tell you about the study to help you decide whether or not you want to take part in the study.

### **What will I do?**

If you decide to be in the study, I will ask you to take an online survey.

### **What benefits do I get for participating in this study?**

Taking part in this study does not have direct benefits to you, but it will help me learn how students think about and experience math and social connections in their math classrooms.

### **Can anything bad happen if I am in this study?**

I do not expect anything bad to happen to you but some kids may get tired. If this happens, try to stand up and walk around before continuing the survey.

### **Will anyone know what I said or did in this study?**

If you decide to be in the study, I will not tell anyone else how you respond or act as part of the study. No one besides the research team will know it's you. Even if your parents or teachers ask what you said or did, I will not tell them.

Everything will remain private unless I think you are being hurt by someone else or in danger. In those rare and unusual circumstances, I am required to tell someone only enough information in order to help you be safe.

### **Will you share what you learn about/from me with other people?**

I plan to share information that we learn from you with others by reporting summaries of what I learn from you and 249 other students across the country. I also want to keep the information that we learn about you for life so that it can be used in other research projects.

### **Do I have to be in the study?**

No, you do not. The choice is yours. No one will get angry or upset if you do not want to do this. You will not lose or miss out on anything. You can also change your mind anytime if you decide you do not want to be in the study anymore.

**What if I have questions?**

If you have questions about the study, you can ask me now or anytime during the study by calling (919) 280-2192 or sending an email to [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu). You can also call <DeLeon Gray at (240) 432-1077 or e-mail him at [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu).

If you have any questions about your rights as a participant in this research or if you feel you have been hurt as a result of this research, contact Jennie Ofstein at the IRB Office at [irb-director@ncsu.edu](mailto:irb-director@ncsu.edu) or (919) 515-8754. She will be able to help you.

You will receive a copy of this form for your records.

Printing/typing your name below means that you have read this form or have had it read to you and that you want to be in this study. As a reminder, you can stop being in the study even after you say “yes.”



**Yes, I want to be in this study**

**Name** \_\_\_\_\_

**Today's Date** \_\_\_\_\_



**No, I do not want to be in this study.**

**Thank you.**

## **Assent Form for 14 to 17 years old**

**Title of Study:** Profiles of Communal Socialization: African American Students' Perceptions of the Communal Values Taught in Mathematics Classrooms (**eIRB # 23617**)

**Principal Investigator(s):** Tamika McElveen, [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu), (919) 280-2192

**Funding Source:** College of Education Doctoral Dissertation Research Continuity Grant

**Faculty Point of Contact:** DeLeon L. Gray, [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu), (240) 432-1077

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I am inviting you to participate in a research study about the messages you receive from your math teacher about ways to be socially connected to others in the classroom or in the community more broadly.

Your parent(s)/guardian(s) know I am talking with you about the study. This form will tell you about the study to help you decide whether or not you want to participate in this research.

### **What is the purpose of this research study?**

The purpose of this study is to examine "if" and "how" your math teacher connects math to how students can be socially responsible in their lives, classrooms, and communities.

### **What will I do in this study?**

If you decide to be in the study, I will ask you to take an online survey.

I expect that you be in this research study for 15-20 minutes.

### **Can I participate in this study?**

You are invited to participate in this study if you agree to be in this study, your parent or guardian allows you to participate in this study, you identify as African American, and you are a 9<sup>th</sup>-12<sup>th</sup> grader currently taking a math course.

All teens who do not meet the inclusion criteria cannot participate in this research.

### **What benefits do I get for participating in this study?**

Taking part in this study does not have any direct benefits for you, but it will help me learn how students think about and experience math and social connections in their math classrooms.

### **Can anything bad happen if I am in this study?**

There are minimal foreseeable risks; some teens, however, may get tired. If this happens, try to stand up and walk around before continuing the survey.

### **Will anyone know what I said or did in this study?**

If you decide to be in the study, I will not tell anyone else how you respond or act as part of the study. This means that no one outside of the researchers will know that it is you. Even if your parents or teachers ask, I will not tell them about what you say or do in the study. Everything will remain private. In the rare and unusual circumstance that I think you are being hurt by someone

else or in danger, I am required by law to tell someone only enough information in order to help you be safe.

**Will you share what you learn about/from me with other people?**

I plan to share information that we learn from you with others by reporting summaries of what I learn from you and 249 other students across the country. I also want to keep the information that we learn about you indefinitely for future research purposes.

**Do I have to be in the study?**

No, you do not. The choice is yours. No one will get angry or upset if you do not want to do this. You will not lose out on anything if you do not want to do this. You can also change your mind anytime if you decide you do not want to be in the study anymore.

**What if I have questions?**

If you have questions about the study, you can ask me now or anytime during the study by calling (919) 280-2192 or sending an email to [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu). You can also call DeLeon Gray at (240) 432-1077 or e-mail him at [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu).

If you have any questions about your rights as a participant in this research or if you feel you have been hurt by this research, you can contact the IRB Office at [irb-director@ncsu.edu](mailto:irb-director@ncsu.edu) or (919) 515-8754. You will receive a copy of this form for your records.

Printing/typing your name below means that you have read this form or have had it read to you and that you want to be in this study.



**Yes, I want to be in this study**

Name \_\_\_\_\_

Today's Date \_\_\_\_\_



**No, I do not want to be in this study.**

**Thank you.**

## **Adult Consent Form**

**Title of Study:** Profiles of Communal Socialization: African American Students' Perceptions of the Communal Values Taught in Mathematics Classrooms (**eIRB # 23617**)

**Principal Investigator(s):** Tamika McElveen, [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu), (919) 280-2192

**Funding Source:** College of Education Doctoral Dissertation Research Continuity Grant

**Faculty Point of Contact:** DeLeon L. Gray, [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu), (240) 432-1077

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### **What are some general things you should know about research studies?**

You are invited to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate, and to stop participating at any time without penalty. The purpose of this research study is to gain a better understanding of the messages you receive from your math teacher about ways to be socially connected to others, including in the classroom or in the community more broadly. We will do this through asking you to participate in an online survey.

You are not guaranteed any personal benefits from being in this study. Research studies also may pose risks to those who participate. You may want to participate in this research because it will help me learn how students think about and experience math and social connections in their math classrooms. You may not want to participate in this research because it will take 15-20 minutes to complete.

Specific details about the research in which you are invited to participate are contained below. If you do not understand something in this form, please ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If, at any time, you have questions about your participation in this research, do not hesitate to contact the researcher(s) named above or the NC State IRB office. The IRB office's contact information is listed in the *What if you have questions about your rights as a research participant?* section of this form.

### **What is the purpose of this study?**

The purpose of the study is to examine "if" and "how" your math teacher connects math to how students can be socially responsible in their lives, classrooms, and communities.

### **Am I eligible to be a participant in this study?**

There will be approximately 250 participants in this study.

In order to be a participant in this study, you must agree to be in the study and (1) self-identify as African American and (2) be a 9<sup>th</sup>-12<sup>th</sup> grader currently taking a math course.

You cannot participate in this study if you do not want to be in the study or if you do not meet the inclusion criteria.

### **What will happen if you take part in the study?**

If you agree to participate in this study, you will be asked to do all of the following:

1. Take an online survey about your thoughts and experiences in math.

The total amount of time that you will be participating in this study is 15-20 minutes.

### **Risks and benefits**

There are minimal risks associated with participation in this research.

There are no direct benefits to your participation in the research. The indirect benefits are to help us better understand and support African American students' academic and social development.

### **Right to withdraw your participation**

You can stop participating in this study at any time for any reason. In order to stop your participation, please contact Tamika McElveen, [tmcclve@ncsu.edu](mailto:tmcclve@ncsu.edu), (919) 280-2192 or DeLeon Gray, [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu), (240) 432-1077. If you choose to withdraw your consent and to stop participating in this research, you can expect that the researcher(s) will redact your data from their data set, securely destroy your data, and prevent future uses of your data for research purposes wherever possible. This is possible in some, but not all, cases.

### **Confidentiality, personal privacy, and data management**

Trust is the foundation of the participant/researcher relationship. Much of that principle of trust is tied to keeping your information private and in the manner that I have described to you in this form. The information that you share with me will be held in confidence to the fullest extent allowed by law.

Protecting your privacy as related to this research is of utmost importance to me. There are very rare circumstances related to confidentiality where I may have to share information about you. Your information collected in this research study could be reviewed by representatives of the University, research sponsors, or government agencies (for example, the FDA) for purposes such as quality control or safety. In other cases, I must report instances in which imminent harm could come to you or others.

How I manage, protect, and share your data are the principal ways that I protect your personal privacy. Data that will be shared with others about you will be de-identified.

**De-identified.** De-identified data is information that at one time could directly identify you, but that I have recorded this data so that your identity is separated from the data. I do not have a master list with your code and real name that connects your information to the research data. When the research concludes, there will be no way your real identity will be linked to the data I publish.

Please note that because you are participating in this research via Qualtrics, your participation will be listed on your Qualtrics profile. However, Qualtrics will not have access to your responses on the survey.

### **Future use of your research data**

To help maximize the benefits of your participation in this project, by further contributing to science and our community, your de-identified information will be stored for future research and may be shared with other people without additional consent from you.

### **Compensation**

For your participation in this study, you will receive the amount you agreed upon before you entered the survey.

If you withdraw from the study prior to its completion, you will not receive compensation.

### **Sponsorship and Funding**

This research is funded by the Doctoral Dissertation Research Continuity Grant. This means that the sponsor is paying the research team for completing the research. The researchers do not, however, have a direct financial interest with the sponsor or in the final results of the study. If you would like more information, please ask the researcher(s) listed in the first page of this form about the funding and sponsorship.

### **What if you have questions about this study?**

If you have questions at any time about the study itself or the procedures implemented in this study, you may contact the researcher, Tamika McElveen, [tlmcelve@ncsu.edu](mailto:tlmcelve@ncsu.edu), (919) 280-2192 or DeLeon Gray, [dlgray2@ncsu.edu](mailto:dlgray2@ncsu.edu), (240) 432-1077.

### **What if you have questions about your rights as a research participant?**

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact the NC State IRB (Institutional Review Board) Office. An IRB office helps participants if they have any issues regarding research activities. You can contact the NC State IRB Office via email at [irb-director@ncsu.edu](mailto:irb-director@ncsu.edu) or via phone at (919) 515-8754.

### **Consent To Participate**

By electronically signing this consent form, I am affirming that I have read and understand the above information. All of the questions that I had about this research have been answered. I have chosen to participate in this study with the understanding that I may stop participating at any time without penalty or loss of benefits to which I am otherwise entitled. I am aware that I may revoke my consent at any time.



**Yes, I consent to participating in this research study**

Name \_\_\_\_\_

Today's Date \_\_\_\_\_



No, I do not consent to participating in this research study.

Thank you for your consideration.