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Is Race a Criteria?: A Case Study on Algebra I Teachers' Conceptualizations of Equity In Track Recommendations

Pam Liu

ACCEPTANCE

This dissertation, IS RACE A CRITERIA?: A CASE STUDY ON ALGEBRA I TEACHERS' CONCEPTUALIZATIONS OF EQUITY IN TRACK RECOMMENDATIONS, by PAM LIU, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Education, in the College of Education & Human Development, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chairperson, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty.

_____
Pier A. Junor Clarke, Ph.D.
Committee Chair

_____
Christine D. Thomas, Ph.D.
Committee Member

_____
Yali Zhao, Ph.D.
Committee Member

_____
Date

_____
Gertrude Tinker Sachs, Ph.D.
Chairperson, Department of Middle & Secondary Education

_____
Paul A. Alberto, Ph.D.
Dean, College of Education & Human Development

AUTHOR'S STATEMENT

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Pam Liu
Middle & Secondary Education
College of Education & Human Development
Georgia State University

The director of this dissertation is:

Dr. Pier A. Junor Clarke
Department of Middle & Secondary Education
College of Education & Human Development
Georgia State University
Atlanta, GA 30303

CURRICULUM VITAE

Pam Liu

EDUCATION:

Ed.D	2021	Georgia State University Curriculum & Instruction
M.Ed.	2016	Harvard Graduate School of Education Special Studies
B.A.	2011	Duke University Mathematics

PROFESSIONAL EXPERIENCE:

2017-present	Mathematics Teacher *Kingston High School
2016-2017	Lead STEM Teacher 21st Century STEM Academy
2015-2016	Substitute Teacher Cambridge Public Schools
2013-2015	Mathematics Teacher Ben Franklin Academy
2012-2013	Mathematics/Science Teacher No. 2 High School of East China Normal University

PRESENTATIONS:

Liu, P. (2019, October). *Level up: The role of 9th grade math teachers in shifting student course trajectories* [Conference session]. 2019 Sources for Urban Educational Excellence, Atlanta, GA.

Fisher-Ari, T., Lee, J., & Liu, P. (2019, February). *Peers, protocols, and possibilities: Discourses of teacher change and development* [Conference session]. 2019 Association of Teacher Educators Conference, Atlanta, GA.

Fisher-Ari, T., Heath, A., Kim, E., Lee, D., Lee, J., Liu, P., Nicol, J., Robinson, L., & Sery, A., (2018, June). *"Teaching is like..": Metaphors about teaching* [Keynote address]. Academy for Future Teachers, Atlanta, GA.

Espy, S., & Liu, P. (2017, March). *STEM gems: Giving girls role models in STEM careers* [Panelist]. Emory Goizueta Business School, Atlanta, GA.

21st Century STEM Academy, & Liu, P. (2017, March). *Robot racing and PancakeBots* [Presentation]. 2017 Atlanta Science Festival, Atlanta, GA.

Liu, P. (2016, July). *STEM literacy: Why every child needs to be STEM literate and the critical role of teachers* [Conference session]. 2016 Southeast Homeschool Expo, Atlanta, GA.

Liu, P. (2016, July). *Making math fun: Using coding and robots to foster a strong STEM foundation* [Conference session]. 2016 Southeast Homeschool Expo, Atlanta, GA.

Food Fortification Initiative, & Liu, P. (2014, July). *Food fortification in India: A literature review* [Poster presentation]. Micronutrient Forum 2014 Global Conference, Addis Ababa, Ethiopia.

PROFESSIONAL SOCIETIES AND ORGANIZATIONS:

2017-present	National Math and Science Initiative
2019-2020	Association of Teacher Educators

IS RACE A CRITERIA?: A CASE STUDY ON ALGEBRA I TEACHERS' CONCEPTUALIZATIONS OF EQUITY IN TRACK RECOMMENDATIONS

by

PAM LIU

Under the Direction of Dr. Pier A. Junor Clarke

ABSTRACT

Teachers in United States' high schools are often tasked with recommending students into mathematics tracks or ability groups. Unfortunately, the literature confirms there are disproportionately fewer Black and Brown students tracked into higher level mathematics courses, and there is limited understanding of how mathematics teachers' recommendations interact with these inequitable tracking outcomes. The purpose of this research was to conduct a case study on the tracking recommendation perspectives of a team of General Algebra I teachers from a diverse, urban high school. The research questions guiding this dissertation were: 1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track? 2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

A Critical Race Theory (CRT) framework centering race and racism shaped the study design and provided the critical lens for data analysis. Data was collected from four tiered sources: a digital survey featuring hypothetical vignettes, a group discussion, a supplemental interview, and individual follow-up interviews. The findings indicate that teachers: (a) believe using test scores as the sole determinants of student ability is inequitable; (b) are aware of racial discrepancies between the General and Honors tracks; (c) lack communication with administration and Honors teachers on school tracking policies; (d) are supportive of affirmative action solutions for increased tracking equity; and (e) benefit from a close relationship with the researcher of this study. The group of six General Algebra I teachers emerged with new understandings of their recommendation criteria and role in maintaining or disrupting tracking opportunity gaps. This study contributes to the literature on the nuances of mathematics teachers' recommendation criteria and conceptualizations of equity. Implications are significant for critical

conversations, school policy reform, professional development, and teacher training in the quest for social justice in education.

INDEX WORDS: Tracking, Mathematics Tracking, Secondary Mathematics, Urban Education, Equity, Recommendation Criteria, Critical Race Theory, Qualitative Case Study, Course Placement, Teacher Decision-Making, Teacher Recommendation, Hypothetical Vignettes

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the College of Education & Human Development

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DEDICATION

I dedicate this dissertation to my husband, Daniel. I did not think that in the three years of my doctoral journey that I would also meet my soulmate, get married, and now be expecting our first child together. From our first date in August 2018 to currently surviving a global pandemic together in quarantine, every moment in my life has been better because of you. You accepted the challenges that came with my graduate student life, and found ways to be with me even when I felt like I had no time at all. Thank you for taking care of me and making life easier. Your positive energy and loving heart is contagious, and I am so looking forward to all the time we can spend together with our growing family now that I am done with graduate school. Cheers to the beginning of the rest of our lives!

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colleagueship and support of my graduate school endeavors. Your experiences no doubt have overlapped with and will provide insight to many teachers across the globe. Thank you for your service to changing the future of education!

To my Mom and Dad – Thank you for encouraging me to always pursue higher education. You led by example and have shown me that great things come to those who prioritize learning in all of life's adventures. As parents you have shown me that whether good, bad, easy, or challenging – any experience is worthwhile if you stay open minded and are willing to grow intellectually. Thank you for supporting my career as a teacher and celebrating all of my personal and educational accomplishments.

Lastly, but certainly not least, I want to give the biggest acknowledgement to the 2018 cohort – a group of individuals who I have grown and connected with like no other. We have laughed, cried, shared frustrations, celebrated milestones, and laughed some more, from day one until today. This experience is an unbreakable foundation to our friendship and successes for years to come. Cheers to all of our graduations, and here's to many more blessings ahead!

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1 INTRODUCTION

Walk into nearly any high school in the United States (U.S.) and you will see evidence of academic tracking, a separation of students into groups consisting of homogeneous ability levels (Chmielewski et al., 2013; Harklau et al., 2018). In theory, as many have argued, tracking makes it easier and more efficient for teachers to differentiate lessons to students' academic needs (Betts, 2011). However, in reality, tracking systems hide behind the illusion of meritocracy and schools with the greatest student diversity end up with inequities between the low and high tracks that are hard to ignore (Harklau et al., 2018; Lucas, 1999, 2001). These racial and class inequities are especially pronounced in high school mathematics (Ballon, 2008; Batruch et al., 2019; Champion & Mesa, 2018; Harklau et al., 2018; James et al., 2016; Kelly, 2009) due to mathematics being among the most heavily tracked subject areas (McFarland, 2006). As a high school mathematics teacher who experienced and saw first-hand an obvious racial gap between low and high track students, I present the following written sections introducing my dissertation research: 1) My Mathematics Tracking Experience, 2) Statement of the Problem, 3) Purpose of the Study, 4) Considerations, 5) Significance of the Study, 6) Definition of Key Terms, and 7) Overview of the Study.

My Mathematics Tracking Experience

Living as an Asian American in the United States (U.S.) education system, I have been tracked my entire life, starting in elementary school. As a child, I could easily fit into a common Asian stereotype (Zhou & Bankston, 2020) - I was quiet, hardworking, and excelled in academics, particularly mathematics. After a teacher recommended me into a gifted program at the end of 3rd grade based on test scores, I began on a mathematics trajectory that would shape the rest of my academic life. In 4th and 5th grade my father drove me out of district to the

elementary school where the gifted program was housed, and there, I began learning the basics of pre-Algebra. In middle school, my 8th grade year, I took a bus to the local high school for Geometry class. By high school in 10th grade, I had already completed Advanced Placement (AP) Calculus. For my junior and senior year, I was again recommended for and accepted into a prestigious boarding school that specializes in advanced mathematics and science courses. Then, I ended up majoring in mathematics at one of the top ten universities in the U.S.

Despite what seemed like an exceptionally positive educational experience in mathematics, only years later when I started my career as a teacher, did I realize the inequities behind the system known as tracking. The significance of these different levels, or tracks, of mathematics courses truly materialized for me when I found out that my first teaching assignment was in an Algebra I class and an AP Statistics class. Typically, the high school mathematics sequence is in this order: Algebra I, Geometry, Algebra II, Pre-calculus, and then if the school offers it, more advanced courses such as AP Calculus or AP Statistics (Kelly, 2007). Knowing that each mathematics course is one-year long and high school requires 4 years of mathematics, logistically I knew that my AP Statistics students had to have started in a mathematics course higher than Algebra I in the 9th grade. Hence, the AP students were on a higher mathematics track. The sequencing logistics of the mathematical hierarchy and tracking was not a problem had it not been for this alarming inequity: My Algebra I students were majority Black or Hispanic, and my AP Statistics students were majority White. What is even more worrying is that the school's racial demographics were roughly 40% Black, 30% Hispanic, and 30% White.

Through much reflection, I realized that this drastic racial divide between the students placed in high versus low mathematics tracks had been evident in my entire academic life. Most

of my classmates growing up were White or Asian. I had gained entry into an elite, higher academic track when my teacher recommended me for the 4th grade gifted program, which then propelled my high school and post-secondary opportunities. While parental involvement (Degol et al., 2017) and my high test scores (Archbald et al., 2009; Dougherty et al., 2017) played a part in my academic position on the higher mathematics trajectory, I know that the societal stereotype of my racial identity as an Asian American certainly reassured others' perceptions of my mathematics ability (McGee, 2014; Walton & Cohen, 2003; Yook, 2013; Zhou & Bankston, 2020). I wondered about how much academic stereotyping affected the disproportionality of more Black and Hispanic students in low track mathematics starting in 9th grade (Ballon, 2008; Champion & Mesa, 2018; Kotok, 2017).

The more experience I gained as a high school teacher, the more I continued to see the phenomenon of inequity resulting from mathematics tracking. Now, 10 years and 5 schools later from when I first stepped foot into the classroom, I see the same distinctive racial compositions of the different mathematics track courses. Yet it wasn't until about three years ago that I recognized the true power that teachers had in the form of teacher recommendations in assigning which students get access to multitudes of opportunities. Teachers, emic to the culture of power (Delpit, 1988), can help students, like my childhood self, enroll in higher-tracked mathematics experiences through the course recommendation process. I knew that my graduate school research had to focus on this teacher recommendation process. These were the beginning musings and awareness of how my observations as a teacher could translate into key research items.

These pivotal reflections of my academic and teaching career have shaped my quest for equity in mathematical tracking. Even though I ended up having a wonderful academic career, it

is imperative to note that racial stereotypes, no matter how positive or negative they may seem, are all part of a normalized structure of racist forces designed to maintain a racial hierarchy with people of color at the bottom (Delgado & Stefancic, 2017; McGee, 2014; Myrtle et al., 2014; Zhou & Bankston, 2020). My positive experience and numerous opportunities that I attribute to being on the high mathematics track in high school are what fuel my anger when I see everyday is the large racial discrepancy in the low versus high mathematics tracks at my workplace, a diverse, urban high school. Moreso, with mathematics' long-standing role as a gatekeeper to societal success and power (Champion & Mesa, 2018; Department of Education, 1997, 1999; Stinson, 2004), it is critical for me to research the teacher recommendation role in influencing students' mathematics course placement.

Therefore, I unequivocally use my research to study an influential, yet dangerously subjective variable which can shift a student's mathematics trajectory from low to high through teacher recommendations (Bernhardt, 2018; Oakes & Guiton, 1995). My entire life trajectory was changed by one teacher's recommendation at the end of 3rd grade, and therefore, this research is tangible to me and something that I have power to affect today as a high school teacher. Every year mathematics teachers at my school are asked to make recommendations for students to move from the general-level track to the honors-level track. Knowing that this move could positively and exponentially impact a student's academic life, this research centers the criteria that 9th grade Algebra I teachers used to inform their mathematics course recommendations and what their conceptualizations of equity were. Tracking, from my experience as a student and a teacher, has led to an unequal distribution of educational privilege and opportunity. Later in Chapters 3 and 5 respectively, I detail how my mathematics tracking experiences shaped my positionality as a researcher, and then I conclude with a reflection on

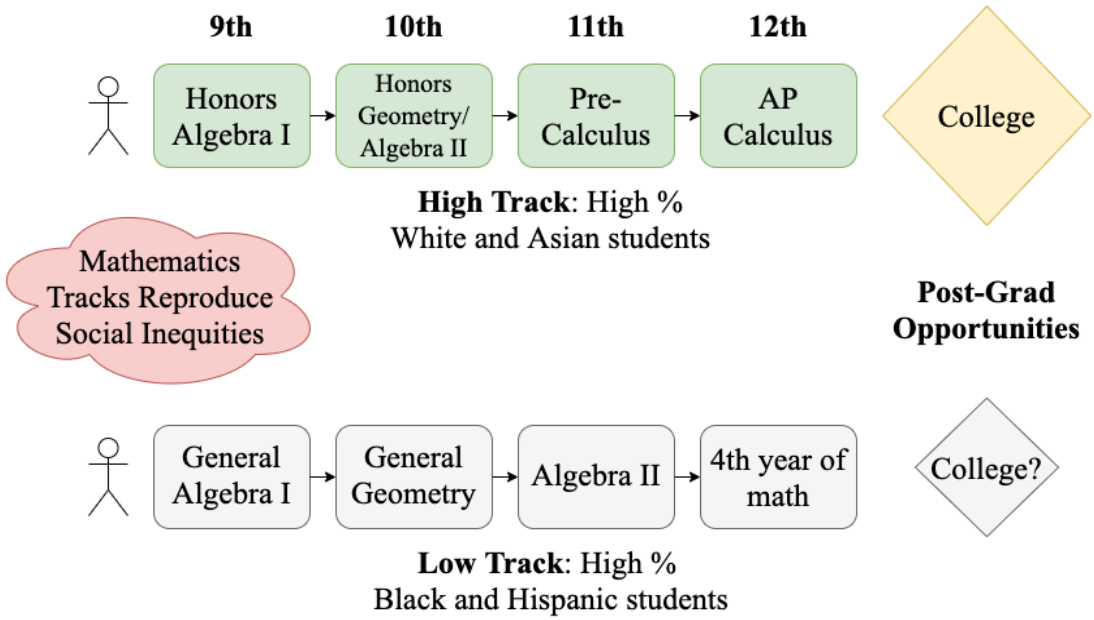
how this study transformed me as a new researcher in the field of mathematics tracking. In the next section I provide further detail on the issues of inequity manifesting in the tracking system.

Statement of the Problem

The problem about tracking in U.S. high schools is that it is undeniably a system that aids in the reproduction of social inequities (Betts, 2011; Bowles & Gintis, 1976; Champion & Mesa, 2018; Kanno & Kangas, 2014; Miller, 2018; Oakes, 1982, 2005). Mathematics remains one of the most commonly tracked subject areas (McFarland, 2006), and taking higher track or more advanced mathematics courses is a good predictor of high school and college completion (Champion & Mesa, 2018; Chmielewski et al., 2013). Unfortunately, the literature on mathematics tracking confirms that higher track mathematics courses remain a space disproportionately populated by the privileged (James et al., 2016; Kelly, 2007; Lee, Croninger, et al., 1997; Lee, Smith, et al., 1997; LeTendre et al., 2003; Miller, 2018; Oakes, 1982, 2005). This is illustrated in Figure 1 below.

Figure 1

Mathematics Tracks Reproduce Social Inequities



Low-income, Black, Hispanic, and English Language Learner (ELL) students are often tracked into the lowest-level mathematics courses in 9th grade condemning them to fewer academic opportunities throughout their high school career and beyond (Archbald & Farley-Ripple, 2012; Ballon, 2008; Buckley, 2010; Champion & Mesa, 2018; Giersch, 2018; James et al., 2016; Kanno & Kangas, 2014; Kotok, 2017; Lubienski, 2002; Mickelson & Everett, 2008). As shown in Table 1 below, Ballon's (2008) quantitative study found that Mexican-Americans and African-Americans were largely underrepresented in Honors and College-level mathematics tracks. This not only reduces potential educational attainment, but placement in lower track courses tend to damage mathematics self-concept for students (Chmielewski et al., 2013; Karlson, 2015) and to make matters even more inequitable, the courses are often taught by novice teachers (Betts, 2011; Gamoran, 1987; Giersch, 2018; Harklau et al., 2018; Harris & Anderson, 2012; Kalogrides & Loeb, 2013; Oakes, 1982; Rosenbaum, 1976).

Table 1

Statistics for Different Racial Groups Along Mathematics Tracks

Variable	*Mexican American*	*African American*	*White*	*Asian American*
Dependent variable				
High school math track				
Nonacademic (ref)	68.4%	66.7%	50.7%	32.3%
College	27.4%	21.2%	37.2%	40.7%
Honors	4.2%	12.1%	12.2%	27.0%

Note: Reprinted from "Racial Differences in High School Hath Track Assignment", by Ballon, E., 2008, *Journal of Latinos and Education, Volume 7,* p. 278

Numerous researchers have studied the mathematics tracking structure and concluded while upward track mobility is limited due to the strict course sequencing of mathematics,

students are not stuck in the track they were assigned (Hallinan, 1996; Kotok, 2017; McFarland, 2006; Tyson & Roksa, 2016). In fact, these researchers note that the most opportune and critical time to move to a higher track is during the earlier high school years such as the 9th grade (Hallinan, 1996; Kotok, 2017; McFarland, 2006; Tyson & Roksa, 2016). However, ease of track mobility will depend on school context, as even two schools in the same geographic location can vastly differ in track comparability (Betts, 2011; Chmielewski et al., 2013; Kelly, 2007; McFarland, 2006; Tyson & Roksa, 2016). In the U.S. and international urban school districts, there is more economic and racial diversity, and only parents and students with more social capital tend to have knowledge on or can impact tracking decisions (Giustinelli & Pavoni, 2017; LeTendre et al., 2003; Useem, 1991), thereby further exacerbating the already unjust tracks. Even guidance counselors, who presumably play a large role in helping students select courses, have misconceptions about prerequisites or are mainly focused on obtaining graduation credits versus propelling students towards highest mathematics course attainment (Buckley, 2010).

An important, yet understudied variable in shaping student track mobility is teacher recommendations (Bernhardt, 2014b, 2014a, 2018; Buckley, 2010; Reyes & Domina, 2017; Tyson & Roksa, 2016; Watanabe, 2006). While there is evidence from U.S. and international research that non-meritocratic measures such as student motivation, behavior, socio-economic, and racial background play a role in teacher recommendations for course enrollment, the decision-making processes and exact mechanisms by which teachers sort students remains unclear (Bernhardt, 2014b, 2014a, 2018; Buckley, 2010; Faulkner et al., 2014; Glock et al., 2015; Oakes & Guiton, 1995; Watanabe, 2006). Tracking as a systemic reproduction of inequity is well documented, yet the literature lacks context-specific examinations of how internal school processes such as teacher course-recommendations operate to maintain this opportunity gap,

especially in mathematics. Therefore, these research gaps provide a niche for the goals of my study.

Purpose of the Study

Quantitative evidence is strong that current mathematics tracking practices, especially in diverse, urban high schools in the U.S., results in the marginalization of Black and Brown students (Ballon, 2008; Champion & Mesa, 2018; James et al., 2016; Kelly, 2009; Oakes & Guiton, 1995). The purpose of my study is to aim for a thorough, *qualitative* investigation of the phenomenon of mathematics teachers' tracking recommendations with a focus on the 9th grade Algebra I teachers. Teacher recommendations are known to influence student placement into either low or high mathematics tracks (Bernhardt, 2014a; Hallinan, 1996; Lucas, 1999; McFarland, 2006; Oakes, 1992). Currently the literature is unclear on the criteria and reasoning that teachers are using to evaluate students' mathematics abilities, particularly at the 9th grade level, a critical time in determining future mathematics trajectory (Kotok, 2017; Steele et al., 2016). To help add clarity to the literature and achieve my purpose in this research, I have crafted two questions to guide my work in the chosen site of study.

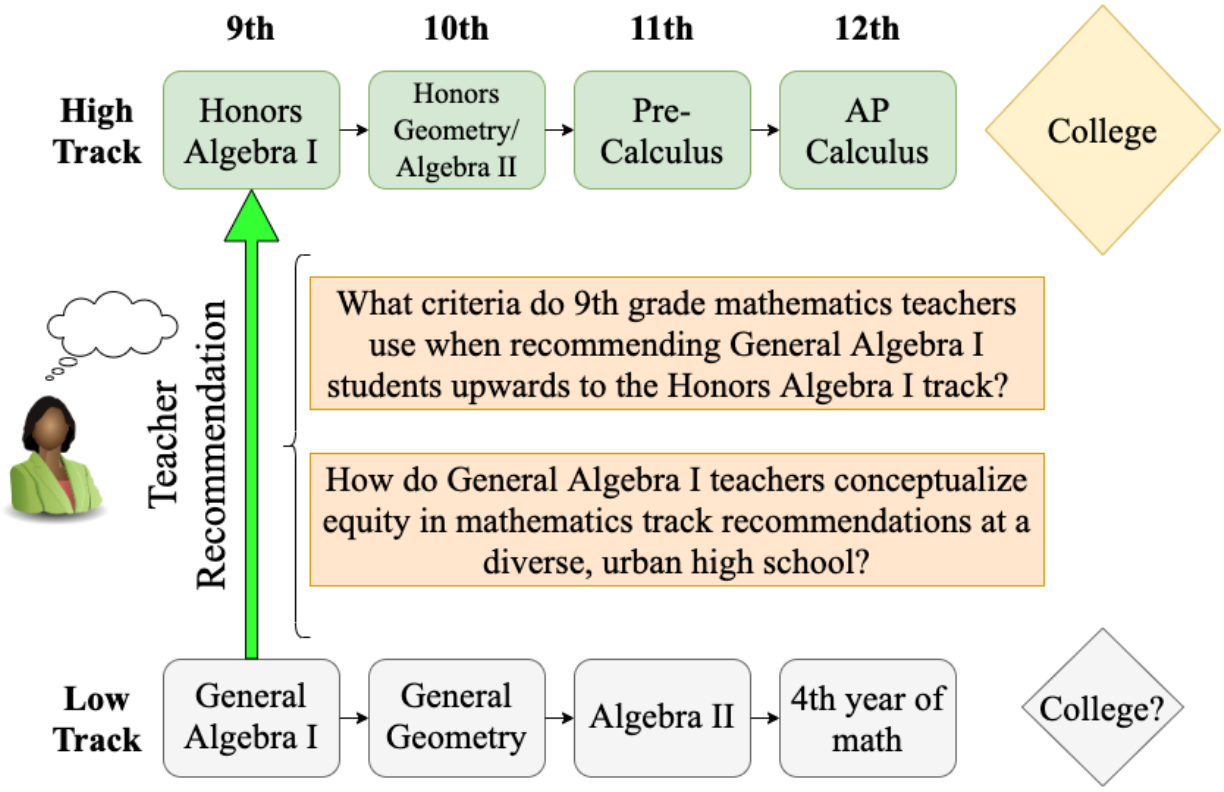
Research Questions

The following questions situated in the statement of the problem, as shown in Figure 2 on the next page, will guide my research:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?
2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

Figure 2

Research Questions



My first research question is designed to guide my search for clarity in recommendation criteria. The subjectivity and autonomous nature of recommendations is unsettling (Bernhardt, 2018; Buckley, 2010; Kelly, 2007; Watanabe, 2006), and I hope to uncover more concrete details on exact student characteristics that teachers are evaluating for mathematics track recommendations.

Secondly, the other main question in my study is crafted to explore how teachers conceptualize equity in their mathematics track recommendations. The U.S. school system's course-by-course tracking model remains fairly flexible in allowing track mobility upwards through ways such as getting a teacher recommendation (Bernhardt, 2014b, 2014a; Foreman & Gubbins, 2015; Oakes, 1992; Tyson & Roksa, 2016), yet tracking still seems to reproduce social

injustices along racial lines (Ballon, 2008; Kelly, 2007; Kotok, 2017; Oakes, 2005). In my study, I looked at how teachers are conceptualizing equity when making mathematics course recommendations for students in a diverse, urban high school. This research consisted of gathering rich, qualitative data in efforts to understand and improve equity in mathematics tracking, but first there are some considerations to reconcile.

Considerations

Before going into details on the significance of my study, I want to address two relevant considerations that deserve attention. First, while it is a highly important factor affecting student enrollment in courses, teacher recommendations do not usually acknowledge other course-scheduling variables that may need to be accounted for when creating a master schedule. For instance, if a student who is passionate about a foreign language is locked into taking a course taught by the sole Japanese language teacher in the school, her schedule presents less flexibility to adjust her mathematics course. Second, another unpredictable consideration that arose during the study was the COVID-19 pandemic which caused undue stress for some of Algebra I team members. According to Watanabe (2006), a strong professional community that will support honest dialogue and reflection takes time to develop. Having a team of individuals come together for research during the pandemic required a little more understanding and flexibility during scheduling individual interviews and group discussion for meaningful conversation.

Both these considerations are a natural part of the intricate constellation of factors outside of the actual teacher recommendation that can impact where students are ultimately placed in their mathematics course. While I cannot control course master schedule logistics or which teachers ultimately participated in my qualitative study, I know that the beauty of qualitative research findings is so that the reader can apply, reconstruct, and then take back the information

that is useful to their own context (Merriam, 2009). I am happy to report that even though I did not recruit all 8 of the Algebra I teachers for my study, the group of six General Algebra I teachers emerged with new understandings of their recommendation criteria and role in maintaining or disrupting tracking opportunity gaps. Other educators who read my research can also reflect this research and move their institution towards more equity.

Significance of the Study

Equity issues of teacher recommendation criteria are challenging to address but necessary to dissect if we are to improve educational opportunity for students of color (Ladson-Billings & Tate, 1995). The significance of my study for key individuals is three-fold, starting with the teacher participants at my site of study and other current teachers, then magnifying outward to other school and district leaders, and finally informing teacher education training programs. In this section I discuss how my research positively impacts current teachers, local school leaders, and pre-service teachers.

The first and foremost significant impact of my study was for the teacher participants of my school site. Knowing that subjective student measures are often used in course placement processes (Faulkner et al., 2014; Glock et al., 2015; Hammerness et al., 2005; Kelly, 2007; Klapproth & Fischer, 2019; Mickelson & Everett, 2008; Oakes, 1994; Oakes & Guiton, 1995; Sneyers et al., 2018; B. Taylor et al., 2019; Westphal et al., 2016), my research has given my teacher participants the opportunity to articulate and reflect on how exactly they are determine which students should move from General Algebra I to the Honors Algebra I track. As noted in other equity research, I made race discussions explicit and critical reflections a centerpiece of the teacher conversations (Max, 2017; Watanabe, 2006). Also, my research allowed for teachers to reflect individually on decision-making criteria as well as discuss collaboratively in a group,

something that is much needed in the current isolated decision-making environment, as mentioned by similar research (Bernhardt, 2014b, 2014a, 2018).

In addition to having a significant impact on the internal analysis and critical conversations for my teacher participants, findings from my study have important implications for the school site leaders and those district leaders with contexts similar to my study site. Kelly (2007) used data from 351 public high schools in North Carolina and found that too often there are vague language or subjective recommendations required in course placement policies, all on top of a rigid master schedule that may inhibit certain students from taking advanced courses. After gaining in-depth insight into an Algebra I team's criteria and conceptualizations of equity used for placing students into mathematics tracks, other important school individuals may step up to promoting equity-related teacher professional development or school tracking reform.

Finally, and most significantly, my research findings have added another important equity dimension to mathematics teacher education programs across the world. Preservice teachers have been an important demographic to study as we move towards more equity across all facets of education. In her study on preservice secondary mathematics teachers' conceptualizations of equity Max (2017) found that these teachers were considering multiple factors when it comes to having an equitable classroom environment, such as fair calculator usage or appropriate modeling of mathematical discourse. Part of what makes for an equitable mathematics classroom environment is ensuring that all students have the opportunity to be recommended into the appropriate level mathematics track, and my research has aided in supporting preservice teachers curriculum to consider how to make an equitable decision on who to recommend. Next, I define key terms which are relevant to my research study.

Definition of Key Terms

Before beginning the literature review in Chapter 2, one must gain an understanding of the key terms used in my research and literature search. While my focus will be primarily on the tracking processes common to the United States (U.S), all types of tracking literature offer important insight for my research because regardless of exact contextual distinctions, tracking at its core is a means of grouping students by ability (Harklau et al., 2018). In fact, practices in other countries such as those in Europe, have resulted in more pronounced separation of students and inequitable opportunity due to the between-schools tracking structure (Glock et al., 2015; Klapproth & Fischer, 2019). As I have already defined tracking, I will proceed with defining more specific key terms: course-by-course tracking, streaming, within-school tracking, between-school tracking, curricular flows, academic trajectory, course sequence, vertical/horizontal differentiation, and track mobility.

In the U.S., the most common type of tracking is *course-by-course* tracking, which means students may be tracked into different groups for different subjects, or tracked in some subject areas and not others (Chmielewski et al., 2013). Students are frequently tracked in their high school mathematics course, and mathematics placement may additionally drive placement in other subject areas (Chmielewski et al., 2013; Mickelson & Everett, 2008). For instance, a student in a high track mathematics course may also be placed in a high track science or English course. Another type of tracking, though less common in the U.S., is the *streaming* of students into a rigid set of courses or programs designated for students in an overall career path as the fine arts or engineering(Chmielewski et al., 2013; LeTendre et al., 2003). Most types of tracking in the U.S. takes place *within* the same school, rather than *between* schools such as in Europe or

Asia where students in different tracks go to entirely separate institutions (Betts, 2011; Harklau et al., 2018; LeTendre et al., 2003).

To fully understand tracking in mathematics courses in U.S. high schools, it is important to know the *curricular flows* for a student and how their *academic trajectory* depends on where they start in the mathematics *course sequence*. For instance, the most common math course sequence in high school is Algebra I, Geometry, Algebra II, Pre-calculus, and Calculus (Kelly, 2007), with each course lasting one entire academic year and requiring completion of the one before it as a prerequisite. This is called *vertical differentiation*. Since mathematics is vertically differentiated, a student who starts in Algebra I in 9th grade would take Geometry in 10th, Algebra II in 11th, and then Pre-Calculus in 12th grade. Another student who started in Geometry in 9th grade would thus be on a higher academic trajectory, or have more academic opportunities than one who started in Algebra I (McFarland, 2006). In another common U.S. high school scenario that is relevant for my study, Tyson and Roksa's (2016) study defines a *horizontal differentiation* of tracks where 9th grade students are sorted into either Remedial Algebra I (low-level), General Algebra I (on-level), or Honors Algebra I (high-level). Students in Remedial Algebra I would therefore be on the lowest track and have lower academic trajectory than a student in Honors Algebra I. The range of potential curricular flows, or possible course movements, in a school with horizontal differentiation of tracks tends to be more complex and diverse than a school with solely vertical differentiation. This maze of vertical and horizontal tiers of math courses complicates a movement process known as *track mobility.*

Track mobility is the possibility for a student to move from a low to high or high to low track (Hallinan, 1996; Lucas, 1999, 2001; McFarland, 2006). For example, a student who moves from General Algebra I to Honors Algebra I, or from Algebra I to Geometry in their 9th grade

year will have moved from a low to a higher track. McFarland's (2006) study on curricular flows and academic trajectories illustrates the nuances behind moving from one track to another, pointing out that not all math course comparisons are one-to-one. He provides the following example: “Supposedly, Algebra I courses occupy the same sequence stage regardless of ability level. However, Algebra A and B (a two-year course sequence) are equivalent to a single course of Algebra I, indicating that one-to-one stage comparisons may not exist in many curricula. In addition, there are points at which prerequisites are unclear and sequences break down so that large proportions of students take career ‘shortcuts’” (McFarland, 2006, p. 180). This potential track mobility, or movement between a low and high mathematics track, is often facilitated by a teacher’s recommendation (Campbell, 2012; Davis et al., 2019; Delpit, 1988; Foreman & Gubbins, 2015; Hallinan, 1996; Johnson, 2008; Oakes, 2005). Why some students receive a teacher recommendation to improve their mathematics trajectory from low to high while others do not, brings me to discuss the overview for my study.

Overview of the Study

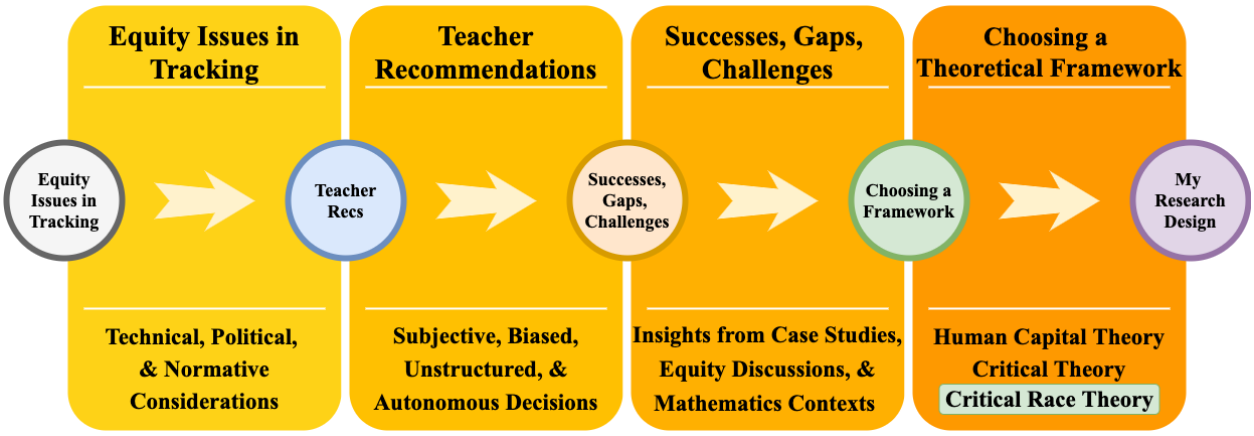
For my research study, I explored teacher recommendation criteria and conceptualizations of equity in mathematics track assignment of students in a diverse, urban high school. I investigated these topics through the use of a qualitative single-case study on a team of 9th grade Algebra I teachers at a selected course-by-course tracked high school located in a large, diverse metropolitan area. In Chapter 2, I present my literature review followed with the rationale for selection of Critical Race Theory (CRT) as my theoretical framework. Chapter 3 delves into my methodology, including detailed descriptions of my theoretical framework, research design, data collection instruments and methods, and analysis process. Finally, in Chapters 4 and 5, I present my findings and then a discussion and implications of the study.

2 LITERATURE REVIEW

My research investigated the recommendation criteria and conceptualizations of equity that an Algebra I team consisting of 6 teachers in an urban high school utilize when making decisions on which 9th grade students to recommend to move upwards from General Algebra I to the Honors Algebra I track. The organization of this literature review shown in Figure 3 is focused on four areas that are essential for framing my proposed study. The first section of my review highlights equity issues in mathematics tracking, and I use Oakes' (1992) description of tracking's technical, political, and normative considerations to frame how social inequities manifest and are maintained in mathematics tracks. Second, I summarize literature findings on what previous empirical studies reported on teacher recommendation practices and criteria used for determining course placement. In the third section, I provide study insights learned from the successes, gaps, and challenges stemming from the current literature. Before concluding Chapter 2, I present a rationale for choosing Critical Race Theory as my theoretical framework. These four sections provide the impetus for my dissertation research.

Figure 3

Organization of the Literature Review



Equity Issues in Tracking: Technical, Political, & Normative Considerations

In this first section of my literature review, I highlight the prominent equity issues in tracking. To do this, I use Oakes' (1992) technical, political, and normative considerations to frame the three dimensions where social inequities manifest and are maintained in mathematics tracks. These three considerations provide a way to categorize tracking inequities as structural, political, and cultural.

Technical Considerations

The technical considerations in tracking refers to the structuring of U.S. schools as institutions that separate students into different academic courses or programs (Oakes, 1992). This dimension is an especially salient equity issue for a highly tracked subject such as mathematics. Oakes (1992) describes the technical complexities in how stratification of students occurs through "variations in the curricular content, pace, and quantity, culminating in distinct college-preparatory and non-college preparatory programs and finer distinctions among levels within the two" (p. 12). To further understand two equity issues in mathematics that emerge from the technical dimension of tracking, it is important to reiterate the common U.S. school tracking structure and mobility patterns.

As stated in the introduction, most U.S. school systems follow a course-by-course tracking model (Chmielewski et al., 2013). In this type of tracking, students may be tracked in one subject area but not another. For example, a student in a course-by-course tracked high school may be enrolled in a high-track math course such as AP Calculus or Honors Algebra, but a low-track English course. In elementary schools, this may look like a student being pulled out of class based on ability for a special reading group (LeTendre et al., 2003). Course-by-course tracking in U.S. schools is important to note because it aids in individualization of a student's

schedule and adds potential for track mobility within a subject area. For my research study, *tracking* refers to this most common type in U.S schools, course-by-course tracking, where students have potential for more individualization of academic subjects and more fluid movement between tracks (Chmielewski et al., 2013; Domina et al., 2019; Lucas, 1999; McFarland, 2006). However, I include insightful tracking research in this review from international regions, where appropriate, to present further support on how tracking structures perpetuate inequities.

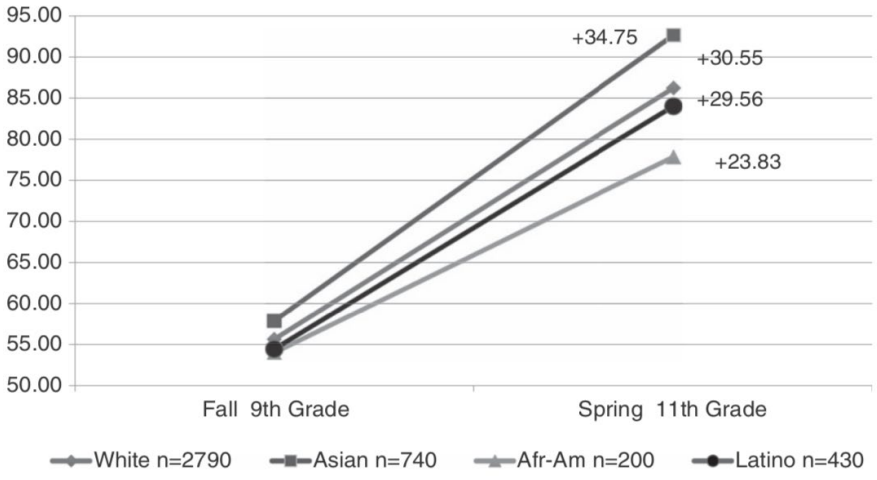
Two major equity issues emerge from the technical considerations described above. The first is the emergence of an academic hierarchy. For mathematics courses, the highest and lowest tiers of the ability hierarchy can vary from school to school. In Tyson and Roksa's (2016) research, the mathematics hierarchy for the common 9th grade course, Algebra I, is differentiated horizontally into the tracks of Remedial (low-level), General (middle-level), and Honors (high-level). Ballon (2008) describes yet another mathematics hierarchy structure for the 9th grade, this time a vertical one: Students in Pre-Algebra in the 9th grade are on the non-academic track (low-level), those in Algebra I are part of the honors track (middle-level), and those in Geometry are on the college track (high-level). These technical considerations in mathematics structuring are significant because students in the highest-level tracks have more positive experiences in school than those who are in a lower track (Gamoran, 1987).

To support the notion that students at the highest level of the math tracks experience more positive effects of schooling, many researchers cite evidence that students make assumptions about their ability level and adjust expectations for themselves based on what track they are assigned to (Chmielewski et al., 2013; Hallinan, 1994; Karlson, 2015; Lucas, 1999; Reyes & Domina, 2017). Using the PISA 2003 data set, Chmielewski et al. (2013) found that

students in high-track math courses had higher math self-concept, or perceptions of their mathematics ability, than those students in the low-track math courses. This self-perception is reinforced every day in a typical course-by-course tracked school because the students "observe the grouping process on an everyday basis and are thus constantly reminded of the relative status of their track within the entire age cohort" (Chmielewski et al., 2013, p. 932). Not only do students in higher tracks have a higher math self-concept, Champion and Mesa (2018) concluded from an analysis of the High School Longitudinal Study of 2009 (HSLS: 09) that only those students who begin high school in the higher-level math tracks are able to reach a calculus course, which is a gatekeeper to many post-graduation opportunities such as college STEM degrees. Similarly, as shown in Figure 4, even students who start with similar mathematics achievement in 9th grade eventually will exhibit large achievement gaps by 11th grade depending on which track they began on (Kotok, 2017).

Figure 4

Math Achievement: Fall 9th Grade and Spring 11th Grade by Race



Reprinted from "Unfulfilled Potential: High-Achieving Minority Students and the High School Achievement Gap in Math", by Kotok, S., 2017, *The High School Journal, Volume 100,* p. 9

A second major equity issue that results from the technical aspect of the mathematics tracking structure is one of track mobility. Low track students, in addition to experiencing fewer mathematics opportunities and lower self-concept than those who are in higher-tracks, also typically remain in the lower track (Hallinan, 1996; Lucas, 2001). To understand mobility, or how one can move between tracks, it is important to remember that mathematics courses in high school are sequential (Kelly, 2007). With each course being yearlong, what course students take in 9th grade usually determines where they will finish. Track mobility from low to high track is difficult given the prerequisites nature of and vertical differentiation of mathematics. One must take Algebra I as a prerequisite course before Geometry, Geometry before Algebra II, etc. Nevertheless, for track mobility, the 9th grade year is a critical year for upwards movement because if not during 9th grade, it is difficult for students to move during the rest of high school (Kotok, 2017; Tyson & Roksa, 2016). McFarland (2006) shows that the likelihood of moving up to a higher math track is only around 5-6%, and that it is more common for students to move down to a lower-level mathematics track. Lucas (2001) also describes a phenomenon known as *effectively maintained inequality*, where low-track students stay marginalized, and high-track students maintain a position of privilege.

It is clear from the research that the technical structures of mathematics tracking in U.S. schools result in the stratification of students into an academic hierarchy, where those students sorted into the bottom levels remain at a disadvantage. As a critical race theorist, I take a look further into the politics of tracking, giving additional insight into how schools reproduce inequities along race and class lines. Below, I discuss the political considerations in mathematics tracking, highlighting how marginalized subgroups remain at the bottom of the academic hierarchy in schools.

Political Considerations

The political considerations of race and social class in mathematics tracking are significant equity issues, and they are highly visible when examining the demographic composition of students in the tracks. Numerous researchers have documented that schools' academic tracks end up mirroring inequities in society where low-income, Black students, Hispanic students, and English Language Learners (ELLs) are disproportionately placed lowest in the academic hierarchy, where experiences more often hurt them than help (Archbald & Farley-Ripple, 2012; Ballon, 2008; Champion & Mesa, 2018; Gamoran, 1987; Giersch, 2018; Hallinan, 1994; Harklau et al., 2018; James et al., 2016; Johnson, 2008; Mickelson & Everett, 2008; Miller, 2018; Oakes, 1992; Slavin, 1990). Thus, tracking in school mathematics ignites a vicious cycle fueled by two components: 1) the *reproduction* of societal inequities and 2) the *maintenance* of societal inequities.

The first political component to address is how U.S. schools reproduce inequity along racial and class lines, especially in mathematics tracking. Large-scale quantitative studies are consistent in reporting that traditionally marginalized members of U.S. society are suffering from a lack of opportunities in schools (Ballon, 2008; Giersch, 2018; Harklau et al., 2018; James et al., 2016; Kelly, 2009; Ladson-Billings, 2013; Oakes & Guiton, 1995; Slavin, 1990; Sørensen, 1970; Tyson & Roksa, 2016). From a high school mathematics context, Champion and Mesa (2018) report these key findings: low-income students are less likely to complete upper-level mathematics courses, therefore reducing post-graduation opportunities and college access; and Black students are the least likely racial subgroup to complete calculus in high school. Similarly, Kotok (2017) analysis on the same HSLS: 09 dataset found that African-American and Latino students were the least likely to take advanced math (Algebra II or higher) in 9th grade compared

to White and Asian students. Two other analyses found that African-American and Hispanic students are underrepresented and experience limited access to advanced math courses (Ballon, 2008; James et al., 2016).

Another subgroup that experiences equity issues when it comes to accessing high-level mathematics tracks are English Language Learners (ELLs). These students who are from non-dominant U.S. language cultures are more likely to be placed in lower-level courses because there is an assumption that the courses will be easier for them given the language barrier (Kanno & Kangas, 2014). Too often, schools assume that ELLs have lower ability in mathematics and consequently place them on a low track. In their qualitative case study at a public high school, Kanno and Kangas (2014) found that ELLs always ended up transitioning from ELL-only courses into the remedial (low) level of that course across subject areas. Because of this, ELL students' enrollment in advanced-level and Advanced Placement (AP) college-level mathematics courses was extremely low. Across schools in the U.S., it is evident that ELL, low-income, Black, and Latino students suffer the repercussions of schools reproducing societal inequities. To make matters more serious, schools not only reproduce inequity, but also serve a role in the systematic maintenance of this inequity.

How schools establish and then maintain this stark inequity of tracking students that result in continued racial, cultural, and class segregation is a complex combination of political factors. Oakes (1992) explains tracking through the political dimension:

> Tracking is accompanied by public labels, status differences, expectations, and consequences for academic and occupational attainment. Thus, tracking becomes part and parcel of the struggle among individuals and groups for comparative advantage in the

> distribution of school resources, opportunities, and credentials that have exchange value in the larger society. (p. 13)

Unfortunately, students from less-advantaged families have less knowledge about high school track options compared to those groups from the dominant culture (LeTendre et al., 2003; Useem, 1991). This finding is supported by international research as well (Giustinelli & Pavoni, 2017). These families also often live in geographic locations that have schools with fewer resources and academic offerings (Ballon, 2008; LeTendre et al., 2003). Additionally, while human capital theorists may argue that state mandated test scores are an objective method to sort students into math tracks, standardized tests are grounded in bias from historical and systemic inequalities compounded over time (Darling-Hammond, 2013; Ladson-Billings, 2013; Popham, 2010).

These racial, cultural, and social class ramifications of tracking are further maintained by two additional forces: low teacher quality and harmful mathematics self-concept. Literature shows that low-track classes have lower quality teachers (i.e. teachers with out-of-field or no certification) and also teachers who use lower-level instructional methods such as learning from textbooks or worksheets (Betts, 2011; Gamoran, 1987; Harklau et al., 2018; Harris & Anderson, 2012; Kalogrides & Loeb, 2013; Oakes, 1982; Oakes et al., 2004; Rosenbaum, 1976). Similar to self-concept studies described in the technical considerations section above, tracking also does psychological harm to students those placed in the lower-levels, as "[a]dolescents glean info about their abilities through their course placements" (Karlson, 2015, p. 119). Thus, students, who are often low-income, Black, Hispanic, or ELL, are placed in low math tracks at the beginning of their U.S schooling and find themselves naturally continuing onward through the lowest academic trajectories. Unfortunately, this reproduces and maintains the racial, cultural,

and class inequities that persist in society and lead to the formation of cultural *norms* that are hard to unlearn.

Normative Considerations

The deeply held norms, or cultural assumptions and practices, about tracking remain embedded in U.S. schools. Oakes (1992) summarizes the norm held by society which supports the very existence of tracking: "[S]tudents' individual needs and capacities vary enormously… schools can best accommodate different individual abilities and accomplish essential social purposes, including work-force preparation, by separating students by their ability and likely occupational future" (p. 13). These normative considerations are important to dissect because they are deeply intertwined with political issues such as race and class. As a critical race theorist (see page 37) would claim, biases on which students belong to which track is ingrained into individual thought and decision making, particularly for teachers who are often tasked with recommending students for course enrollment. Despite research that claim tracking decisions are made based on solely meritocratic student measures (Archbald et al., 2009; Dougherty et al., 2017), empirical research exists both domestically and internationally that suggests teachers use a combination of meritocratic and non-meritocratic criteria mirroring societal inequities when recommending students for course placement (Foreman & Gubbins, 2015; Glock et al., 2015; Hallinan, 1994; Kelly, 2007; Oakes et al., 2004; Popham, 2010; Sneyers et al., 2018).

Empirical research suggests there are normative factors of tracking that influence teacher recommendations in high school because "once students get to high school, the race and class-based stratification associated with course-taking patterns has already taken root and recommendations can no longer be seen as purely meritorious" (Bernhardt, 2014a, p. 6). Teachers are key school personnel that shape student course enrollment and also have the agency

to make recommendations that will shift a student's mathematics trajectory (Bernhardt, 2014b; Foreman & Gubbins, 2015; Reyes & Domina, 2017; Watanabe, 2006). Unfortunately, normative factors that impact fair decision making and the subconscious thoughts are hard to escape because racism is normalized in our lives (Bell, 1988; Delgado & Stefancic, 2017; Ladson-Billings & Tate, 1995). In a 2014 study analyzing the Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 (ECLS-K) data set, even when "controlling for Math Performance, Teacher Evaluation, socioeconomic status, gender, and IEP status, the odds of placement in algebra by the eighth grade for Black students were reduced by two-thirds to two-fifths compared to their White peers" (Faulkner et al., 2014, p. 304). An international quantitative analysis, Glock et al. (2015) concluded that ethnicity is an implicit bias factor when teachers make track placement decisions. Thus, racism pervasive in schools is a global phenomenon.

Furthermore, societal norms on what a good math student looks and behaves like are shaped by traditional or Eurocentric views of education (Berry, 2008; Carter et al., 2008; Chazan et al., 2013; Ladson-Billings, 2013; Oakes, 2005). In a study about access and achievement in mathematics and science (Oakes et al., 2004), teachers frequently used "highly subjective judgments about students' personalities, behavior, and motivation" (p. 79). Similarly, in a 2008 study, Carter et al. concluded that teachers who were not prepared to work with students from diverse backgrounds may perceive students with high levels of *verve*, which is a common style of energetic and expressive body language among African-American children, as disruptive or incapable or off-task. This lack of cultural competency may result in a negative perception of a student's abilities, and therefore, impact a teacher's recommendation for the student to enroll in a higher-level mathematics course.

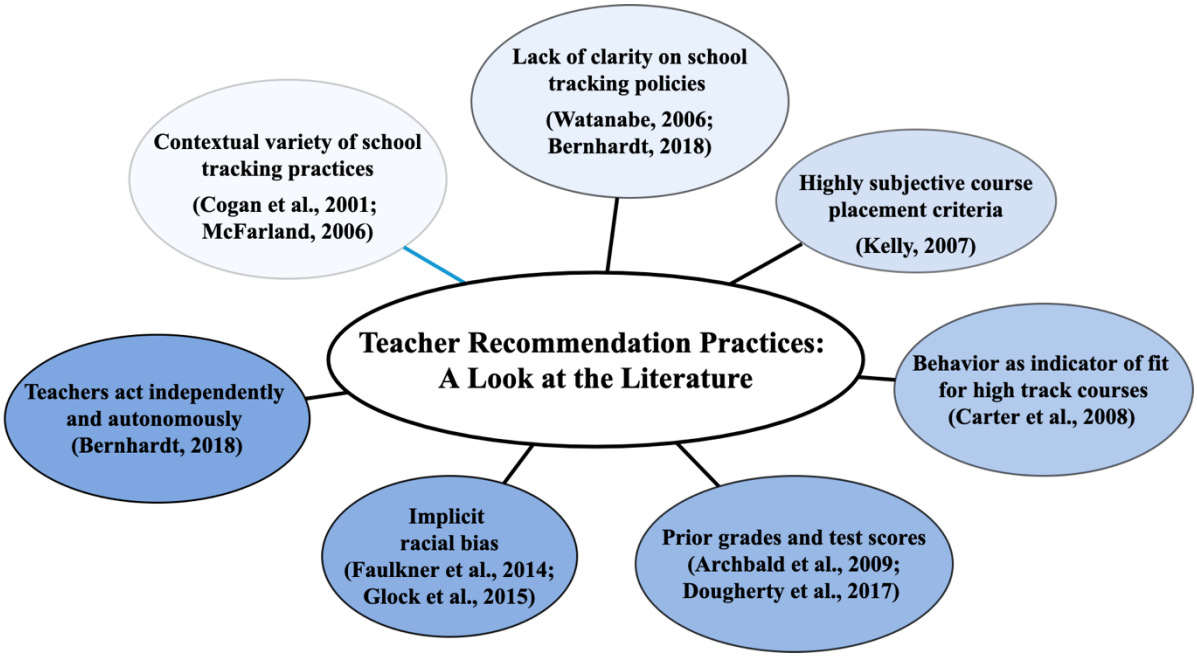
Alas, the normative considerations of tracking encompass deeply held beliefs about student ability that are hard to unlearn. Mathematics tracking is such a pervasive phenomenon in U.S. schools and a platform to view consequences stemming from assumptions about race, gender, and class. Thus, normative factors, along with political and technical factors, represent three key dimensions of how mathematics tracking reproduces inequity. In the next section of my literature review, I focus on what previous empirical studies have reported on teacher recommendation practices and criteria used for determining course placement.

Teacher Recommendation Practices

Each year, it is common for teachers to be asked to make course recommendations for students (Bernhardt, 2014b) and there has been plenty of literature on their recommendation practices, as summarized in Figure 5. While there is research supporting that course placements are made based on seemingly objective measures such as test scores and prior course attainment (Archbald et al., 2009; Dougherty et al., 2017; Hallinan, 1992), other studies report that student placement into courses are based off a mix of highly subjective measures (Darling-Hammond, 2013; Faulkner et al., 2014; Glock et al., 2015; Kelly, 2007; Klapproth & Fischer, 2019; Mickelson & Everett, 2008; Oakes, 1994; Oakes & Guiton, 1995; Sneyers et al., 2018; Westphal et al., 2016). An analysis of empirical research reveals an unstructured combination of meritocratic and non-meritocratic criteria that is being used to place students into courses (Kelly, 2007; Oakes & Guiton, 1995). Teachers are making decisions rather autonomously and based on unclear or inconsistent measures (Bernhardt, 2018). Finally, the variety of school policies and course options makes tracking an extremely contextual phenomenon (Cogan et al., 2001; Kelly, 2009; McFarland, 2006).

Figure 5

Summary of the Literature on Teacher Recommendation Practices



Note: Major findings with examples of supporting empirical studies placed in chronological order. Not all citations are included in the figure.

To begin the summary of insights from teacher recommendation research, numerous studies in the U.S and internationally have found that there are patterns of racial bias when teachers make course recommendations (Faulkner et al., 2014; Glock et al., 2015; Sneyers et al., 2018; Zimmermann & Kao, 2020). In addition to Faulkner et al.'s (2014) study described earlier, Glock et al. (2015) conducted an experiment in Germany and Luxembourg and found that teachers' stereotypes about ethnic minorities led to less accurate track placements. Another study in Belgium, Sneyers et al. (2018), found that a plethora of variables such as teachers' perception of math skills, teachers' perceptions of school-appropriate behaviors, parents' SES, and teachers' perceptions of language skills (which was related to students' ethnicity) could directly predict track recommendations. Taylor et al. (2019) argued that, worryingly, teachers use factors such as

worth ethic or attitude to determine track placement. Even though some criteria such as teacher perception of students' behavior or their work ethic may not initially trigger connections to racial bias, historical structures and perpetuated systems connect many variables to support that racism permeates all societal functions (Delgado & Stefancic, 2017).

Additional studies provide further evidence of how convoluted teacher recommendations requirements may lead to perpetual low-track status for marginalized subgroups of students. Kelly (2007) highlights how many course handbooks list a teacher recommendation as required for entry into an advanced-level course, yet only provide a list of vague eligibility prerequisites. As Kelly's study states, "When one is confronted with such requirements for course placement, it may feel as if gaining entry into courses was like gaining entry into an elite country club" (p. 23). In most instances, the lack of clear and measurable criteria needed for the teacher recommendation component of course enrollment can become an issue for marginalized students. Pollack (2013) found from a series of qualitative interviews and journal entries that informal *teacher talk* includes deficit-oriented perspectives of students of color. Furthermore, Fox (2016) and Gershenson et al. (2016) found for Black students in particular, if they have a White teacher, the teacher's expectations of them are much lower than if they have a Black teacher. It is evident that teacher subjectivities play a large role in their perceptions and therefore recommendations of students for tracked classes.

While there has been discussion of teacher reliance on non-meritocratic evaluation measures, there has been relatively little literature or agreement on the exact processes on how teachers come to these judgements about where a student should be placed. This inconsistency is partly due to the contextual variety of school tracking practices (Betts, 2011; Chmielewski et al., 2013; Cogan et al., 2001; McFarland, 2006; Reyes & Domina, 2017), individualized nature of

teacher beliefs (Bernhardt, 2018; Nespor, 1985), and also lack of qualitative research on teacher decision-making criteria (Bernhardt, 2018; McFarland, 2006). In his 2018 case study, Bernhardt presented three social studies teachers with hypothetical vignettes of students to gain insight into their course recommendation practices. He found that all three teachers acted independently and autonomously when making decisions, made decisions without a clear understanding of school policies or criteria, did not consult with high-track teachers on the student criteria needed for success, and used non-meritocratic such as "ethic and motivation, level of participation, on-task behavior, and future potential" (p. 78) to decide about course placement. The notable finding was that none of the teachers actually offered a way for measuring those non-meritocratic measures listed above.

Another case study on teachers found a similar lack of clarity on tracking criteria and course-taking as Bernhardt's (2018) findings, but adds the additional perspective of positive school reform outcomes that can come from collaboration between teachers (Watanabe, 2006). Unlike Bernhardt's (2018) homogenous group of three social studies teachers, Watanabe (2006) coordinated discussion and reflection on tracking amongst an interdisciplinary teacher inquiry group. Although her research was not explicitly centered on teacher recommendation practices and decision-making criteria, Watanabe uncovered important insights into teachers' perspectives on student intelligence and ability through group dialogue. She writes,

> Although teachers may refrain from expressing the unpopular viewpoint that intelligence is fixed, teachers' notions of ability and intelligence come through in their talk about classroom practice, and it is important for teachers to become adept at identifying these perspectives in each other's comments" (Watanabe, 2006, p. 29).

This research offers recommendations for teacher leaders in a school to use inquiry groups as a means of unpacking hidden racial and class inequities in track placement and discuss solutions together to improve a school's educational equity.

Ultimately, the qualitative findings on teacher recommendation practices and patterns are sparse, context-specific, and lack details about concrete decision-making criteria for student mathematics track assignment. Given that there are numerous quantitative empirical studies on mathematics tracking detailing it as a mechanism that reproduces inequities for subgroups of students, further research must be conducted on the individual decision-making criteria in schools that reinforce such a pervasive practice. Illuminating current research successes, gaps, and challenges on understanding mathematics course assignment criteria will open up avenues for teachers to reflect on their own experiences and critically examine tracking practices in their school.

Successes, Gaps, & Challenges

Under the guise of individualizing education, the U.S. tracking system is far from equitable or meritocratic. In fact, many researchers agree that "the tracking system sets failure as a default" (Harklau et al., 2018, p. 4). The overwhelming consensus from the research is that we are long overdue for tracking reform in U.S. schools (Gamoran, 2001; Hallinan, 1992, 1994), particularly on the processes in which students are placed into advanced courses (Kotok, 2017). Given tracking is pervasive yet idiosyncratic across subject areas, grade levels, schools, states, and even countries, there is no one-size-fits-all reform solution. Research on the process of how students are assigned to courses is contextual and dependent on the school or even academic department level (Bernhardt, 2014a; Cogan et al., 2001; Kelly, 2007; LeTendre et al., 2003; McFarland, 2006). Furthermore, there is a lack of qualitative research on teacher

recommendation processes in mathematics and perceptions of equity in tracking (Bernhardt, 2018; Buckley, 2010; Watanabe, 2006). Future research must bring context, clarity, and equity discussions into how students are tracked as key variables to tracking reform.

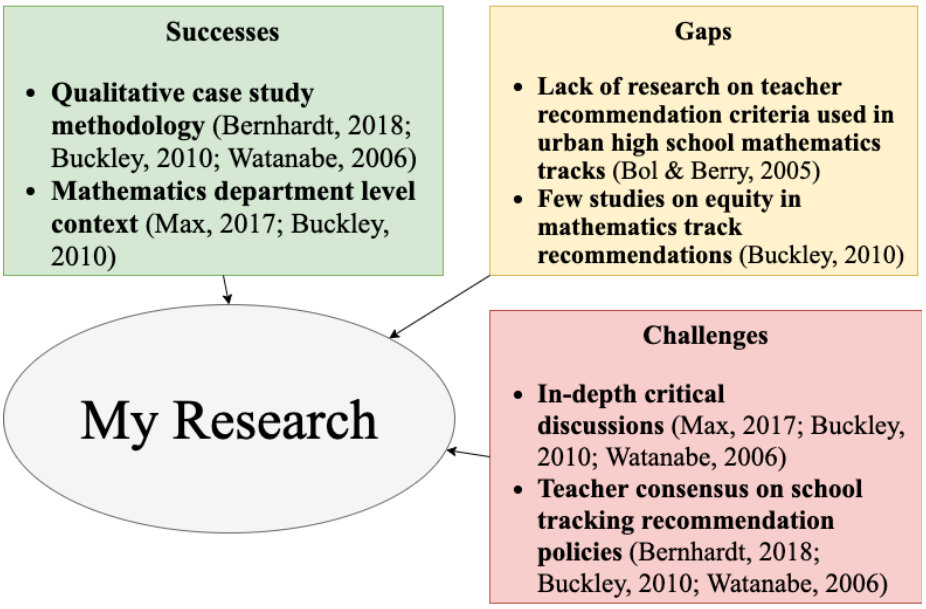
One successful way in discovering more clarity as to why some students get tracked into higher courses and some do not, despite equal meritocratic measures, is through a case study on influential individuals at the school level. Teachers are highly intuitive individuals when it comes to understanding students' ability and making recommendations for courses (Bernhardt, 2014b; Buckley, 2010; Campbell, 2012; Davis et al., 2019; Delpit, 1988; Foreman & Gubbins, 2015; Johnson, 2008; Oakes, 2005; Reyes & Domina, 2017; Tyson & Roksa, 2016; Watanabe, 2006). However, as LeTendre et al. (2003) states "there is substantial confusion over the process of selection" (p. 80-81). Confusion on the selection process for students into various tracks in U.S. schools can be clarified through investigation on a contextual, school-based level using qualitative research, as shown in three case studies I emphasize next.

One major gap in the literature is that there is a lack of qualitative research focused specifically on teacher recommendation practices for *mathematics* tracking. However, lessons for future research, such those which informed my study as diagrammed in Figure 6, can be learned from related studies. In her case study of a high school mathematics department, Buckley (2010) conducted a year-long inquiry into one department's efforts to redesign the mathematics curriculum to remedy high-failure rates in courses with a high proportion of students of color. She found that through group discussion and reflection, teachers' expectations of their students were revealed, and what was intended to be a positive reform in the school turned out to be a failure that only reproduced further inequities. Buckley highlights the importance of an outside

stakeholder with a critical lens taking part in department level discussions when implementing equity-oriented reform.

Figure 6

Successes, Gaps, and Challenges in the Literature Inform My Research



Note: Citations included in the figure are in reverse chronological order.

To expand on equity related issues in mathematics tracking, it is important to look at another area that needs further investigation: Teacher conceptualizations of equity. Buckley (2010) found from her case study on one mathematics department that the teachers had a shallow examination of equity and "had not examined the reasons for the disproportionate enrollment of students of colour in targeted courses" (p. 74). She calls for critical examination and discussion of tracking equity problems in schools. In another study on preservice mathematics teacher conceptualizations of equity in classroom teaching practices, Max (2017) noted that although all

the participants were thinking about equity issues of access and power, “no participant mentioned race, gender, or socio-economic status as a consideration in their responses” (p. 293). The challenge of discussing equity is similar to Buckley's (2010) recommendation that future studies need to encourage teachers critically reflect on how school policies or structures are disenfranchising students of color.

Another researcher, Bernhardt (2014b, 2018), also conducted a case study on a group of teachers involving the recommendation process. Although his study participants were high school social studies teachers, Bernhardt (2014b, 2018) found important gaps in the clarity of the teacher recommendation process for assignment of students to courses that may be applied to other subjects as well. First and foremost, the teachers lacked knowledge of school course assignment policies both at the high school and middle school level. Additionally, teachers were making course decisions based on ill-defined, non-meritocratic measures and also without consulting other teachers to determine the necessary prerequisites for the courses to which they were assigning the students. He recommends that future research address the challenge of group consensus by creating a space for teachers to discuss course placement practices with one another, including the social and academic ramifications of maintaining the status quo. A particular limitation of Bernhardt's (2014b, 2018) study was that there was no way to follow through to see the extent that teacher recommendations influenced the courses in which a student truly was enrolled.

In another case study, Watanabe (2006) conducted an inquiry group with six interdisciplinary teachers at an urban high school. While her primary focus was on the topic of detracking schools, her key takeaway offers important reform insights into teacher recommendation practices for mathematics tracking:

> Teachers can begin the necessary conversations about the challenges to detrack in teacher inquiry groups and help build the department or school's capacity to detrack. Although the process may appear arduous, it is the vision, willingness to experiment, and dedication of individual teachers to continually reflect and problem solve that will spark and sustain change. (p. 31)

Watanabe found from her case study that even groups of teachers working in the same school have different perceptions of whether tracking exists. By developing group norms to support honest conversation, it was easier for reflection to begin to unravel teacher views on ability and intelligence.

Clearly from all of the qualitative case studies described above, a critical lens, honest dialogue, and reflection at the school or departmental level are key components in investigating a tracking or equity phenomenon inside a school. To date, there has been a lack of literature on mathematics teacher recommendation criteria for students in the 9th grade General Algebra I track to the Honors Algebra I track. Additionally, there are few studies examining teachers' conceptualizations of equity when making mathematics course recommendations. For my study, I employed a qualitative single-case study methodology to ensure obtaining rich data in studying how teachers make recommendations for students into mathematics track and how they conceptualize the equity of it all. Next, I describe in detail my process in choosing a theoretical framework to situate my work.

Choosing a Theoretical Framework

To conclude this literature review, I want to highlight two common theoretical perspectives in tracking research, Human Capital Theory and Critical Theory, and ultimately why I have chosen Critical *Race* Theory (CRT) as the theoretical framework to move forward

with my study. Research from the two popular theories on tracking have different perspectives on academic tracks, or the "veritable maze of lanes, streams, honors programs, and vocational programs" (LeTendre et al., 2003, p. 79) that persist in U.S. secondary schools. Human capitalist theorists tend to be supporters of tracking while critical theorists argue against the inequitable system. Below, I present an overview of each dominant tracking theory and then conclude with my rationale for choosing the more specific branch of CRT for my study.

Human Capital Theory

Human capital theorists, proponents of tracking, argue that school caters to each student's individual needs in order to prepare them for a differentiated workforce, and those who have high academic achievement will be rightfully recognized with a high-rewards job (Bernhardt, 2014a; Oakes & Guiton, 1995). Within this perspective of tracking, students' hard work and determination are translated into economic benefits through gaining more labor skills and higher status in society (Bowles & Gintis, 1976). (Oakes & Guiton, 1995) write that human capital theorists believe sorting students into different levels of tracks is a fair process, that "the primary mechanisms for allocating students to curriculum opportunities are objective assessments of relevant abilities, effort, and interest" (p. 5). Therefore, a strictly meritocratic phenomenon where all students can enter in an open contest for social and economic advancement is a central tenet for the human capital theorist perspective on tracking (Oakes & Guiton, 1995).

Critical Theory

In opposition to human capital theorists, other tracking researchers operate from a critical theory lens: They argue that schools are institutions that reproduce social inequalities, particularly along racial and social class lines (Bernhardt, 2014a; Bowles & Gintis, 1976; Harklau et al., 2018; Johnson, 2008). While human capital theorists and critical theorists may

come to different conclusions on the meritocracy of tracking, "both orientations acknowledge that academic mobility, culturally valued resources, and high status knowledge are unequally distributed among members within society and those with access are in positions of social, political, and economic advantage" (Bernhardt, 2014a, p. 6). Unfortunately, and unsurprisingly, the literature review consistently revealed mathematics tracking practices in schools disadvantage traditionally marginalized subgroups such as low-income, Black, Hispanic, and English Language Learners (ELLs) (Ansalone, 2009; Bowles & Gintis, 1976; Davis & Jett, 2019a; Gamoran, 1987; Harklau et al., 2018; James et al., 2016; Johnson, 2008; Kelly, 2007; Lucas, 1999, 2001; Mickelson & Everett, 2008; Miller, 2018; Oakes, 1982, 2005; Reichelt et al., 2019).

A Case for Critical Race Theory

Of the two major theories, human capital theory and critical theory, I concluded from my personal experiences and literature review on the topic of mathematics tracking that indeed, a critical perspective best supported my dissertation research. More specifically, I align this unequal distribution of resources and opportunity which we pass under a normalized guise of academic tracking, as akin to the major tenet of Critical *Race* Theory (CRT). This first tenet states that "racism is ordinary, not aberrational" (Delgado & Stefancic, 2017, p. 8). Below I summarize how the literature findings reveal tenets of CRT, setting up the foundation and theoretical framework for my study.

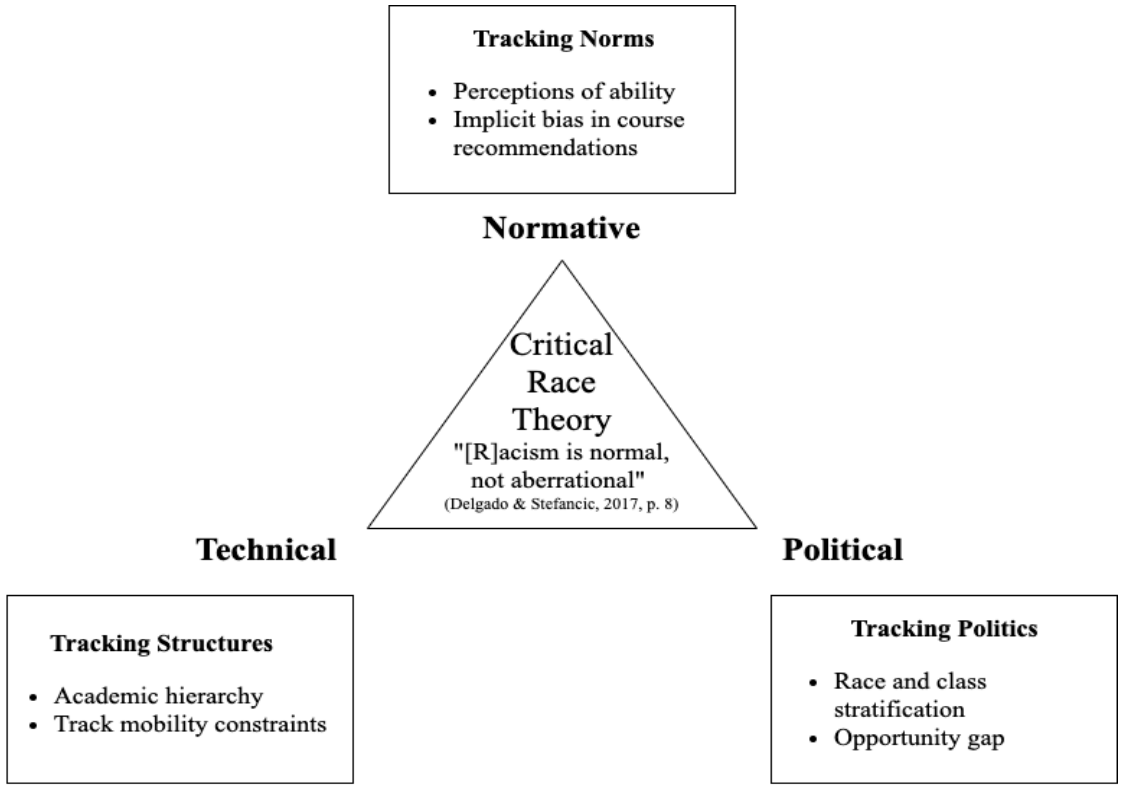
Historically and currently, CRT is a powerful explanatory tool for how students of color continue to suffer inequities while existing in the White master script of education (Ladson-Billings, 2003). CRT pioneer Derrick Bell (1988) explained that racism is endemic to numerous foundations and structures that U.S. society rests upon. Using a CRT perspective on issues of

mathematics tracking is integral to my research because it illuminates a need to focus on the intersecting roles that racism, sexism, and classism play in maintaining inequitable school structures (Yosso, 2002). As seen from the research, the tracking system is far from meritocratic, and in Figure 7, I summarize how this inequity manifests through CRT's main tenet alongside Oakes' (1992) technical, political, and considerations, which I discussed earlier in the review.

Understanding that racist structures support all facets of the tracking phenomenon, from the mere idea that students should be ranked by ability to the inevitable result of ability correlating with race, is fundamental to my selection of CRT as my framework for my study design. I placed tracking norms as the top of Figure 7 because normative considerations are an essential part to teacher beliefs, and therefore, integral to my study on teacher recommendations.

Figure 7

CRT Perspective of Tracking along Technical, Political, and Normative Dimensions



In her 2003 piece, “Just what is critical race theory and what's it doing in a nice field like education?”, Ladson-Billings says “Adopting and adapting CRT as a framework for educational equity means that we will have to expose racism in education *and* propose radical solutions for addressing it” (p. 22). Therefore, any research that claims to use CRT should not only be prepared to address uncomfortable topics of racism and social injustice but also move forward with serious solutions to rethink the school processes which reproduce those inequities. I have done this by centering race in discussing the findings of my qualitative single-case study.

As I found from my literature review, current research on teacher recommendations in mathematics tracking lacks a deliberate qualitative investigation and equity-oriented approach. After consideration of two prominent tracking theories, I selected Critical Race Theory as my theoretical framework because I will no longer be passive when mathematics tracking in schools reproduces social inequities and robs Black and Brown individuals of opportunities. CRT oriented research is critical and in the next chapter, I describe in greater detail how the tenets of CRT as my theoretical framework are woven throughout my research methodology.

3 METHODOLOGY

As the literature suggests, concern of school mathematics tracks reproducing social inequities has been a topic in the scholarly community for over 30 years (Ansalone, 2009; Bowles & Gintis, 1976; Darling-Hammond, 2013; Davis & Jett, 2019a; Gamoran, 1987; Oakes, 1982, 2005). Teachers can be critical agents in equity-related school tracking reform (Bernhardt, 2014b; Buckley, 2010; Campbell, 2012; Davis et al., 2019; Delpit, 1988; Foreman & Gubbins, 2015; Johnson, 2008; Oakes, 2005; Reyes & Domina, 2017; Tyson & Roksa, 2016; Watanabe, 2006), yet there is little understanding behind the decision-making criteria and teacher conceptualizations of equity used in mathematics course assignments. To add to the scholarly literature, I centered my research study around two main questions:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?
2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

I conducted a qualitative single-case study on a team of 9th grade General Algebra I teachers from a racially and socio-economically diverse comprehensive high school in order to investigate my research questions. I explain below important details regarding the theoretical framework, research design, hypothetical vignette data instrument, study site, participants, researcher positionality, data collection and analysis process, and credibility checks for my study.

Theoretical Framework

As explained at the end of Chapter 2, Critical Race Theory (CRT) is the theoretical framework I chose after a thorough literature review. Next, I will detail how CRT helped me in the creation of my qualitative single-case study. Ever since first stepping foot into the classroom

in 2010, I became aware of racial inequities with the mathematics tracks. At the time I did not realize there was a formal theory to support my critical lens on the world, but now I can confirm that the main tenets of CRT provide the framework on which I build many of my observations, synthesized from the literature review, and shaped the design for this study. In this section, I review how both the tracking literature pertinent to my research questions and elaborate on how my study design is situated in CRT.

First, I define three main tenets of Critical Race Theory that are relevant to the background literature and design of my study. The first and main assertion of CRT is that "racism is ordinary, not aberrational" (Delgado & Stefancic, 2017, p. 8). In fact, racism is so endemic to our everyday life that it appears normal and natural (Delgado & Stefancic, 2017; Jett, 2009; Ladson-Billings, 2003; Parker & Lynn, 2002; Yosso, 2002). Secondly, another major proposition of CRT is that storytelling and counter-storytelling is a powerful tool in constructing realities that are different from those in a dominant, Eurocentric culture (Delgado & Stefancic, 2017; Jett, 2009; Ladson-Billings, 2003; Parker & Lynn, 2002). Thirdly, CRT asserts a critique of formal conceptions of equality such as color-blindness, objectivity, and meritocracy (Ladson-Billings, 2003; Ladson-Billings & Tate, 1995). Next, I situate the main CRT tenet into the tracking literature that supports my study.

Tracking scholar, Oakes (1992), describes three key dimensions of tracking: technical, political, and normative, which I posit are deeply connected to the first tenet of CRT. Technical considerations refer to how the tracking system is structurally set up; political considerations emphasize how race and class intertwine with tracking in U.S. schools and society; and normative considerations include tracking assumptions and practices that remain embedded in U.S. culture (Oakes, 1992). First and foremost, the very nature of tracking, which includes the

technical structure of splitting children up into ability groups, is representative of CRT's main tenet, that racism is embedded into the everyday idea of school. Black students, Hispanic students, and English Language Learners (ELLs) are disproportionately placed lowest in the academic hierarchy (Ballon, 2008; Harklau et al., 2018; James et al., 2016; Kelly, 2009; Oakes & Guiton, 1995). Even studies concluding that course placement decisions are meritoriously based on fair measures such as standardized test scores (Archbald et al., 2009; Dougherty et al., 2017), when taking a closer look at how the scores are stratified among racial groups provides evidence that seemingly objective measures of sorting students actually reflect centuries of historical and systemic assessment biases (Darling-Hammond, 2013; Ladson-Billings, 2013; Popham, 2010). The racism embedded in tracking reinforces normative beliefs and political considerations as evidenced by teacher decision-making and recommendation processes.

The CRT tenet that racism is endemic in our society also manifests in teacher beliefs and decision-making as implicit racial bias when it comes to matters of tracking. For instance, in Faulkner et al.'s (2014) analysis of the Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 (ECLS-K), teacher evaluations of students played a significantly harmful role for Black students in Algebra course placement, even despite having equal academic merits compared to White students. The findings highly suggest the role of implicit racial bias leading fewer Algebra course placements for Black students in the 8th grade, which adversely affect high school mathematics track placement and academic outcomes (Faulkner et al., 2014). Additionally, Pollack (2013) found from a series of qualitative interviews and journal entries that informal *teacher talk* includes deficit-oriented perspectives of students of color. In another study, teachers unfamiliar with *verve*, a form of expressive and energetic body language among African-American children, may view those students as disruptive or off-task, and consequently

unfit for high track courses (Carter et al., 2008). To sum it all up, Ansalone (2009) says that teacher perceptions of tracked students lead to a self-fulfilling prophecy where they, both teachers and students, begin to make assumptions of student ability based on current track placement. Therefore, the current track placement is a racialized space in school that keeps students within the same tracks and discourages movement across tracks.

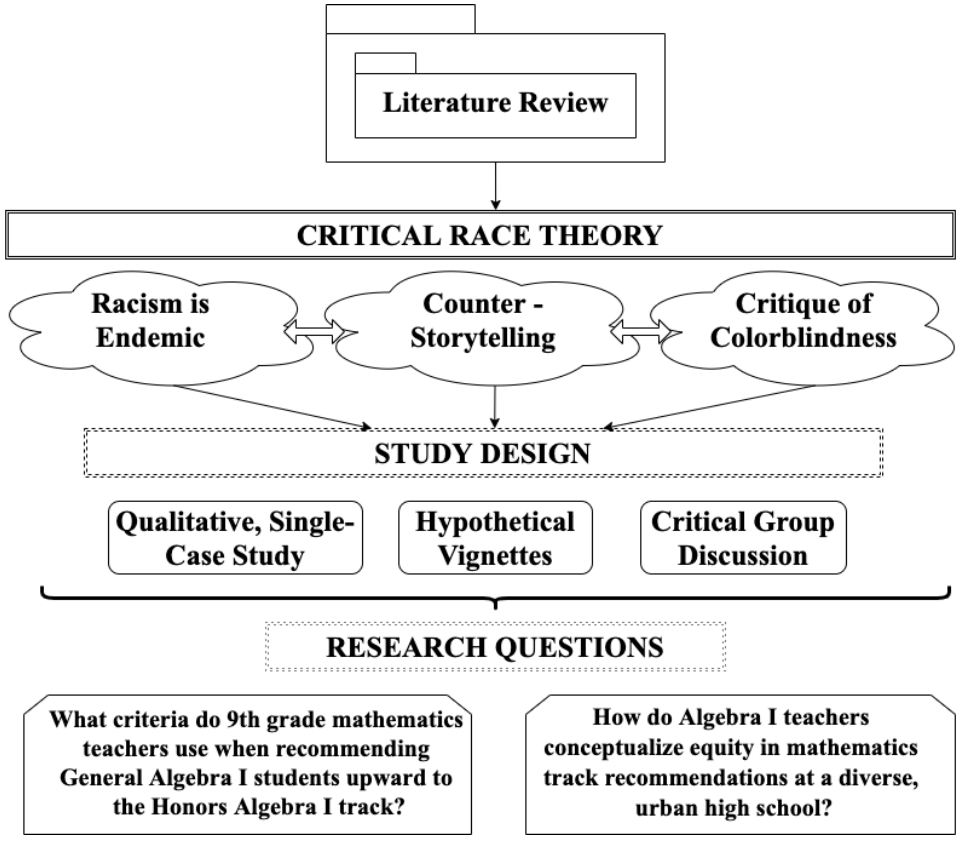
Recognizing the fact that racism shapes every aspect of our lives leads me into the next two CRT tenets that are key in constructing my research study: counter-storytelling and a critique on colorblindness. CRT scholars emphasize that to create social change, individuals must take intentional actions centralizing race and telling positive academic stories for students of color to counter the status quo (Delgado & Stefancic, 2017; Ladson-Billings, 2003; Yosso, 2002). For example, in (Berry, 2008) study on eight African-American middle school boys who were successful in mathematics, he found through CRT's counter-storytelling that positive support systems such as encouraging mathematics teachers, academically-gifted placement, and parental involvement were essential components to access upper-level mathematics. Additionally, Rousseau and Tate (2003) emphasize that mathematics teachers must reflect on the appropriateness of a colorblind perspective. This in-depth type of information is best gathered through a qualitative case study as I will use in my research. Similarly, Parker and Lynn (2002) write that it is thick description, characteristic of a case study that provides the personal narrative and exposes perceptions of race and racism.

Therefore, a qualitative single-case study aligned with the tenets of CRT has helped me investigate teacher evaluation criteria and conceptualization of equity when recommending students move from General Algebra I to the Honors Algebra I track because it gave me a platform to see deeply into tracking decisions. Through intentionally designed research methods,

I was able to see how tenets of CRT manifested in teacher beliefs and conversations on their mathematics tracking recommendations. Figure 8 gives an overview of how I centered CRT in pursuit of answers to the research questions.

Figure 8

How Critical Race Theory is Situated in the Study



In the next sections, I provide further detail in my research design and how a CRT perspective shaped the hypothetical vignettes, a key data instrument used in my qualitative single-case study.

Research Design

This research took place on-site at Kingston High School (KHS), a pseudonym, during the August, September, and October 2020 of the fall school semester. As someone who used to

be on the Algebra team, also known as the Algebra cadre, I know from first-hand experience about the recommendation process. Usually around mid-September, teachers begin to recommend students who they believe should be in a higher ability group from the General Algebra I track into the Honors Algebra I track. Since the school year started in early August, I spoke with the individuals of the Algebra cadre (defined as anyone who has taught Algebra I in the past 4 years) during one of our weekly team meetings early on to obtain informed consent (Appendix A) for participation in my case study. All of my colleagues know that I have been working over the past two years in a doctoral program, and I had minimal issues in obtaining 6 participants for my study.

To make the process easier for my participants, I obtained permission from the assistant principal to conduct the group interview portion during one of the regularly scheduled Algebra cadre meeting times. Next, I will describe the rationale for using the qualitative single-case study methodology along with a detailed look into the hypothetical vignette instrument I used for rich conversational data in answering my research questions about equity in the teacher recommendation process. The general flow of the research timeline is diagrammed in Figure 9.

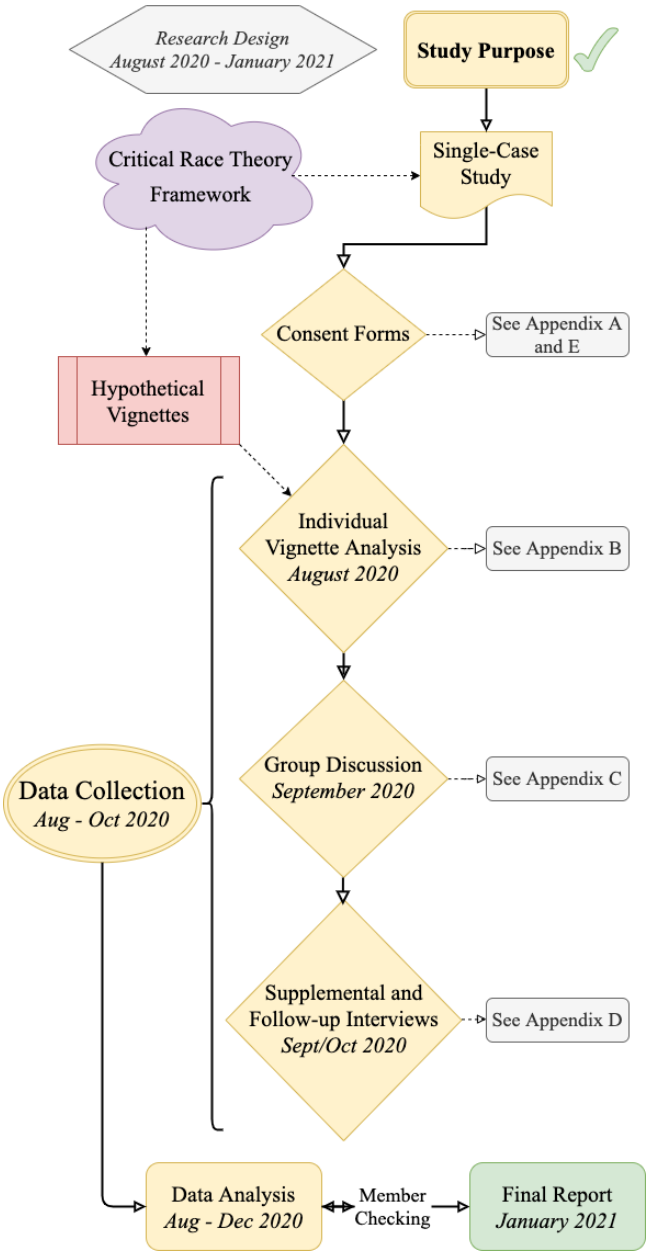
Qualitative Single-Case Study

When studying the teacher recommendation criteria to determine which students are granted the opportunity to move upwards in mathematics track from General Algebra I to Honors Algebra I, a qualitative single-case study is the best methodology for gathering rich, in-depth data. Case study dictates an in-depth analysis of a bounded unit, or a unique group of individuals who share a particular trait and meet together regularly (Bogdan & Biklen, 2007; Merriam, 2009; Stake, 1995). As seen in previous research on teacher recommendation processes and mathematics track equity, qualitative single-case study on a group of teachers in the same

department has also been the preferred methodology in research design (Bernhardt, 2018; Buckley, 2010; Watanabe, 2006). Additionally, case study grounded in CRT is beneficial for highlighting personal stories centered on issues of race, class, and gender, as well as critiquing the status quo (Berry, 2008; Jett, 2009; Parker & Lynn, 2002; Yosso, 2002).

Figure 9

Research Flow Diagram



To justify why I bound my unit of analysis to just those Algebra I teachers at KHS, I detail the significance of high school mathematics context. High school mathematics course options, sequencing, and tracking procedures vary slightly from school to school, such that even courses at different schools that have similar names (e.g. Algebra I or Algebra A and B) may not represent equivalent placements in a school's mathematics course sequence (McFarland, 2006). For example, the Algebra I course at one school may be different from an Algebra A course at another school, despite both being Algebra courses. Therefore, in order to maintain consistency in language and credibility in data, my case study was limited to a single case, only those Algebra I teachers at KHS. Next, I describe the hypothetical vignette data instrument I used for data collection.

Data Instrument: Hypothetical Vignettes

Due to the challenge that race-centric conversations driven by Critical Race Theory may be met with initial hesitation or need more facilitation than traditional discussion (Ladson-Billings, 2003; Yosso, 2002), I used hypothetical vignettes as a key methodological instrument in my case study research on mathematics course assignment criteria and equity in the teacher recommendation process. Hypothetical vignettes are "short stories about hypothetical characters in specified circumstances, to whose situation the interviewee is invited to respond" (Finch, 1987, p. 105). They can be as simple as a one sentence description or as complex as a multi-paragraph story including pictures or videos, but one critical component of hypothetical vignettes is that they simulate a real life experience (Al Sadi & Basit, 2017; Finch, 1987; Schoenberg & Ravdal, 2000; Skilling & Stylianides, 2019; B. J. Taylor, 2006). Next, I elaborate more on the benefits of using hypothetical vignettes followed by a detailed description of how I employed this data instrument in my study design.

Hypothetical vignettes are a useful data collection tool for three reasons as noted by Schoenberg and Ravdal (2000): "(1) flexibility that allows the researcher to design an instrument uniquely responsive to specific topical foci; (2) enjoyment and creativity for the informant; and (3) depersonalization that encourages an informant to think beyond his or her own circumstances" (p. 63). Given that my research enters the realm of teacher beliefs, hypothetical vignettes are an ideal tool for exploring those specific tracking decision-making criteria while simultaneously distancing the participant from potentially sensitive issues (Finch, 1987; Skilling & Stylianides, 2019; Taylor, 2006). In fact, a great benefit of using hypothetical vignettes is that it makes the research process quite enjoyable and interesting for the participants who are responding (Al Sadi & Basit, 2017; Schoenberg & Ravdal, 2000). Additionally, hypothetical vignettes "allow participants a level of freedom and power in the research process because their understandings can be unraveled and expressed freely" (Skilling & Stylianides, 2019, p. 5). To facilitate the conversation around my research questions, I created three hypothetical vignettes of student profiles and teacher exchanges (Appendix B) for my research participants to analyze, first individually and then as a group. These vignettes are inspired by a combination of vignette methods from previous research.

When creating the hypothetical vignettes for my study (see Appendix B), I took insights into the design process from previous research that covered similar topics on teacher recommendations for academic track assignment (Bernhardt, 2018) and teacher conceptualization of equity in mathematics (Max, 2017). Bernhardt (2018) created student profile vignettes, highlighting qualities that have been known to influence academic tracking: "[S]ex, race, socioeconomic status, course grades, percent of homework completed, attendance rate, extent of class participation, social behavior in relation to peers and teachers, participation

in extracurricular activities, and future academic and/or professional goals" (Bernhardt, 2018, p. 76). Similarly, each of my vignettes includes student profiles with such characteristics that mimic students from the General Algebra I student body at KHS. Therefore, I did not include any students that are Asian/Pacific Islander or American Indian/Alaskan Native. Following the student vignettes, I included hypothetical teacher math course recommendation conversations surrounding the student profiles. Each hypothetical teacher conversation was designed to highlight one or more of these tenets in Critical Race Theory: 1) Racism is Endemic 2) Storytelling/Counter-storytelling 3) Critique of Colorblindness (Delgado & Stefancic, 2017). I plan to use a digital, open ended response format for delivery of the hypothetical vignettes to my individual teacher participants, similar to Max's (2017) research design.

An example of what my teacher participants saw on the screen after the 3 hypothetical student vignettes (Appendix A) is a running header with background and a fictitious exchange between teachers as follows:

> **Background:** Every year, teachers at Middlebrook High School are asked to recommend students for mathematics course assignment in the following year. Ms. Scott, Ms. Edwards, Mr. Jones, and Mr. Lopez are four General Algebra I teachers discussing which 9th grade students they would recommend to move up to Honors Algebra I for the Spring semester. Montrell, Paige, and Eduardo are three students in the General Algebra I track who are under consideration. Below is an excerpt from their conversation during the weekly mathematics department meeting. Please respond to each exchange and give your thoughts as if you were a part of their team discussions.
>
> ***Exchange 1***
> Ms. Scott: I think to be the most fair we have to look strictly from a numbers standpoint. Paige has the highest grades and state test scores, so I would recommend her be placed in Honors Algebra I next year.
>
> Ms. Edwards: I agree they need to have high grades and scores, but some kids just don't test that well. Montrell is in my 4th period class and while he can act immature in class, I see a strong sense of problem-solving ability in him. Plus he told me he wants to be an engineer and be the first in his family to go to college.

However, before going into more details on the data collection methods, I want to provide contextual information about my research site, Kingston High School (a pseudonym).

Context of the Study

Kingston High School (KHS) was the selected site for this study for three main reasons: mathematics tracking structure, demographic variation, as well as personal and professional considerations. In order to study what criteria guide teacher recommendations of 9th grade students' upward movement from a low to high track, this research required a site that had at least 2 distinct levels of mathematics tracks that students were sorted into during their freshman year. KHS has General (low-track) Algebra I and Honors (high track) Algebra I. Additionally, the selected school needed demographic variation in student race and economic background, as there are major equity implications along these variables from the research (Betts, 2011; Chmielewski et al., 2013; Davis & Jett, 2019a; Faulkner et al., 2014; Glock et al., 2015; Oakes, 1982, 2005; Oakes & Guiton, 1995). Finally, given my personal and professional connection to KHS, I am strongly invested in working with the mathematics department in understanding and improving current tracking practices.

Kingston High School's mathematics tracking structure begins in 9th grade when students are sorted into the Honors Algebra I course or General Algebra I course. The school business manager, a key person in creating students' schedules, informed me that the course assignment process uses methods such as test scores and previous course grades to assign students into mathematics tracks. However, when looking at the demographic composition of those students in the tracks, a system which is rooted in historical divides appears: the Honors Algebra I course has a significantly higher proportion of White students than the General Algebra I course. Even physically speaking, students are divided in KHS. The west-side hallway

in the school building houses the majority of general-level mathematics (e.g. General Algebra 1, Geometry, Mathematics of Finance), and the north-eastern hallway is where the majority of advanced-level mathematics classes (e.g. Honors Algebra 1, Pre-Calculus, Advanced Placement (AP) Calculus) are held. This physical separation of honors versus general courses creates a visible racial divide at KHS. While KHS' student body is reported to be roughly 78% Black, 12% White, 6% Hispanic, and less than 1% Asian/Pacific Islander or American Indian/Alaskan Native, the Honors and General Algebra I courses are highly disproportionate to the school demographic, as is consistent with the systemic racism and literature finds (Ballon, 2008; Harklau et al., 2018; Kelly, 2009; Oakes, 2005; Yosso, 2002). In my three years at KHS, I have only seen a handful of White students and no Asian/Pacific Islander or American Indian/Alaskan Native in the General Algebra I course: most of them are in the Honors Algebra I track.

Teachers at KHS are not ignorant when it comes to the visibly different student demographics along the mathematics tracks, however, it is not a typical topic of discussion at the team meetings. Perhaps, as Delgado and Stefancic (2017) and other critical race theorists proclaim, racism is so pervasive in our society that the reality of more White students in Honors Algebra I and more Black students in General Algebra I has become the status quo, or to use a more colloquial phrase, the elephant in the room. Next, I will elaborate further on my research participants and their dynamics as an Algebra cadre.

Participants

The KHS Algebra cadre has been through a few team changes over the past few years, but the types of interactions as a team have stayed relatively consistent from my observation. For my study, I was able to recruit 6 General Algebra teachers of diverse backgrounds and teaching

experience. Their pseudonyms are Ms. A, Ms. D, Mr. N, Ms. R, Mr. S, and Mr. Y. Self-reported demographic attributes are listed in the teacher profile table, Table 2, below.

Table 2

Algebra I Teacher Profiles

Participant Name	**Race/Ethnicity**	**Gender**	**Years Teaching**
Ms. A	Multi-racial (Asian and White)	Female	4
Ms. D	White	Female	1
Mr. N	Black	Male	11
Ms. R	Black	Female	12
Mr. S	Black	Male	9
Mr. Y	White	Male	1

The most significant responsibility (pertinent to this study) that they are tasked with every year by the school business manager and assistant principal is in making mathematics course recommendations for students. Similar to mathematics department members in Buckley's (2010) study, the teachers at KHS also have a cooperative mindset, supportive work ethic, and cordial relationships with each other. When it comes to teacher recommendations for student mathematics course assignment, the Algebra team members usually act rather autonomously, similar to what was found with the social studies teachers in Bernhardt's (2018) study. From the interviews, I found there has not been team collaboration when it comes to making student recommendations for mathematics courses. In the next section, I will describe my researcher positionality in this study, followed by how I facilitated the data collection procedures.

Researcher Positionality

As I documented previously when describing my K-12 experience, I noted that I was a beneficiary of mathematics tracking when a teacher recommended me to be placed in gifted classes. This gifted label was just the beginning of a series of academic opportunities that changed my life and put me in the position of a doctoral student researcher that I am today. In this section, I expound on how my mathematics tracking experiences have shaped my post-graduate direction and positionality as a researcher in this study.

Only when I started my graduate studies in 2015 did I truly begin to put a name to all the social privilege that had worked in my life, especially when it came to academic opportunity. As an Asian-American from a middle-class family, I was positioned early on in my life in a place of privilege through my participation in the elementary gifted program that carried me into higher advanced courses throughout high school and college. Now, I find my thoughts enveloped by tenets of Critical Race Theory as I navigate the intersectionality of my role as an Asian American mathematics teacher who has taught in primarily Black schools. Having been the recipient of mathematics tracking privilege and stereotyped under the Asian model minority myth (Yook, 2013), I know from first-hand experience how mathematics tracking and stereotypes can shape one's academic trajectory. Now, as a teacher who situates herself in a critical paradigm, I discuss how that may impact my interactions as a researcher and colleague to my study participants.

For my first two years at KHS, I was a teacher on the Algebra I team and had experience with recommending students to move from General Algebra I to the Honors Algebra I track. Now that I teach Geometry and AP Statistics, my role in my research study was one that is primarily researcher/facilitator, and not a participant in the Algebra cadre. However, I am fully aware of the potential sensitivity of topics in my vignettes since they were written with a CRT

lens, and I have made the assumption based on my observations that there is currently minimal discussion surrounding racial injustice of the mathematics tracks in the Algebra cadre meetings. The reason I designed my study asking teachers to respond to hypothetical teacher conversations was to aid in honest conversations and depersonalize responses so teachers think beyond just their individual circumstances. I did my best during the data collection to practice epoché (Hamill & Sinclair, 2010; Husserl, 1960), or bracket my own opinions and assumptions, in order to support meaningful dialogue and uncovering of their reality from my unit of analysis, the Algebra cadre. My intention through data collection and analysis was to create a space that was free of judgement to reassure the team that the ultimate goal of the research is for the benefit of our students and for greater equity in education.

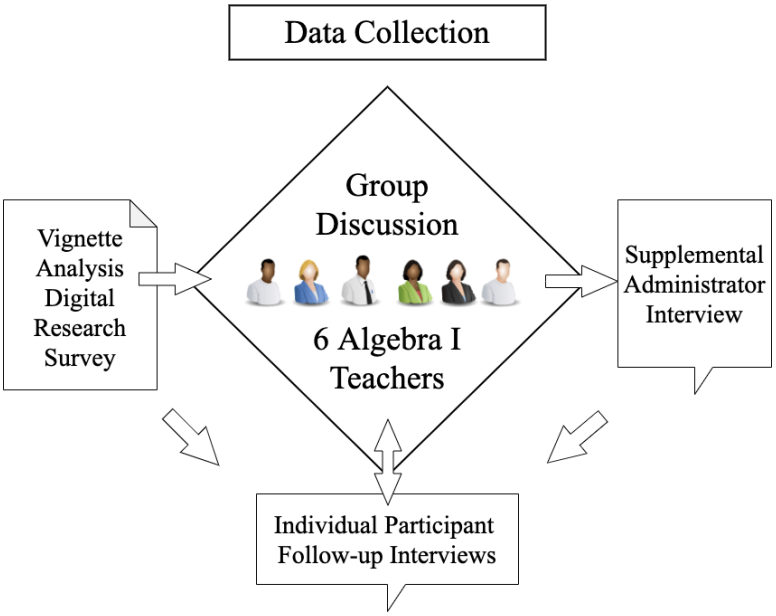
Data Collection

Before recruiting my participants or beginning any data collection, I received approval by the Institutional Review Board (IRB) from both Georgia State University and the participating school district. I completed a human subjects training module certification through the CITI Program (CITI Program, 2020) to ensure I understood and could comply with research ethics. See Appendix A and E for the informed consent documents I gave to my teacher participants of the Algebra I cadre and an administrator familiar with the Algebra teachers. Once I had collected all consent forms, I began data collection as described below.

The data collection was completed in four parts: 1) Individual, digital responses to hypothetical vignettes 2) Group discussion facilitated by the researcher 3) Supplemental Interview with an Administrator 4) Follow-up interviews with each individual participant. See Figure 10.

Figure 10

Data Collection Sources



Note: Arrows represent the direction that a data source was used to inform questioning or understanding of another data source.

While the supplemental administrator interview was not a focal interview of my research, information provided by this key school leader aided in triangulation and crystallization of the factors affecting teacher decision-making criteria. All interviews were conducted through a virtual conferencing platform, Zoom (Zoom Video Communications, Inc, 2020). The reason for using a virtual interview platform was because of a global COVID-19 pandemic that required schools to be on virtual teaching and learning in the fall 2020 semester. While this was temporarily a new experience for all teachers and students, conducting my data collection virtually rather than in-person did not impact the quality or depth of the conversations on mathematics tracking.

For the first stage of the data collection process, I used Google Forms to create a digital survey which included the hypothetical student vignettes and teacher exchanges (Appendix B).

Participants received the link through email and were asked to submit their responses at their leisure. I anticipated that the survey took each teacher about 45 minutes to complete. The first portion of the Google Form included the background info and hypothetical student profiles of Montrell, Paige, and Eduardo. Following the profiles, were the three exchanges between pairs of the fictitious teachers, Ms. Scott, Ms. Edwards, Mr. Jones, and Mr. Lopez. The teachers typed their responses to each of the three hypothetical exchanges in a separate text box so I will know which response goes with which scenario. Since I had emailed each participant a unique link, I knew when all the surveys have been completed. See Table 3 for the timeline on which I received my various data sources.

Table 3

Data Accounting Log

	Digital Research Survey on Google Forms (Hypothetical Vignettes)	Group Interview	Individual Follow-Up Interview	Supplemental Data Interview
Ms. A (Algebra I teacher)	9/10/20	9/10/20	10/14/20	N/A
Ms. D (Algebra I teacher)	8/26/20	9/10/20	10/19/20	N/A
Mr. N (Algebra I teacher)	9/2/20	9/10/20	10/30/20	N/A
Ms. R (Algebra I teacher)	8/22/20	9/10/20	10/16/20	N/A
Mr. S (Algebra I teacher)	8/31/20	9/10/20	10/15/20	N/A
Mr. Y (Algebra I teacher)	8/31/20	9/10/20	10/20/20	N/A
Dr. Andrea Lee (Administrator)	N/A	N/A	N/A	9/16/20

After receiving all the Algebra I teachers' responses to my hypothetical vignette analysis, I reviewed the responses, and then scheduled the group discussion portion of my data collection for the next available cadre meeting. The Algebra cadre meets 1-2 times a week for 60 minutes on a regular basis so I knew I could schedule a meeting with all of my participants shortly after they finished the vignette analysis. The purpose of the group dialogue was to instigate critical discussion and allow a space for the teachers at KHS to reflect on their responses to the vignettes, recommendation practices, and the equity of the current mathematics tracks. This discussion component was key for the second research question: "How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?" Roulston (2010) in her book section on group dialogue, states that for critical inquiries, the nature of a fairly unstructured, free-flowing discussion where participants outnumber the moderator is a good opportunity for understanding phenomena and transforming views.

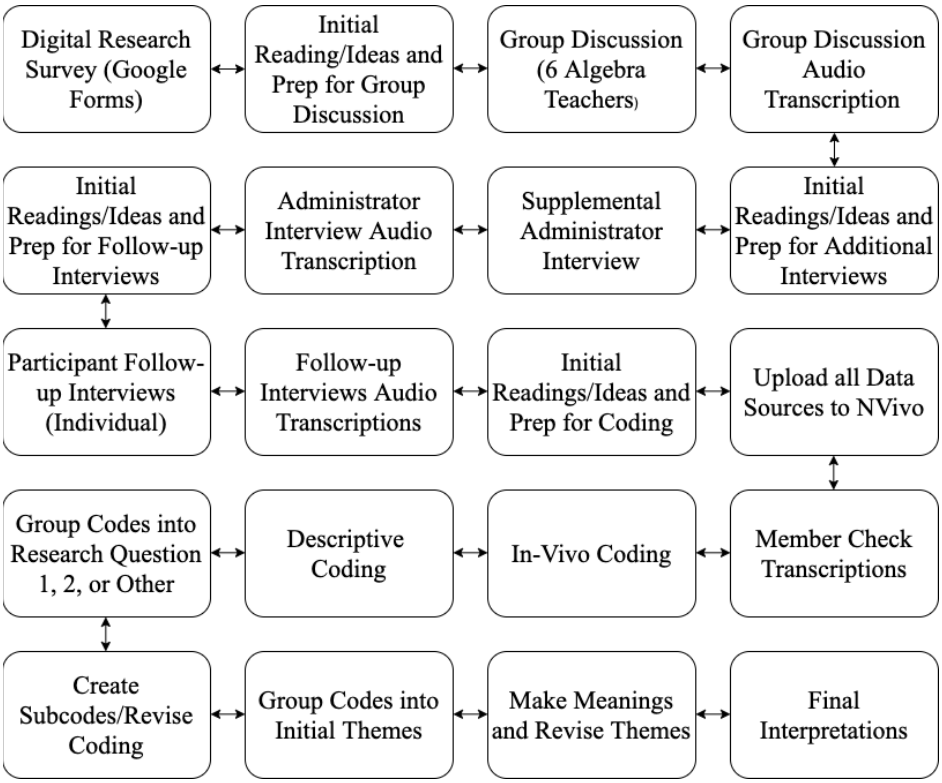
As the group discussion moderator, I followed the protocol in Appendix C, initially start by letting everyone know I would be audio-recording the discussion, and then ensuring group norms were established for productive and honest conversation (Watanabe, 2006). To establish group norms, I will ask everyone to type a norm into the chat box in Zoom, or to say it out loud. Then I recalled the top 4-5 norms. Once everyone agreed on norms, I led the discussion with the first question from my list in Appendix C, "What are your initial thoughts from the hypothetical vignette analysis?". Appendix C served as a guiding protocol in the semi-structured discussion. To help target certain discussion topics such as recommendation criteria or conceptualization of equity in mathematics course recommendation, I provided each participant with an electronic copy of the vignettes and their individual responses. At the end of the meeting, I reminded participants that I would schedule individual follow-up interviews (Appendix D).

Data Analysis

The initial portion of data analysis began when I reviewed my participants' typed responses to the hypothetical vignettes. My first review of their digital data was done to begin generating some key themes and to aid in constructing guiding questions for the group discussion. After the group discussion, I set up the interview with a school administrator, and the individual participant follow-up interviews. Fortunately, the Zoom platform that I conducted my interviews on already included audio-recordings and transcriptions of the all the dialogues. After I re-listened to the audio-recordings and edited the transcriptions for clarity and reading purposes (Creswell, 2009), I began in-depth coding and thematic analysis. My entire analysis process is diagrammed in Figure 11 and explained in detailed on the pages following.

Figure 11

Data Analysis Process



My data analysis was an iterative process that began as soon as I had my participants responses to the digital research survey. I started with a handwritten process that included highlighting and color-coding relevant segments, sentences, or paragraphs in the vignette responses that I thought would help answer my first and/or second research questions:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?
2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

This initial handwritten ideas on topics addressed the following material as indicated by Creswell (2009): "Codes on topics that readers would expect to find, based on the past literature and common sense; Codes that are surprising and that were not anticipated at the beginning of the study; Codes that are unusual, and that are, in and of themselves, of conceptual interest to readers; and Codes that address a larger theoretical perspective in the research" (p. 187). For example, I noted any recommendation criteria such as "work ethic" or "motivation" that my participants mentioned using in suggesting students to the Honors Algebra I track. Additionally, I also highlighted any statements related to my framework Critical Race Theory, such as comments about racial equity in the tracks or how the current tracking system is set up to perpetuate the domination of a White narrative in mathematics.

After reading and generating initial ideas from the digital research survey using the process described above, I also made note of any clarifying questions I had for the group in preparation for the group discussion. When I had the group discussion transcript, I repeated my initial readings and handwritten coding process to generate more ideas about my research. It was then I realized I needed to conduct an interview with an administrator familiar with the school

tracking policies, so I went ahead and set up a supplemental interview with Dr. Andrea Lee, an assistant principal at KHS. After her interview, I had more information on school tracking policies to bring back to my participants and to engage them in individual follow-up interviews with this new knowledge. When I conducted my individual follow-up interview with each teacher participant, I had their vignette response, the group discussion, and my insights from the administrator interview to probe even deeper in their thoughts in effort to capture the richest data possible for my research questions.

The real in-depth portion of my data analysis was completed with the help of a computer-assisted qualitative data analysis software (CASDAQ) called NVivo (QSR International, 2020). I used NVivo to organize my relevant coding schema into a digital format, which allowed for easy revision and regrouping of codes, and to prepare for thematic interpretation of the data (Boréus & Bergström, 2017). Using Nvivo helped me easily locate and determining relationships between codes, which will allow me to make meaning of the data as it relates to previous literature and existing theories. I also could determine any new questions that emerged from the findings. In Chapter 4, I summarize my data findings in a narrative report, including the themes I found addressing each of my research questions. Additionally, I have included a reflective statement indicating my subjectivities during this process (Creswell, 2009). For further validity of my data, I provided my participants the opportunity to comment on my organization of the themes in order to provide them the opportunity to check and review my interpretations (Creswell, 2009). Next, I give a comprehensive overview of strategies I actively took to ensure credibility of my findings.

Credibility

In her piece on criteria of excellent qualitative research (Tracy, 2010) emphasizes the need for credibility, which is defined as the "trustworthiness, verisimilitude, and plausibility of the research findings" (p. 842). Some key components of credibility include having thick description, triangulation, crystallization, and member reflections (Tracy, 2010; Tracy & Hinrichs, 2017). I will comment on how I incorporated each of these components into my research design below.

Obtaining thick, rich description (Geertz, 1973) is a large part of gaining credibility in research (Tracy, 2010; Tracy & Hinrichs, 2017). I gathered thick, rich data by ensuring that nothing was presented without information surrounding the context. For instance, in my follow-up interviews, I was able to gather rich detail on each teacher participant's background, both personal demographics and their prior teaching and schooling experience. Given that there are numerous studies on ethnic matching and the importance of teacher background on students', especially Black students', mathematical achievement and identity (Chazan et al., 2013; Eddy & Easton-Brooks, 2011; Fox, 2016), it was imperative that I provided detailed descriptions of my Algebra I teachers in my analysis and interpretations. I obtained this information through a question "Please describe your racial background and educator experience" on the hypothetical vignette survey that my participants respond to in part 1 of the data collection, as well as through the follow-up interview probing questions in Appendix D.

A second crucial component of credibility in my research was triangulation and crystallization. While both triangulation and crystallization "entail the inclusion of multiple data points, sources, and researcher points of view" (Tracy & Hinrichs, 2017, p. 6), there is a slight difference in the two concepts. Triangulation uses multiple data sources to converge onto a

single truth or finding, whereas crystallization has a goal of opening up the data to more in-depth or fuller understanding of a complex phenomenon (Tracy, 2010). My study used both individual responses to the hypothetical vignettes as well as group/individual interviews to triangulate my teacher participants' recommendation criteria and conceptualization of equity in mathematics track recommendations. Furthermore, I did a supplemental interviews with an assistant principal to understand the mathematics course assignment process from an administrative standpoint. The questions I asked the administrator were directly informed by the teacher participants' group interview. All of the data source information helped crystallize the entire tracking process and school practices from multiple viewpoints.

Finally, I gave all my teacher participants the opportunity for member reflection, which is where "researchers share preliminary findings with participants and make note of reactions to themes and issues that have emerged in the analysis" (Tracy & Hinrichs, 2017, pp. 6–7) to enhance credibility in my research. I explained that after I organized my analysis into themes, I would take a draft of my report outline to those participants who stated they would like to read over my interpretations of the hypothetical vignette responses along with the group discussion findings. While no teacher participants took me up on the offer for member reflection, they did all review and approve the transcriptions from both the group and individual interviews. Next, I conclude with a statement on ethical considerations.

Ethical Considerations

I have maintained the highest professional and ethical norms as outlined by the Human Research Protection Program (HRPP) and monitored by the Institutional Review Board (IRB) of Georgia State University. All participants of the study had the opportunity to read and consent to the research using the informed consent document in Appendix A or Appendix E, and I also

periodically checked in verbally or electronically to ensure consent was maintained throughout the entire study (Marshall & Rossman, 2016). Participation in my research was fully voluntary and participants knew they could withdraw at any time. I made sure to protect participants' personal information through the use of pseudonyms and storing all confidential documents in a password protected computer or locked file cabinet. No harm was done to anyone in this study. Participants had the opportunity to ask questions and member check my assumptions and interpretations of their comments along every step of the research.

Summary

This qualitative single-case study was designed to answer the following two research questions:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?
2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

Using the Critical Race Theory (CRT) as my theoretical framework, I highlighted the tenets of racism is ordinary, counter-storytelling, and a critique of colorblindness and meritocracy (Delgado & Stefancic, 2017) when creating my hypothetical vignette data instrument. The hypothetical vignettes featured descriptions of three students representative of the Kingston High School student body along with three pairs of teacher exchanges regarding recommendation from General Algebra I to the Honors Algebra I course. My 6 teacher participants responded to the vignettes in a digital survey and a group discussion which I facilitated. The group discussion was followed by a supplemental interview with an administrator along with individual participant follow-up interviews. My goal in this research was to spotlight an Algebra I team's teacher

recommendation criteria and conceptualizations of equity in mathematics track assignment of students in a diverse, urban high school. In the next chapter, Chapter 4, I present the four main themes I found from my data analysis along with examples of how the themes appeared throughout the duration of the study.

4 FINDINGS

Four major themes arose from my data analysis. After the hypothetical vignette survey responses, group discussion transcript, and supplemental and follow-up interview transcripts were cleaned up and uploaded into Nvivo software, I first conducted a type of coding called in-vivo coding, which involves using direct quotations from participants as coding categories (Miles et al., 2019). I selected significant quotes from all the data sources that either were relevant to "Codes on topics that readers would expect to find, based on the past literature and common sense; Codes that are surprising and that were not anticipated at the beginning of the study; Codes that are unusual, and that are, in and of themselves, of conceptual interest to readers; and Codes that address a larger theoretical perspective in the research" (Creswell, 2009, p. 187). These in-vivo quotations were then given descriptive codes, which then were placed into main categories. Once I spent some time grouping and regrouping the coding categories, I was able to identify four main themes that emerged from concepts based on my Critical Race Theory framework. I chose to use an in-vivo quotation from my participants as the title of each theme to honor the authenticity of their voices. See Figure 12 on the next page for a visual of a description of each theme and its specific coding categories. Before going into details on each theme, I want to remind my readers of my theoretical framework.

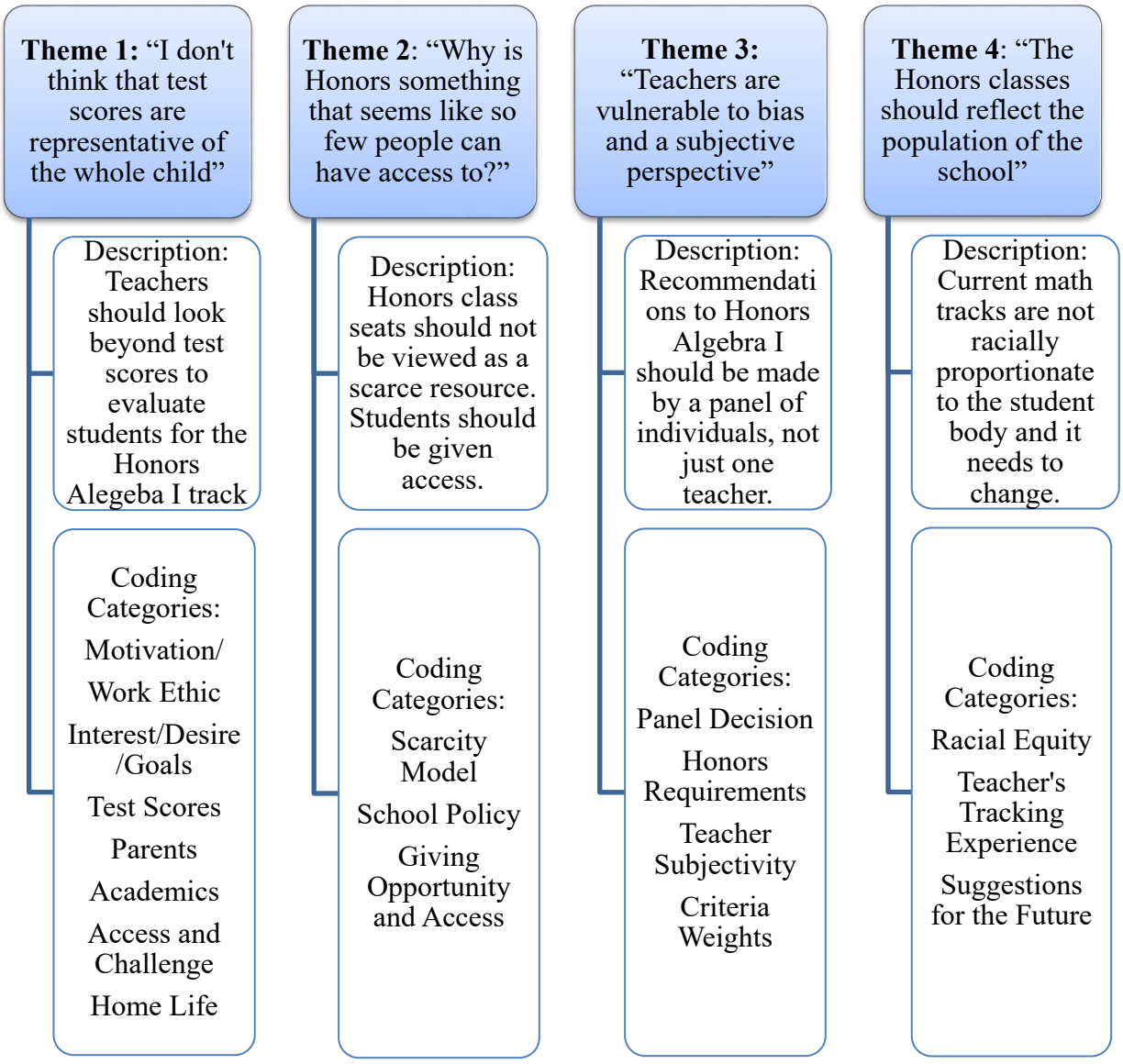
Theoretical Overview

As discussed in Chapter 2, this research is grounded in critical race theory (CRT). CRT rose from critical legal studies (CLS), a movement in the late 1970s that challenged and questioned legal discourse that was aimed at legitimizing a social hierarchy in the United States (Anderson, 2019; Davis, 2019; Delgado & Stefancic, 2017; Tate, 1997). However, while CLS critiques formalism and objectivism (Tate, 1997), its limitation was that it failed to center issues

of race when critiquing the injustices of the law (Ladson-Billings, 2003; Tate, 1997).

Figure 12

Theme Descriptions and Coding Categories



Thus, CRT emerged with a central tenet rooted in the notion that racism is endemic and pervasive throughout society and structures in the United States (Delgado & Stefancic, 2017),

including schools and mathematics education (Davis, 2019). In my research, I used a CRT lens to help design my study, as well as analyze and interpret my findings, which are described in the remainder of this chapter.

Reiterated from Chapter 3, to help collect the data with the goal of answering my two research questions, I developed hypothetical vignettes and teacher conversations around assigning students to an honors mathematics track for my research participants (6 Algebra I teachers) to discuss. These data instruments each featured a fictitious teacher conversation centered around one or more of these tenets in CRT: 1) Racism is endemic 2) Counter-storytelling 3) Critique of Colorblindness (Delgado & Stefancic, 2017). One exchange highlighted two teachers discussing whether a student should be evaluated for an honors class based strictly on test scores and grades; Another exchange featured two male teachers telling stories about their childhood mathematics experiences and how they can relate to the students who may otherwise be overlooked for honors course consideration; A final exchange showcased a teacher explicitly calling out the racist structures in schools that are designed to set Black and Brown students on a trajectory for failure in mathematics. I designed my data instruments to initiate discussion from my teacher participants on the topics of meritocracy, mathematics as a racialized space, and colorblindness in mathematics track recommendations (Davis & Jett, 2019a).

As mentioned above and diagrammed in Figure 12, I found four main themes from the coding process that I will introduce briefly now through a CRT lens. The four themes were named based on in-vivo quotations from my research participants during the interview. They are as follows: “I don’t think that test scores are representative of the whole child”; “Why is Honors something that seems like so few people have access to?”; “Teachers are vulnerable to bias and a

subjective perspective"; "The Honors classes should reflect the population of the school". It is clear from my conversations with the teachers that schools remain institutions that uphold the separate and inherently unequal education that Brown v. Board of Education was supposed to eradicate (Anderson & Byrne, 2004; Bell, 1980). Additionally, there is no such thing as a racial achievement "gap" in mathematics education (Martin, 2009), only a gap in opportunity. The teachers agreed that racial demographics of the Honors Algebra I course should be consistent with the overall demographics of the school, and that one consideration to this equity issue is avoid a colorblind approach to teacher recommendations or tracking policies.

In conclusion of my theoretical overview, CRT was centered in the design and analysis of my research study. Next, I provide great detail into my research findings by elaborating on each of the four themes. It is important to remember that the unit of analysis in this case study is defined as the entire team of Algebra I teachers at KHS, rather than separate individual cases representing each unique teacher. The reasoning for this distinction is because high school mathematics course options, sequencing, and tracking procedures vary slightly from school to school (McFarland, 2006), and I wanted to showcase how this one group operates as a team in discussing tracking decisions. When describing the themes, I feature the voices of my teacher participants and how the group's dialogue supports the themes as a collective case.

Theme 1: "I don't think that test scores are representative of the whole child"

There was a lot of discussion among my teacher participants about the criteria used to determine which students should be recommended from General Algebra I to Honors Algebra I. Their responses from the hypothetical vignette digital research survey, group discussion, and follow-up interviews spoke directly to answering my first research question: What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the

Honors Algebra I track? Overall, the consensus from the teachers was that looking at test scores alone is not enough to evaluate a student's ability to thrive in the Honors Algebra I class. The following are some excerpts from what they shared:

Ms. D: [Group Discussion] Every student is going to have bad days and things like that. But are they consistently trying to complete getting a 70 across the board, every time? Are you just putting in that effort to even submit what you've got, because I think a lot of people just get defeated right off the bat. So kind of showing that like you want to persevere - I think makes you extremely capable to be in an Honors class. Not just a test score.

Ms. A: [Hypothetical Vignette Survey] The criteria should be more holistic. I don't think that test scores are representative of the whole child or really an indicator of their long-term success. We are actively disadvantaging our students if we don't take into account their ability to comprehend or complete the course material beyond just a test.

Ms. R: [Hypothetical Vignette Survey] I would disagree that strictly from a numbers standpoint is the way to go. When we are thinking about the success rate in an Honors Algebra class, we must look at the motivation of our student also. Is this something the student wants? Will they perform well based on the newer, more-challenging environment? Will they feel inadequate in this environment based solely on the rigor? Remember, it is faster-paced and more rigorous, so I'd like to converse with the students and their parents first before recommending them.

Some teachers even went to describe how they would not rely on the test scores because standardized tests are rooted in systemic racial biases, as confirmed by many researchers

(Darling-Hammond, 2013; Ladson-Billings, 2013; Larnell, 2019; Popham, 2010).

Mr. S: [Hypothetical Vignette Survey] I wouldn't stress about the standardized test scores due to biases that may be present.

Ms. A: [Individual Interview] So I do think using data to inform instruction and to inform like course assignment for students should be a component- I just don't think it should be the exclusive component because I've worked in a district where that was the exclusive component that was considered and I think that that drastically discriminated against, students, and especially students of color.

Mr. Y: [Group Discussion] That's the problem is that if you just take test scores across the board. Let's say college applications, it would essentially be White males who would get most of the acceptances. And standardized tests are culturally biased. I mean, I saw a question and it was about baseball- This person is going to go around home base, around all four bases. And I thought, you know, that's a pretty specific sport for the United States. It's kind of like having a cricket question. And being like everybody knows cricket. So anyways. My point being that . . .We're in the system already and the system is built around testing for a certain type of knowledge and that certain type of knowledge is generally speaking white and male. And so unless there's something else to have a criteria, we would end up having the same group of students given the opportunity and the same group of students that don't get the opportunity to stay in those same places. So I guess that's where I felt like, yes, we need to address these things and perhaps that may be looking away from test scores.

Despite their opinions that test scores should not be a significant criteria in determining which

students go into Honors Algebra I courses, many of the teachers felt defeated in that test scores is ultimately how final course scheduling decisions are made—and my supplemental interview with the administrator, Dr. Lee, confirmed that test scores are a significant criteria.

Ms. D: [Individual Interview] I just feel like a lot of times, even though we shouldn't be looking at test scores- That is what it boils down to.

Ms. A: [Group Discussion] I just get asked for a list of kids that I think [should be in Honors] and then the only pushback I ever get is, if their test scores don't necessarily support that.

Dr. Lee: [Supplemental Interview] I don't really know if there is a way to align every math teacher in Georgia, especially at the middle school and high school level of what a good math student looks like. And so what one person may feel like is already a good math student is not necessarily what their colleague is going to think is. So it does make it a little bit subjective, and I believe that is why I think the best we've all agreed that the best method is to use a tangible data point.

It is important to note the administrator Dr. Lee's remark that teachers may have subjective opinions on a student's mathematical ability as a rationale for using test scores or other numeric data points as a more objective method for determining who gets to be placed in Honors classes, further supporting the myth of meritocracy (Delgado & Stefancic, 2017; Joseph & Cobb, 2019) This is contrary to the teachers' consensus that test scores are not holistically representative of the students' abilities, and in fact, that test scores are known to be racially biased. The misalignment in criteria used between teachers and administrators to assess a student's fit for Honors courses is one of many key areas adding to the unclarity of how school tracking decisions are truly made.

To further elaborate on my teacher participants' discussion of the criteria they would use to decide whether a student should move from General Algebra I to Honors Algebra I, I present Table 4, which lists the top coding categories under "Criteria" along with in-vivo examples and references. Then I share some significant excerpts from the conversations.

Table 4

Top Criteria Coding Categories

Code	**Examples**	**# of References**
Motivation/Work Ethic	"Are you willing to put forth the effort" "intrinsic motivation can offset anything" "Do they have that motivation? Are they willing to learn?" "Diligence to complete and understand"	34
Interest/Desire/Goals	"student who seems interested in math" "wants to be an engineer" "if you have that passion or desire [for math]"	29
Parents	"if a parent wants it, that's fine" "our service is to the parents" "it is a parent's right to advocate for the educational opportunities that they want for their students"	12
Academic Performance	"their performance in the first quarter or within the first-grade report period"	8

	"even if I don't have a very like strong personal relationship with a student, I do try to let their work. And their academic performance come through" "prerequisite [or prior academic years'] performance"	
Need Access/Challenge	"are they just bored or they finding it too easy for them" "Maybe something more challenging could be just the push she needs" "Will they perform well based on the newer, more-challenging environment?"	7
Home Life	"we should look at their individual circumstances as well" "we do delve into our students' home life. You know, see what's going on" "usually some of the students have a lot of issues at home…students who have been homeless students who have been moved in from home-to-home living with different relative"	5

All of the teachers mentioned "Motivation" and "Work Ethic" at some point in the interviews as some of the top criteria they would look at to determine if a student should be moved from the General Algebra I class to the Honors Algebra I class. Originally, I had coded these two criteria separately, however upon further inspection, I decided to group "Motivation/Work Ethic" into one code because all of the teachers described these criteria as

having the drive to succeed and put in the effort for success in class. The second most common criteria was “Interest/Desire/Goals”, which was also three separate coding categories that I later decided to combine. The reason I combined these three codes is because all of them referred to the student showing an interest or having a goal that requires mathematics in their future, such as following their dream to pursue engineering. The key difference between “Motivation/Work Ethic” and the “Interest/Desire/Goals” coding categories was the former was a general drive and effort to do well in school, and the latter pertained to a specific desire for learning higher level mathematics. See some significant excerpts below that illustrate the differences in these two coding categories.

Mr. S: [Individual Interview] As long as they have that motivation and that will to be successful and to put forth the effort- I feel like they'll be successful. I don't feel like I was an amazing mathematician in high school, but I got a math degree in college because of work ethic, motivation and just, - I think that intrinsic motivation is can offset anything.

Mr. N: [Hypothetical Vignette Survey] I would have picked Montrell [to go to Honors] because he had he had a desire that he wanted to, you know, be an engineer. I wouldn't be surprised if Paige followed her passion and stop the sequence of higher-level math which is not needed for her personal success in the Arts/Theatre.

After “Motivation/Work Ethic” and “Interest/Desire/Goals”, the next most common criteria my participants mentioned was “Parents”. References to students’ parents referred to when a parent requested or asked school administration to allow their child to be placed into the Honors Algebra I class. Parental requests sparked some differing opinions and dilemmas

between the teachers during the group interview. Some teachers felt that parents have a right in wanting a specific course assignment for their child, whereas other teachers did not have a clear answer on whether more value should be placed on the student or the parent's desires.

Ms. A: [Group Discussion] Especially as a public school and a public service, we are beholden to their parents . . .I think every student and family should be allowed to access the education they want.

Mr. Y: [Group Discussion] I've experienced parental recommendation and request. I think that's hard to challenge. You know, I guess, we all want to give them the opportunity once that request has been made.

Mr. N: [Group Discussion] Should we recommend kids, based on what they want or what their parents want or what we think is best for them? And that is where I have maybe an ethical dilemma . . . I'm kind of, you know, kind of unsure you know which is the ethical thing to do.

While the teachers seemed to be well-intentioned by supporting the parent's role in decision-making for child's educational trajectory, critical race theorists would say that unfortunately, not all parents are informed with the knowledge on how mathematics tracking affects future trajectory. As mentioned in Chapter 2, parents and students with more social capital tend to have knowledge on or can impact tracking decisions (Giustinelli & Pavoni, 2017; LeTendre et al., 2003; Useem, 1991). For many Black students, Joseph and Cobb (2019) state that their parents "might unwittingly fail to challenge their children's placement in mathematics courses that are presumably easier in hopes of their children securing a high grade" (p. 155). This lack of parental knowledge about mathematics courses not only reduces a child's opportunity to secure more

advanced mathematical knowledge for college admissions standardized assessments, but also may potentially reinforce racial biases in teachers about student ability (Joseph & Cobb, 2019).

Another common criteria that the teachers said they use as a consideration if a student should be recommended for Honors Algebra I is their academic performance, either current or prior years'. What is interesting about this criteria, and many of the others, is that all teachers who mentioned academic performance mentioned it alongside other criteria such as motivation or parent request. There was great consensus that similar to test scores, academic performance is not the only criteria that teachers should be looking at when evaluating a student for Honors. For instance, when Ms. A was speaking about hesitating to a parent's request to put their child in Honors, she added a contingency statement:

Ms. A: [Individual Interview] If you're genuinely concerned, I think that that's when you bring in administration and say this is what the parent wants. These are my concerns. I think that you should allow them. I mean, if they are put into this course, it should be considered to be a like probationary thing or a probationary condition, it should be conditional enrollment--contingent on their performance in the first quarter or within the first-grade report period.

It is important to note that many of the next criteria, "Needs Access/Challenge" and "Home Life" were often referenced in conjunction with taking into consideration a student's academic performance or test scores. For instance, Mr. N gave an example of two students with different grades but also different home environments as reasoning for why teachers should look beyond just numeric values.

Mr. N: [Hypothetical Vignette Survey] I agree that students should have high grades as one of the criteria for consideration. However, we should look at their individual

> circumstances as well. For example, an 85-percentile student who does not participate in any extra-curricular activities, does not volunteer or have a job, does not have the responsibility to take care of a younger sibling, and have parents who provide every educational resource for student success. And compared to a 75-percentile student who participates in extra-curricular activities, has to work to help with the household income, takes care of a younger sibling, and does not have the educational resource to be successful. This is why I don't think that we should make the decision purely on grades.

Ms. D also gave an example of when sometimes a student's high standardized test scores and low in-class academic performance appeared contradictory, it could be indicative of that student requiring the challenge of a more advanced mathematics class.

> **Ms. D:** [Group Discussion] I think sometimes too if you see that a kid's scoring like distinguished on their EOC [end of course exam], but they're giving you 10% in class, you got to look at the reason behind that. Or they're just bored or they finding it too easy for them and their whole life they've just been looked at, like, as not being successful in math because they're not turning in that work and taking their test, but it's just a because they're bored.

Overall, the conversation from the teachers regarding criteria for recommendation into Honors Algebra I was rich with examples of "Motivation/Work Ethic", "Interest/Desire/Goals", "Parents", "Academic Performance", "Needs Access/Challenge", and "Home Life" as the main categories. Similar to results found by Bernhardt (2014b, 2018), the teachers did not offer any definitive ways to measure such subjective criteria such as motivation, but relied on having a good personal relationship with and understanding of the student. Additionally, similar to Max's

(2017) study results, although my participants were thinking about equity issues when it came to testing biases, “no participant mentioned race, gender, or socio-economic status as a consideration in their responses” (p. 293). Only later when I prompted them with follow-up questions during the interview did my participants start discussing more about race as a criteria to consider when making recommendations. This first portion of the data helped provide initial answers to my first research question: What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track? Next, I discuss portions of the data that addressed my second question: How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school? I address this question by referring to Themes 2, 3, and 4 of my data analysis.

Theme 2: “Why is Honors something that seems like so few people can have access to?”

Another theme that emerged from the data was the idea that the teachers felt the Honors Algebra I class is a place reserved for only a select few students. The main coding categories in Theme 2 are “Scarcity Model”, “School Policy”, and “Giving Opportunity and Access”. When discussing the three students in the hypothetical vignettes, all of the teachers asked why all three students couldn’t be recommended for the Honors class. Mr. Y brought up a point for discussion in the group interview: “Are we really doing like a scarcity model here, there's only one student that can go?” His question initiated a conversation around what the actual school policy was regarding making recommendations for students. Similar to what Bernhardt (2014b, 2018) found, my research participants lacked clarity on the school course assignment policies, as evidenced by the quotations below.

Mr. S: [Group Discussion] I haven't really heard too many school policies. The only thing that I really know is kind of piggyback on what everyone else stated is the

test scores- like it's the teachers opinion after you see did they pass the [end of course exam] EOC it seems. That's kind of how I've seen it.

Mr. N: [Group Discussion] I can't recall any other schools that I've been that asked us to go by school policy or district policy in promoting these kids. It's always someone that says, "Hey, who do you think should go?" and that's it.

Ms. R: [Group Discussion] Other than them asking us, I'm not sure what all that entails. I mean, they asked our opinions and that's about it. I mean we base it on, on, you know, their data- how they score standardized tests.

Ms. A: [Group Discussion] I definitely think though that test scores are like very highly considered.

Despite not knowing entirely what the school policy consists of when making tracking decisions for math, the teachers seemed to agree that standardized test scores appeared to play a big role in the process. When I conducted the supplemental interview with Dr. Andrea Lee, the administrator over the mathematics department, she confirmed that is in fact a school handbook with course requirements and that test scores and teacher recommendations play a big role in deciding which students go into Honors.

Dr. Lee: There is like a comprehensive course guide or course handbook that our school utilizes- Each department did have input as far as what the requirements were. And so in there it states what students should look for, what teachers should look for when recommending a student to Honors, and usually that is a combination of teacher recommendation and a score of proficient or above on the Georgia Milestones [the end of course state standardized test].

Dr. Lee also admitted that as far as training for teachers in how to recommend students, there is nothing formal.

Dr. Lee: [responding to researcher question on whether or not teacher recommendation training is provided to teachers] Nothing beyond things I have shared before like what makes a strong student. There's not like a formal training by the district or anything that kind of talks about what's the process for recommending.

According to Dr. Lee, there is not a district-specified criteria to look for when recommending students to Honors courses, but rather a combination of the state standardized test score and teachers' personal judgements on what makes a qualified Honors student.

Another important finding from the data was that not only are teachers unsure of how students are selected for Honors, but they lacked knowledge on how many Honors class seats there were. As Mr. Y pointed out in the group discussion, is a seat in the Honors Algebra class considered a scarce resource? After speaking with Dr. Lee, I was made aware of some enlightening information to share with the teachers:

Dr. Lee: There is no cap [on number of Honors seats]. So how our courses run is…Our course numbers run based on the number of requests that we receive.

Essentially, according to the administrator, the number of students allowed into the Honors level mathematics classes is dependent upon how many students or teachers (on behalf of a student) submit requests for those classes! When I mentioned this to the teachers in their individual follow-up interviews, I found that most of them did not know this is how the allotment of students per Honors class was determined and wished there was more transparency between administration and teachers.

Ms. A: [Individual Interview] I wonder how that transparency would translate to student teacher recommendation. Because I do think a lot of teachers operate from a scarcity mindset when it comes to honors and gifted recommendations, just because I think those courses have a connotation of exclusivity. So I've always kind of operated under the assumption that I'm just going to send as many names as I think like the kids that have shown me that they can do well. That's how many kids I send. Um, I've never tried to limit that number, but I would be really interested to see how the numbers change if the administration was more upfront about how about their decision-making process when it comes to honors courses.

Ms. D and Mr. N also brought up the fact that they believe many teachers operate from a scarcity mindset when it comes to how many students to recommend to Honors, when in reality, there is no need to limit recommendations since the seats are unlimited. Both of these teachers said they would change their mindset now and consider even more students for recommendation.

Ms. D: [Individual Interview] I feel like it's more of a scarcity model coming from us regular teachers being unwilling to recommend a bunch of students because I think there probably are more kids that are capable. And I know last year, I didn't sit down with every student and asked them if they wanted to be moved. So maybe that's something I should do this year to feel like if they want to try to do that honors course.

Mr. N: [Individual Interview, after learning that Honors seats are not capped] Rather than try to restrict it to promote just one of them [to Honors]. You know, I would go out and promote all three [students].

Not only did the teachers lack clarity on the school policies on the assignment and selection process for the Honors Algebra I class, but they felt as if teachers are operating from a scarcity mindset when it comes to making recommendations. Overall there is a sense that Honors is a space with limited capacity for only a select group of students. This is not surprising information for critical race theorists because historically, mathematics education and access to advanced mathematics courses has been structured using the myth of meritocracy as primarily a White institutional space (Davis & Jett, 2019a). To further expound on Theme 2, I want to relate my findings to my second research question: How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school? The teachers all emphasized the need to give students access and opportunity by recommending them for the Honors Algebra I class. Giving all students the chance rather than limiting them was a common rhetoric as evidenced by the excerpts below.

Ms. D: [Hypothetical Vignette Survey] All students need the chance. The education system is a result of systemic racism and it is evident in classes. Kids need to be encouraged and believed in. With hard work, everyone can be successful. We must approach things from a growth mindset… We shouldn't limit them especially right now when they're such in such a developmental period. So allow them to try and if they decide to come back to the regular class. I think that's completely fine too but just giving them the opportunity to see if they can do more. And if they want to do more. I believe every kid deserves a chance to succeed, they all should be given the option.

Mr. N: [Individual Interview] Give them an opportunity to still consider it while in it, rather than just take away that opportunity. Totally. Because I know that student

wasn't interested…sometimes teenagers change their mind daily and …I would give them the opportunity rather than just deny that before they even get started.

Ms. R: [Hypothetical Vignette Survey] How will the students know what they like or what they are capable of if they aren't exposed? It's high school so being able to try out different classes to determine your likes and dislikes could help them develop a sense of what they want for their future. It will also help them navigate the classes they will need for college should they decide to attend. Opportunity and exposure to something different could be just what all 3 students need.

Ms. A: [Individual Interview] I'm always going to default to letting a kid have access to higher level material instead of holding a kid back.

The coding category "Giving Opportunity and Access" is relevant in discussing equity issues among the tracks because the reason that there are disproportionately less Black and Brown students in the higher track mathematics courses is due to a lack of opportunity, not due to lack of academic ability (Ladson-Billings, 2013; Ladson-Billings & Tate, 1995; Martin, 2009). From the interviews with the teachers and administrator, it seems that teacher recommendations, when done with intention and magnitude, can be a potential solution for granting more students the opportunity to take Honors Algebra I. In the next section, I discuss Theme 3, and address the teachers' thoughts on teacher bias in recommendations.

Theme 3: "Teachers are vulnerable to bias and a subjective perspective"

While the teachers spent a majority of the group discussion conversing about the criteria that they look for when recommending students into Honors Algebra I, they also suggested that the current recommendation process of only asking one teacher's opinion is open to biased perspective. In Theme 3, the major coding categories were "Teacher Subjectivity", "Panel

Decision", "Honors Requirements", and "Criteria Weights". First the teachers discussed how individual teachers can have subjective and biased opinions on students, which may lead to inequitable recommendations. This observation led to a suggestion that recommendations for Honors should be made based off a panel of individuals, rather than just the student's mathematics teacher. Then, the conversation led to the observation that there is lack of communication between the General Algebra I teachers who are recommending the students and Honors Algebra I teachers who are receiving those students. In concluding this portion of the data, the teachers discussed how much different decision-making criteria, including the teacher recommendation, should weigh into the promotion of a student into Honors Algebra I.

The first coding category "Teacher Subjectivity" that initiated the formation of Theme 3 is well-addressed in the teacher recommendation literature. As critical race theorists observe, factors that impair fair decision making and the subconscious thoughts are hard to escape because racism is normalized in our lives (Bell, 1988; Delgado & Stefancic, 2017; Ladson-Billings & Tate, 1995). In fact, and this is especially pertinent to schools such as my research site KHS with its high Black student population, there is a known risk of teacher recommendation bias involving anti-Blackness (Faulkner et al., 2014; Joseph & Cobb, 2019; Larnell, 2019). Additionally, in an international quantitative analysis, Glock et al. (2015) concluded that ethnicity is an implicit bias factor when teachers make track placement decisions. The teachers in the research study also felt that there is a risk of teacher bias when it comes to teacher recommendation process for student placement into Honors Algebra I.

Mr. Y: [Group Discussion] Yes, teacher recommendation is important… But I think at the same time, you'd have to look and see if like in eighth grade if they had straight B's or an A or two in the other subjects and they had a C or D in math-

You might want to say, well, was that the teaching style of this particular math teacher? Was that something going on with their math curriculum? Because it sounds like as a student, they're not struggling with the work ethic and making good grades. So just something like, and maybe their seventh-grade math teacher, they had an A. So, I think we've all experienced those, those subjects that we like- and then we get the teacher that's not our favorite and it kind of diminishes our results.

Mr. S: [Group Discussion] I don't feel like the teacher recommendation or anything, should be weighted one over the other, because you never know that relationship is with . . . from that child to that teacher.

To mitigate potential biases from an individual teacher's recommendation, the teachers suggested that before recommending a student from General Algebra I to Honors Algebra I, that a panel discussion be conducted between a group of significant decision-making individuals. This panel idea came about when Ms. A brought up her initial reactions to the hypothetical vignettes teacher exchanges and the group discussion amongst the six Algebra I teachers.

Ms. A: [Group Discussion] What I felt wasn't is, at least not at [Kingston High School] and I don't feel like I felt had this conversation at my other school either. Um, I don't feel like there are multiple teachers giving input on this [teacher recommendations], or at least like if it's math unless you have a co teacher, there's only one teacher's opinion. We don't look at, it's not like we sit down as a cadre and look at all the kids and their data and then talk about it and defend the decision to send them or not send them. It's, it's like made by one person.

When I asked if they thought that multiple people should be making the decision rather than relying on one teacher's recommendation, the consensus was overwhelmingly yes. The teachers then elaborated on who should be included in on this panel meeting.

Ms. D: [Individual Interview] Definitely the parents, definitely the student. I think like our math coach would be a good person to include, and then the teacher who currently has been the Honors teacher.

Mr. S: [Individual Interview] I feel like it should be more of a collaborative effort of deciding if it's [Honors] going to be best for each child. That includes the parent, that includes the child, and that includes the teacher. Um, and maybe it's another teacher or a teacher who's never had the student who can sit in the meeting as well and be able to make it make an educated opinion based off of based off of some of the conversation.

Mr. Y: [Individual Interview] It's just one of those things where a lot of times these decisions [recommendation to Honors] are made, and does the student know this decision has been made for them? So I think that it doesn't have to be maybe the student isn't at every meeting, but they could be a part of the process and I think, yeah, I think other teachers. And the student. That would be good.

Mr. N: [Individual Interview] We should still have that type of partner[ship], where the parents, the counselor, and a couple of teachers you know come together and made that decision.

Most of the teachers mentioned including other teachers, math coaches, counselors, parents, and even the student themselves in meetings about their future mathematics course trajectory. Then Ms. A brought up a good point about hearing the perspective of the receiving Honors Algebra I

teacher, which led to conversations about their current knowledge of the Honors curriculum or pre-requisites.

Ms. A: [Group Discussion] I think it would have been interesting to hear the perspective of the Honors teacher. I don't think any of us teach Honors and so I don't know necessarily, I'm not as familiar with how different the curriculum is. I know a lot of it is a lot more about depth. But I think maybe that would have given some insight into what the Honors teacher looks at, or uses, or what trends they've seen as the teacher.

Ms. R: [Individual Interview] I definitely think the Honors teacher, the school counselor and a parent. That way, everyone can converse about what they feel is best suited for the child. A lot of times it's one person's opinion or maybe two people. And I think the parents and the student needs to understand what exactly will be the expectation and going into an Honors classroom, you know, because I don't think at least for me Honors does not mean all we just do more work. It should be activities that are geared toward challenging their brain to develop more into you know look beyond what the standard curriculum is.

All of the teacher participants in this study are General Algebra I teachers, and this group discussion had many of the teachers reflecting on if they even knew what the Honors classes entailed, and how they may differ from the General Algebra I class.

Ms. D: [Individual Interview] As a teacher who doesn't teach Honors, I don't always know like what exactly they're looking for in those Honors students, but I notice my kids that are going above and beyond. And those are the kids I recommend.

Mr. N: [Group Discussion] And one of the complaint I hear from teachers who teach Honors in recent time is the kids that that is being recommended for Honors- They are not true Honors kids and it makes it extremely difficult. Well, maybe we, you know, teachers who are recommending probably not doing just service either.

Ms. A: [Individual Interview] I mean, I don't know that there's ever a chance that we get to communicate with the Honors level teachers. I mean, even when I taught Algebra II, we never collaborated with the Honors Algebra II. And like when we compared the kind of work we were doing- it was very different. I had to independently seek them out… I would not say that I know what Honors curriculum for at least students at our school look like. I think my idea of what an Honors level course should look like is different from necessarily what our kids receive. And I don't think that there's any sort of transparency about what that is and what that actually looks like.

Ms. R: [Individual Interview] At our current school I'm unclear, because I know from what I've seen, I have access to what the students are being exposed to and it looks like honestly, we're doing the same thing [between General and Honors]. I know, as far as standards wise, there's no difference in the standards, but as far as activities, I'm not seeing a major difference in math.

Mr. Y: [Individual Interview, in response to if he knew what the Honors class requirements are] I don't know. I don't know.

Clearly, the teachers lacked knowledge of and had not had a conversation before with the Honors Algebra I teacher about what they look for in an Honors student. This is similar to findings in

Bernhardt's (2014b, 2018) study on three social studies teachers that the lower-track teachers did not consult with high-track teachers on the student criteria needed for success. The lack of communication and transparency between the tracks is another area for improvement in the future.

Finally, the teachers discussed how much different decision-making criteria, including the teacher recommendation, should weigh into the promotion of a student into Honors Algebra I. It was apparently from the conversations that none of the teachers agreed that an individual teacher's recommendation or a test score should be used as the sole criteria for recommendation.

Mr. S: [Group Discussion] I feel like all the things that go into deciding if a kid is going to go to Honors or not - I feel like they should be evenly weighted. Whether it comes to the student motivation, whether it comes to the teacher recommendation or even when it comes to, um, I wouldn't say previous academic performance, but just kind of having like prerequisite knowledge, a prerequisite knowledge base. So it might not necessarily mean like passing the EOC type deal. But just having a prerequisite knowledge, where can they had, they can build on something as they move forward. But I thought they should all be kind of evenly weighted.

Mr. Y: [Group Discussion] Yes, teacher recommendation is important. I think it should be considered - maybe the standardized tests, yeah that's important too. But the teacher recommendation. I think would stand equal or more important.

The administrator informed me of what currently happens at the school in terms of how criteria are weighted.

Dr. Lee [Supplemental Interview] I think that the milestone score [end of course state test] is going to be your most heavily weighted thing. And then, of course, the teacher

> recommendation as well. But the parents can recommend, but usually [the 9th grade counselor] does a pretty good job of making people aware of fit versus something you desire, if that makes sense. Like, you may desire for the child to be here, but let's kind of talk through what's on that child's plate. And whether or not you feel like that's really the good/better fit for them. So a parent you know they have all the right they can to recommend, but it really is kind of based on the school's decision and it's basically up to the counselor to kind of try to help guide them in the right direction.

From the conversation with the administrator, it appears that the standardized test scores and teacher recommendation, in that order of significance, are both valued in the decision-making process of promoting a student into the Honors Algebra I course. However, all the teachers are hesitant to agree that decisions based off one teacher or a test score are equitable to the student. They suggest a panel decision for making recommendations and to look at criteria other than test scores when deciding which students are a good fit for Honors. Additionally, they would love to have conversation and more transparency with the Honors track teachers to make sure that the receiving teachers and recommending teachers are on the same page for the students' best interest.

To conclude the presentation of my findings, next I will address Theme 4 "The Honors classes should reflect the population of the school". The conversations in this theme address a combination of both of my research questions:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?

2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

The topics in this theme center around using race as a criteria for decision making and what ideas the teachers had for making mathematics tracking decisions more equitable in the future.

Theme 4: "The Honors classes should reflect the population of the school"

Given that I am utilizing a critical race theory (CRT) framework in my study on teacher recommendations in mathematics tracking, it was imperative that race and racism were discussed in the digital survey, group discussion, and follow-up interviews with my participants. Despite being commonly thought of as a neutral content area, mathematics education is in reality very highly political and racialized (Jett, 2019). For researchers using a CRT lens, there must be a deliberate decision to center race and racism when researching issues of injustice in education (Davis, 2019; Jett, 2019; Larnell et al., 2016; Parker & Lynn, 2002). In Theme 4, I present the data findings pertaining to the following three coding categories: "Racial Equity", "Teacher's Tracking Experience", and "Suggestions for the Future". To begin, I want to provide contextual support for each of my teacher participants.

In my follow-up interviews I had the opportunity to ask each of my participants about their own K-12 experience, experience as a teacher, and experiences with mathematics tracking in the past. This thick, rich description (Geertz, 1973) is critical to understanding the thought processes of my participants in this qualitative single-case study, particularly when it comes to matter or race and educational equity. As Tatum (1994) writes, "We all must be able to embrace who we are in terms of our racial cultural heritage, not in terms of assumed superiority or inferiority, but as an integral part of our daily experience in which we can take pride" (p. 282). This statement rings true for all teachers, regardless of race. My participants are a racially

diverse group of individuals, as shown previously in Table 2, and their past experiences are important for understanding their ideas on mathematics tracking and racial equity in education. Below are some excerpts from the individual, follow-up interviews detailing some significant moments in the participants' own K-12 experiences.

Mr. S: [Individual Interview, speaking on his high school experience] I would say it was about 60 to 70% African American in a General class, maybe even 80% of the General class, but I know the advanced classes. I mean, it might be- out of 20 people that might be 2 Black people, 17 White, and then someone of another race. So it was a very, very separate very separate… [on his thoughts being one of the only Black kids in Honors class] I felt like I was the voice of African American people. That's what it is. It's a Every stereotype gets thrown on you. And usually - I feel like every stereotype gets thrown on you, and it's just you become whatever everybody else view as, however they view African Americans and you just kind of just got to wear that.

Mr. Y: [Individual Interview, talking about how he got tracked into higher track in childhood] It was, I think, first grade. They took a test, like my sister and I took the same test- she scored like one or 2% to below gifted and I, I guess I didn't. Oh, so I was considered gifted from that point while she was not And I just feel like if I looked right now at us two people- There's no difference in like our acumen. So it's just interesting like how quickly, you get trapped at a young age… And I think she always felt like she wasn't smart until she went to college and then she really excelled. And, um, I don't know. It's to me, it felt like when you're told you're not good enough and you believe that, and I had a lot of experiences where I was

challenged and I struggled, but I was given the opportunity to really excel. So I guess my tracking benefited me, but it seemed like at the cost of other students' experiences… I was in a pretty diverse school, but when it came to the classes I was in it was primarily, I would say. Jeez. I don't know any Black men who were in my classes.

Ms. R: [Individual Interview] I am an African American woman my school was predominantly White. Um, when I when I was in high school and I was pretty much, I always tested in the higher percentile. So, um, I mean, I was always in the upper-level mathematics classes. Anyway, so I don't think tracking necessarily affected me… it was only myself and another Black girl in my class, but the class was pretty small. We had about maybe 10 students taking, you know, like AP courses, the calculus and the other higher-level maths.

Ms. D: [Individual Interview] Everyone did their classes I was strictly in Honors classes when I was in high school, so I was kind of unaware to like the regular opportunities and then like the remediation courses, honestly.

Mr. N: [Individual Interview, speaking on his experience growing up in Jamaica] Well, the only standardized test we have was to get into high school. And then once you get in, then based on your score on your progress report, then you can be tracked into what we call additional mathematics. So everybody did the basic math, all the way up to ninth grade. So your first three years of high school, everyone that the same math on the same level. And then when we went to upper school grade 10 and 11, you're selected. You are selected by the receiving teacher who

communicate with the upcoming teacher that based on your score, based on your scores and the final year of ninth grade.

Ms. A: [Individual Interview] I was tracked in sixth grade I did very well in sixth grade math and so they tracked me for honors Algebra I seventh grade. And I did not do well in that class. I almost I actually almost failed that class. It feels a lot like, it was very lecture assessment style, so there would be a lecture, we were taking notes and then she would give an assessment. Um, And I've always struggled with that I've always done better with like more discussion-based learning. Um, so that really was difficult for me in that class. I also have ADHD. And so we were expected to sit and be nearly silent for almost the entire class period, which I struggled with. And so I was always, I also got in trouble for behavioral disruptions.

Many of the teachers noted that the Honors mathematics tracks were disproportionately White in their own schooling experiences, similar to their observations working at KHS. In addition to racial differences noted in the tracks, the teachers also brought up issues such as being tracked early on and staying on the same track throughout their K-12 experience. Ms. A also brought up the fact that even though she tested into the Honors mathematics class, she did not do well with the lecture teaching style. All of these observations related to suggestions that the teachers put forth for consideration in the future. Next, I want to share the main observations related to racial equity that the teachers discussed in the group interview.

Mr. S: [Group Discussion] I believe the Honors classes should reflect the population of the school… I don't feel like it should be 90% of a particular group of people in one class, but then they might take up 40% 30% of the school, or even 50 or 60%

> of the school. I just felt like it should somehow. . . Because universities even do that. . .when it comes to diversity and being able to reach out and grab and have a true diverse group of students in their university, I felt like the same thing should be done [in high schools] when it comes to accelerated classes or advanced classes.

Mr. S brings up a key point of discussion among the teachers – that the racial diversity of the school should be reflected in the Honors classes, unlike the current situation where the Honors classes are disproportionately White. Stemming from their own K-12 experiences with the same phenomenon, many of the teachers reflected on KHS and agreed that something is wrong with a system where there is a racial imbalance between the General and Honors tracks. Ms. R, Ms. D, and Ms. A also pointed out their observations at KHS.

Ms. R: [Group Discussion] I know at our school, um, you know, I just see this a lot at our school. You know, it's like one side and then there's a whole other side. So like if you go on one side of the hallway, you're like, "Hmm." But then you go on the other side of the hallway, you just see a completely different demographic.

Ms. A: [Individual Interview] I think you see more frequency of White and Asian students in upper-level classes like pre-calculus, calculus . . .My DSE [department of special education] classes were predominantly Black or African American

Ms. D: [Individual Interview] The education system is a result of systemic racism and it is evident in classes… I feel like it's definitely one demographic at the front of our school and another demographic at the back, and then also the classes when you walk into an Honors class, there is a racial difference in the classes for sure.

When it came to addressing these racial issues, the teachers had quite a few suggestions, ranging from outreach programs with affirmative action, new criteria for evaluating students for Honors, maintaining a growth mindset about students, and increasing transparency between administration and staff about how students are selected for Honors.

Mr. S: [Individual Interview] I feel we should do outreach programs in the school to be able to get- admin and teachers and working staff to do outreach - Programs to be able to try to get that population there. I feel like anything inside that school should represent the population of the school.

Ms. A: [Individual Interview] If we could come up with some sort of profile criterion for students who are in Honors and what is expected of Honors level student, to differentiate an academic student versus just a learner… [Also] encouraging students, especially our Black and Brown and African American students to take higher level math. Um, preparing them to be ready to take upper-level math is also important, I think, not just, not just recommendation, but retention is important for those programs.

Ms. D: [Hypothetical Vignette Survey] Kids need to be encouraged and believed in. With hard work, everyone can be successful. We must approach things from a growth mindset.

Ms. R: [Individual Interview, responding to a question about if there is enough transparency between administration and teachers] Um, no, not really, because until I started working in high school, because I was a middle school teacher- previously, um, I didn't even realize there was a calculation difference when it

came to their transcripts [this is in reference to certain math courses getting calculated at a higher GPA].

In response to the teachers' suggestions on how to mitigate current racial bias when it comes to the students in the Honors Algebra I course and the General Algebra I course, I asked if race should be explicitly considered as one of the criteria when recommending students. The responses were mostly yes, with Mr. N and Ms. R being the only teachers saying that race should not be considered.

Mr. Y: [Individual Interview] I think it's [race is] an important aspect. If you're going to look at the student whole experience. And say, this. The problem with test scores- if they had a bad morning and they scored blank on this test- is that limiting the rest of their experience in high school and perhaps race could be a determinant. We live in a culture where you know there is social and health outcomes that are pretty stark with determined by race. So I think as teachers- yes, we have to be receptive to this student. And their test scores may not be reflective of their intelligence as much as reflective of the system that they're in. So, I don't know if there's like a quota or like a number or a metric based on race, but more of a qualitative kind of situation of saying okay this is their background and experience. And if you're seeing a majority of one particular race in one track, I think that should be concerning especially when this the makeup of our school is… I think that makeup of every class should be the same as the makeup of the profile of the whole school.

Ms. A: [Individual Interview, responding to if race should be a criteria] I think, in an ideal world- No, but the problem with it is I think that it's not an ideal world. And

so I think that there tends to be some overlook- so . . . do I think it should be a deciding factor? No, but I do think it should be taken into consideration, more for opportunities sake.

Ms. D: [Individual Interview, responding to if race should be a criteria] I think in a way of making sure that we're not only recommending those white kids to be an honors, honestly. And really look at everyone whole rounded and you just have to think about access too.

Mr. S: [Individual Interview, responding to if race should be a criteria] I believe it should. I'm just, I'm a makeup number but using this as an example, let's say you have, um, it's a 70% African American school, but then you get into your advanced classes and it's 80% White . . .I feel like it [race] should be addressed because I felt like I felt like if it was not being addressed, you not including a certain population. I feel like that'd be unfair. Unfair across the board.

Ms. R: [Individual Interview, responding to if race should be a criteria] Oh, that's kind of tough. Because I really don't want it to be about race, at all. It seems like that's how it is currently. And I don't want it to be, Oh, well we need a certain quota of, you know, African American students or Chinese students or Indian students or whatever the demographics may be, um, so I just think it should really be about motivation and ability and not strictly about how well someone tested that particular day.

Mr. N: [Individual Interview] Well, I won't necessarily say race, but we should look at the overall student. I don't think race should be a factor, but we should look at the overall student, even the students who appears not to be doing well.

Even though a couple of the teachers stated that race should not be a criteria when evaluating students for Honors Algebra I, this is contradictory to their claims that something should be done about the current racial differences in the mathematics tracks. To ignore race only promotes mathematics as a politically neutral space and further spreads the myth of meritocracy (Larnell, 2019). Critical race theorists claim that the very rules and structure organizing school mathematics today, which hide behind a guise of meritocratic test scores, is just a tool for maintaining White supremacy and ensuring that mathematics remains a privileged subject reserved only for White individuals (Bullock, 2019). Therefore, in order to truly make an impact in the current mathematics tracking system in high schools, educators must be willing to critique the colorblind approach to track recommendations.

Progression of Race Discussions in the Four Themes

While I have grouped the findings into the four themes discussed above, it is important to note that none of the themes exist in isolation of one another. In particular, there is a clear progression of race discussions beginning with recommendation criteria conversations in Theme 1: “I don’t think that test scores are representative of the whole child” and culminating in the suggestions of an affirmative action tracking policy present in Theme 4: “The Honors classes should reflect the population of the school”. Below I describe my observations in how race discussions progressed throughout the findings grouped within Theme 1, 2, 3 and 4.

Race conversations began to emerge with those findings grouped into Theme 1. Participants discussed recommendation criteria for moving a student from General Algebra I into Honors Algebra, and everyone agreed that test scores should not be the sole measure. Though most of the criteria discussions were centered around student qualities such as motivation, work ethic, or desire, a few teachers cited racial bias as the reason why test scores should not be the

determining criteria for tracking decisions. When discussing standardized test scores and using numerical data as the exclusive component for deciding which students go to Honors courses, Ms. A said that in the past she has seen where test scores "drastically discriminated against students, and especially students of color." Mr. Y also stated that "the problem is that if you just take test scores across the board. Let's say college applications, it would essentially be White males who would get most of the acceptances".

In the findings grouped into Theme 2: "Why is Honors something that seems like so few people can have access to?" and Theme 3: "Teachers are vulnerable to bias and a subjective perspective", the participants also began to dissect equity as it pertains to various racial groups having access to the Honors Algebra I track coupled with the potential for teacher bias in tracking recommendations. Ms. D noted the discrepancy of student racial groups in the tracks by saying, "All students need the chance. The education system is a result of systemic racism and it is evident in classes." Mr. S also cites that one teacher recommendation should not be used as the sole determinant for tracking decisions "because you never know [how] that relationship is with . . . from that child to that teacher." His statement is supported by literature which states that teachers recommendations have been known to shown implicit racial bias, particularly anti-Blackness (Faulkner et al., 2014; Joseph & Cobb, 2019; Larnell, 2019).

Finally, the discussions of student race as it pertains to tracking recommendations really came to the forefront when looking at the findings in Theme 4: "The Honors classes should reflect the population of the school". Many of the quotation data points grouped into Theme 4 came from the individual interview sessions when I explicitly asked the participants to share their personal high school experiences with tracking and also to comment on the affirmative action idea that Mr. S brought up in the prior group discussion. All the teachers, with the

exception of Mr. N who grew up in another country, reflected on their own childhood experience and said that White students were the dominant group in the Honors mathematics tracks. They also overwhelmingly agreed that KHS has a disproportionally low number of students of color in the Honors Algebra I class and that this could be mitigated by taking race into consideration when making recommendations.

Overall, there is a clear progression of race discussions interwoven throughout the findings in Themes 1, 2, 3 and 4. Themes 1, 2, and 3 included more subtle and generic remarks that acknowledged racial bias in testing, teacher recommendation, and representation in mathematics tracks. On the other hand, the findings in Theme 4 were more explicit conversations about race stemming from personal childhood experience and direct observation from working at KHS and in other school systems. The findings in Theme 4 also showcased teacher suggestions of an affirmative action policy that could help solve current race differences within mathematics tracks. Next, I will address other noteworthy patterns from the research that emerged from looking holistically at the four themes.

Patterns in Data Sources and Growing Participant Comfort

Although the four themes were generated from grouping the data findings into categories without specific regard to the data source (hypothetical vignette survey, group discussion, or individual interview), I noticed a pattern after observing the origin of the most prominent data sources for each theme. More of the participant quotations grouped into Themes 1, 2, and 3 stemmed from the hypothetical vignette surveys and group discussion, and most of the findings grouped into Theme 4 came from the individual interviews. Additionally, my role as the researcher and also familiar colleague to my participants seemed to aid in the depth of

conversation that evolved from the beginning of the study to the end. Below I will describe my observations regarding the pattern of and the richness of the data.

As described in Chapter 3, I collected the participant data from three main sources: hypothetical vignette surveys, a group discussion, and individual follow-up interviews. My participants first filled out their responses to the hypothetical vignettes, then participated in an hour-long group discussion with all 6 Algebra I teachers, and finally met with me individually for follow-up interviews. All information from these three stages of data collection was considered equally in answering the two research questions and when grouping into the four themes during data analysis. However, I noticed a pattern that the data which was grouped into Themes 1, 2, and 3 stemmed more from the hypothetical vignette surveys and group discussion, and the data grouped into Theme 4 came mostly from the individual interviews. This is significant because the data presented in Theme 4 featured the participants directly speaking on race and racism, whereas the data presented in Themes 1, 2, and 3 were mere hints at the inequities presented in tracking systems. This pattern runs parallel with the passage of time and how comfortable the participants felt as the conversations grew deeper into discussions of racial equity.

Moreover, as the researcher and former colleague of the Algebra I teachers, I observed a growing level of comfort that my participants had when responding to the vignettes, conversing in the group discussing, and in particular, engaging in the one-on-one interviews. Given that my research enters the realm of teacher beliefs and potentially sensitive issues such as such as race and racism, I found it was a good strategy to start the data collection with the hypothetical vignettes so that the participants could distance themselves from the race-centered scenarios (Finch, 1987; Skilling & Stylianides, 2019; Taylor, 2006). Second, the vignettes gave me as the

researcher a good place to direct the group discussion to get participant-generated, rich conversation flowing. Most significantly, I noticed that participants really became more comfortable talking about race as the group discussion progressed and even more so in their individual interviews. I attribute this comfort due to trustworthy relationship with me as their colleague and as someone who understands the context of KHS and shares a common experience (Fleming, 2018; Flodén, 2019). This observation speaks directly to the benefit of rapport between colleagues as well as the increasing need for teacher retention in schools for these connections to build. I will speak on this in more detail in the discussion and implications sections presented in Chapter 5.

Final Reflections from the Data

Upon final reflection of the data from the hypothetical vignette digital surveys, the group interview, administrator supplemental interview, and the individual follow-up interviews, I noted overwhelmingly positive reactions to the study from my research participants. Participating in the research left my participants with new insight into their actions, both previous and future. Many of them mentioned that they enjoyed the research experience and conversations with the other teachers, and even commented on how they have changed their future thought processes.

Mr. S: [Group Discussion] I like the questioning here [on the hypothetical vignettes]. I like the thought process that goes through here. I wish it was [like that] in a traditional school setting- I was it was as involved as it is, in this context where I feel like you're truly analyzing each kid… this is a reality, especially in low-income schools. Honors is not just for the kid who got A's in middle school… just truly analyze why each child is in honors and not decipher them not

separating them up solely off behavior or things of that nature, I thought that analyzation is needed in education.

Ms. A: [Group Discussion] Thank you so much for this really important conversation.

Ms. R: [Group Discussion] The hypotheticals were pretty realistic because this is what we see, at least this is what I've seen in the schools that I've worked with. And I've always worked in Title one schools for the past 12 years, and I see this all the time where I'm students who may be capable of performing better or doing differently aren't necessarily given the access because maybe they don't have the high grades, you know, the high academics, but do they have that motivation… Thank you, and I hope it brings about change. I really do. We definitely need to see that.

Mr. N: [Group Discussion] This research has kind of forced me to look back at the overall student because in the past, usually, I just recommend based on the standardized test score. I never dug deep into a student's background and see what's going on with them in terms of the load that they have to carry at home. They may have a second job or two jobs. You know I never looked into it, this the first because of this because of this research, it forced me to think in the future to look at the whole student.

Mr. Y: [Group Discussion] I'm also teaching an AP computer science and the focus of [that] class has been to give opportunities to students who normally wouldn't have it so it's not determinant by test scores. My experience has been that the [AP computer science] students come with a fresh mind and they don't have a lot of fear and that gives them, I think, a better chance to succeed. So it kind of gave me pause when I was doing this vignette response to say, Well, how many of these

> students need a fresh start? You know, to be seen as successful. So I think it takes some like getting to know the person as a person.

Having a group of teachers who are part of the same mathematics team come together and discuss matters of race, mathematics tracking, and the political inequities of current educational decision-making is just the beginning of the type of "truth-telling" (Joseph & Cobb, p. 157) that is necessary for change in the system to occur. From the participants' responses to the research, I feel there has already been new insight in their minds when thinking about teacher recommendations and mathematics tracking. All my teachers themselves had grown up in the public school system, so the thoughts they had about the tracking were informed by not only the experience at KHS, but for some of them, their own tracking experience.

The main 4 themes I found in my data are summarized as follows: Theme 1: "I don't think that test scores are representative of the whole child"; Theme 2: "Why is Honors something that seems like so few people can have access to?"; Theme 3: "Teachers are vulnerable to bias and a subjective perspective"; Theme 4: "The Honors classes should reflect the population of the school". Furthermore, I identified a significant progression of race discussions which emerged across all four themes, along with a parallel connection to the growing level of comfort between participants and researcher in discussing potentially sensitive topics. In this chapter I used a critical race theory framework and addressed how the four themes and emergent observations responded to my research questions: What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track? How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school? In the next and final chapter, I discuss the implications of my study and my recommendations for future research.

5 DISCUSSION AND IMPLICATIONS

I entered this research with a critical race theory (CRT) lens and a goal of inspiring collegial discussions of race and racism in the realm of mathematics tracking, in particular the teacher recommendation process for 9th grade Algebra students. Jett (2019) concluded in his own personal narrative journey of critical race theory (CRT), "[i]f we are serious about racial progress and wish to move beyond the lip service espoused in much of the social justice rhetoric, then we must engage in a systematic and more sophisticated treatment of race and racism as mathematics education researchers" (p. 176). His words have really inspired me to reflect on my research study and how the experience and findings have added to the fight for more justice in mathematics education. In my research, I sought to answer the following two questions:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?
2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

I began data collection in August 2020 with six General Algebra I teachers with diverse demographics and teaching experiences. My main data instrument was a set of hypothetical vignettes (Appendix B) featuring three student descriptions and three conversational exchanges between fictitious teachers. As discussed in the Theoretical Overview section, one exchange highlighted two teachers discussing whether a student should be evaluated for an honors class based strictly on test scores and grades; Another exchange featured two male teachers telling stories about their childhood mathematics experiences and how they can relate to the students who may otherwise be overlooked for honors course consideration; A final exchange showcased a teacher explicitly calling out the racist structures in schools that are designed to set Black and

Brown students on a trajectory for failure in mathematics. This data instrument was intentionally designed with a CRT lens to initiate rich conversation amongst my teacher participants during the group discussion and individual follow-up interviews. I also had the opportunity to conduct an additional supplemental interview with the administrator over the mathematics department at Kingston High School (KHS). In Chapter 4, I wrote about the four major themes I found from my data sources: Theme 1: "I don't think that test scores are representative of the whole child"; Theme 2: "Why is Honors something that seems like so few people have access to?"; Theme 3: "Teachers are vulnerable to bias and a subjective perspective"; Theme 4: "The Honors classes should reflect the population of the school".

In Chapter 5, I present three concluding sections which feature a reflection, discussion, and implications of the research. First, I will reflect on my experience as the researcher throughout the entire study; Then, I will discuss my findings in the light of my two research questions and existing research; Finally, I provide the implications of my research for current teachers, school and district leaders, and teacher education programs.

Reflections as a Researcher

My journey in this research, in hindsight, began at a very early age, even before becoming immersed in CRT scholarship. Anderson (2019) asks, "What is the goal of utilizing CRT in mathematics education?. . . Our students are paying a heavy racial tax in schools every day. What are we doing to alleviate that burden?" (p. 29). In reflecting on my own experience as a first generation Asian American scholar who grew up in predominantly White schools, reaped mathematics tracking benefits of the model-minority myth (Delgado & Stefancic, 2017; Hu-DeHart, 2004; Yook, 2013), and now has been teaching in predominantly Black schools for over 5 years, I have been fully aware of the Black-White paradigm in race discussions and more

intrigued by the role of my intersectionality in achieving the goals of CRT. Critical race theorist Crenshaw (1991) says, “Through an awareness of intersectionality, we can better acknowledge and ground the differences among us and negotiate the means by which these differences will find expression in constructing group politics” (p. 246). I apply Crenshaw's (1991) words on intersectionality to my research on mathematics tracking and the intersectional identities of the participants in my case study, the Algebra I team. Furthermore, the idea of grounding differences and negotiating how to push a common ideology or agenda for the betterment of American school children is a concept that can be applied to mathematics teaching teams across the United States.

From the interviews, both group and individual, with my 6 research participants, I came to know my colleagues as more than just Algebra I teachers. As a critical theorist, I approached my study knowing that I would do my best to remain strictly a facilitator in the interview dialogues, while also being cognizant that nothing in this type of qualitative research could be situated without context or acknowledgement to historical or personal relationships. Guba and Lincoln (1994) state that in the critical theory paradigm, each individual’s reality is shaped by their experience over time and that there is a transactional and transformative relationship that interactively links the researcher and the subjects. I experienced this transformative relationship in a couple of key instances during my research which I will describe below.

During my research study, I kept a couple of analytic memos (Miles et al., 2019) on my phone whenever I needed to quickly jot down some thoughts or musings that I had during the process. One prominent memo in early September 2020 was when I noted that two of my participants had called me after the hypothetical vignette portion of the study just to tell me how much they enjoyed reading and thinking about the tracking scenarios! Schoenberg and Ravdal

(2000) indicated that hypothetical vignettes are a useful data collection tool for three reasons I confirmed to be true in my research experience: "(1) flexibility that allows the researcher to design an instrument uniquely responsive to specific topical foci; (2) enjoyment and creativity for the informant; and (3) depersonalization that encourages an informant to think beyond his or her own circumstances" (p. 63). One of the participants, Mr. N, who had grown up in Jamaica but later moved to the United States, called me after school hours to say that reading the vignettes changed his opinion about judging or evaluating a student solely from numeric values of test scores or grades. He said he couldn't wait to hear what the other teachers thought about the vignettes. Another participant, Ms. R, a Black woman with 12 years of teaching experience, called me to say she really enjoyed the third fictitious teacher exchange that called out the racist school system. She said that discussions about race are much needed in today's schools and was very happy to help with the direction of my research. It was their initial positive reactions to the hypothetical vignettes that affirmed my research design and gave me even more inspiration in this critical work.

When it came to the group discussion portion of my interviews, I immediately became aware of a lack of specificity in language on "controversial" subjects and an initial hesitation of my Algebra teachers to discuss racism, let alone White supremacy. White supremacy is a powerful and critical concept in racism discussions because it pinpoints racism as a systemic domination by White individuals and White thinking in institutional contexts (Martin, 2013; Stinson, 2017). In fact, even in my own journey into the CRT scholarship, I had a learning curve to go through before being able to navigate the discourse and articulate phenomenon of White supremacy as what leads to opportunity gaps and systemic violence on Black and Brown children (Ladson-Billings, 2013; Martin et al., 2019; Stinson, 2017). Stinson (2017) writes about

how “racism and White supremacy are two sides of the same coin” (p. 910), yet much of the research community that discuss race, particularly in the field of mathematics education, hardly discuss race alongside mentions of racism, let alone White supremacy. As shown from the writings of Stinson (2017), Alexander (2019), Bullock (2019), and Frank (2019), research and discussions on mathematics education must go hand-in-hand with conversations on White supremacy. Without a plan for dismantling and transforming the current White supremacy, there would be little hope for true equity in mathematics education. My participants eventually did begin conversations as a group around racial bias in testing and a disproportionate number of White students in the Honors Algebra I classes, but as a whole, naming racial bias is only one step in the direction of examining the pervasiveness of White supremacy in mathematics tracking. I felt that this was the first time the Algebra teachers had met and discussed racial matters together and it would take more than just one discussion for everyone to really feel comfortable in the conversations on race.

As noted before, work in the critical theory paradigm often results in a transactional and transformative relationship for both participants and the researcher (Guba & Lincoln, 1994). As a new educational researcher in the field of mathematics tracking, this study was incredibly transformational for me. Similar to my participants, I previously was also a General Algebra I teacher who had never deeply reflected on how I was making track recommendations for my students. In fact, for the few students that I did recommend to Honors Algebra I in the past, I remember I had used some combination of their grades, test scores, and work ethic as decision-making criteria. Conducting this research was the first time I had talked with my colleagues and the administrator about the equity of our tracking recommendations. Listening to the group discuss the hypothetical vignettes and asking the administrator questions about school policies

allowed me to reflect on my own values and ideas for improving the current teacher recommendation and tracking system at KHS. Recently, I even spoke with my 10th grade students about the importance of their mathematics trajectory and helped them select mathematics courses for the following year. This experience has pushed me to engage with my colleagues and school leadership in conversations about tracking, and I know this is just the beginning of incredible change to come.

Although conversations on race are difficult for a group of diverse individuals living in a White mathematical space who have been trained to focus meeting minutes on data and testing, I found that overall there was a sense of gratitude for my research and that having gone through the interview and group discussion, my participants say they are now looking at their teacher recommendation for mathematics tracking with a new perspective. Additionally, I am happy to be growing in my own journey as an Asian American CRT scholar and reflecting on this experience has shown me that facilitating a conversation where teachers of the same mathematics team come together and discuss matters of race, mathematics tracking, and the political inequities of current educational decision-making is just the beginning of the type of "truth-telling" (Joseph & Cobb, 2019, p. 157) that is necessary for change in the school system to occur. Next, I delve into the discussion of my research and how my findings are situating in existing research and in answering my two research questions.

Discussion

In this discussion of the findings, it is important to keep in mind the two research questions I was seeking to answer in my study:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?

2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

From the digital survey responses to the hypothetical vignettes, group discussion, individual follow-up interview, and the supplemental administrator interview, I was able to pull together four main themes: Theme 1: “I don’t think that test scores are representative of the whole child”; Theme 2: “Why is Honors something that seems like so few people have access to?”; Theme 3: “Teachers are vulnerable to bias and a subjective perspective”; Theme 4: “The Honors classes should reflect the population of the school”. The data that fell into Theme 1 mainly addressed the first research question on criteria used for recommendation from General Algebra I into the Honors Algebra I track. Data from Themes 2, 3, and 4 address the second research question about how the Algebra I teachers conceptualized equity in the track recommendations. However, it is important to note that Theme 1 conversations occurred early in the data collection from the vignette responses and beginning of the group interview, whereas discussions about equity evolved with some probing questions form the researcher and as the participants grew more comfortable. As a whole, the conversations took on a cyclical nature in relation to answering to the research questions. Conversations on recommendation criteria turned into discussions of equity, which in turn, informed the conversations on criteria once again. Below I discuss the evolution of the data by focusing on the teacher’s thoughts of criteria for recommendation, then their conceptualizations of equity in mathematics tracking, and then finally how the discussion of equity influenced a revision of the originally discussed criteria. In addition to addressing recommendation criteria and conceptualizations of equity , I speak on two other emerging findings that are noteworthy in my research. This discussion will also be connected to previous research literature.

Recommendation Criteria

To begin the discussion of my first research question, "What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?", I will start by referring back to the literature from Chapter 2 and summarize previous findings and gaps. Firstly, concern of school mathematics tracks reproducing social inequities such as a segregation of racial groups has been a topic in the scholarly community for over 30 years (Ansalone, 2009; Bowles & Gintis, 1976; Darling-Hammond, 2013; Davis & Jett, 2019a; Gamoran, 1987; Oakes, 1982, 2005). Teachers are critical agents in equity-related school tracking reform (Bernhardt, 2014b; Buckley, 2010; Campbell, 2012; Davis et al., 2019; Delpit, 1988; Foreman & Gubbins, 2015; Johnson, 2008; Oakes, 2005; Reyes & Domina, 2017; Tyson & Roksa, 2016; Watanabe, 2006), yet there is little understanding behind the decision-making criteria that teachers use when making track recommendations for students. Quantitative research on teacher recommendations has found that there is often a statistically significant difference among racial groups of students when it comes to who gets promoted to a higher level mathematics track (Faulkner et al., 2014; Glock et al., 2015), with Black students and other ethnic minorities at a disadvantage when compared to White students. Unfortunately, due to the contextual variety of school tracking practices (Betts, 2011; Chmielewski et al., 2013; Cogan et al., 2001; McFarland, 2006; Reyes & Domina, 2017), individualized nature of teacher beliefs (Bernhardt, 2018; Nespor, 1985), and lack of qualitative research on teacher decision-making criteria (Bernhardt, 2018; McFarland, 2006), there continues to be a gap in the qualitative research on the criteria that teachers are using to determine which students to recommend to the higher track, especially in mathematics courses.

The findings from my study on teacher decision-making criteria for recommending students from General Algebra I to Honors Algebra I are detailed in Theme 1: “I don’t think that test scores are representative of the whole child”. While there is research supporting that course placements are made based on seemingly objective measures such as test scores and prior course attainment (Archbald et al., 2009; Dougherty et al., 2017; Hallinan, 1992), other studies report that student placement into courses are based off a mix of highly subjective measures (Darling-Hammond, 2013; Faulkner et al., 2014; Glock et al., 2015; Kelly, 2007; Klapproth & Fischer, 2019; Mickelson & Everett, 2008; Oakes, 1994; Oakes & Guiton, 1995; Sneyers et al., 2018; Westphal et al., 2016). Critical race theorists say that evaluating students based off test scores only perpetuates a myth of meritocracy, when in reality, those measures of mathematical proficiency are racially biased and therefore unfair to students of color (Joseph & Cobb, 2019; Larnell, 2019). As teachers at a predominantly Black school, all of my participants agreed that gaps in standardized testing numbers may be the result of an inequitable system and not necessarily indicative of a student’s true mathematical knowledge or fit to be in an Honors mathematics class. Mr. Y put it succinctly:

> The system is built around testing for a certain type of knowledge and that certain type of knowledge is generally speaking White and male. And so unless there's [some other] criteria, we would end up having the same group of students given the opportunity and the same group of students that don't get the opportunity to stay in those same places.

As an alternative to solely looking at numeric measures such as test scores and grades, the teachers in my study group suggested evaluating students holistically and observing additional criteria such as their work ethic/motivation, interest/desire/goals, parents, academic performance, needs, and home life when making the decision. Mentioned in Chapter 2, a previous study by

Bernhardt (2014b, 2018) who looked at how three social studies teachers made recommendations also found that teachers used subjective measures such as “ethic and motivation, level of participation, on-task behavior, and future potential” (p. 78) to decide about course placement. The notable finding in both the Bernhardt (2014b, 2018) and my research study was that none of the teachers offered a concrete way for measuring the criteria listed above. When I asked Mr. S for how he would measure intrinsic motivation this is what he said:

> Um, how would I measure the intrinsic motivation? It's really hard. It's hard to measure that without, other than just speaking to the student, kind of just having a discussion with a student and picking their brain in regard to what they feel their plans are in the future. How they see themselves approaching this [Honors] class or just yeah. To be honest with you, it will be kind of hard to measure without just conversing with the students and ask them questions and seeing what it is in regard to moving forward in that.

The other teachers had similar comments about the only way measure certain holistic criteria is to “get to know the students”. While speaking with a student may seem like a natural approach to gauge a student’s fit for the Honors Algebra I course, this method may not always be reliable for a many reasons cited in the literature review: only students from families with more social capital tend to have knowledge of tracking decisions impacts (Giustinelli & Pavoni, 2017; LeTendre et al., 2003; Useem, 1991); students may prefer to take an easier, lower-track course in order to receive a higher grade (Davis & Jett, 2019a); students in the lower-track courses have a lower self-concept and may not feel worthy of being in an Honors mathematics course (Chmielewski et al., 2013); and teachers may already have implicit biases against students (Faulkner et al., 2014; Glock et al., 2015; Joseph & Cobb, 2019; Larnell, 2019). All of these statements above about looking at a student characteristics from a subjective or holistic

perspective, no matter how good the intention, are linked and may ultimately manifest as racial bias against Black and Brown students because of the historical structures that connect many variables to support to racism permeating all societal functions including mathematics tracking (Davis & Jett, 2019b; Delgado & Stefancic, 2017).

Given the supporting literature and my current research, it may seem like a catch-22 when it comes to making recommendations for students to move from General Algebra I to Honors Algebra I that always ends up with Black and Brown students at the lower level track, because all criteria mentioned above, whether it be numerical values such as test scores or more subjective measures such as motivation or work ethic seem to be tainted with remnants of the United States' history of racial inequities. However, from a CRT perspective, there is an important student criteria that none of the teachers in my study had mentioned in the group's conversation until I prompted a discussion on the hypothetical vignette exchange #3 (see Appendix B). Although my participants had openly mentioned with their colleagues the potential for racial bias in test scores and teacher's subjective opinion on other student criteria, none of them explicitly mentioned using a student's race as one of the criteria for consideration until I opened the discussion to thoughts on the hypothetical vignette exchange #3. It was then that Mr. S suggested implementing something along the lines of affirmative action, where recruitment should be done so the Honors class demographics are reflective of the demographics of the school. My findings about the teachers' initial hesitation to talk about race is similar to Max's (2017) study results where the participants were openly thinking about equity issues, yet "no participant mentioned race, gender, or socio-economic status as a consideration in their responses" (p. 293). To respond to Stinson's (2017) question "do we have the will?" (p. 910) to discuss race, racism, and White supremacy in mathematics education equity research, I would

respond that it will take intentional training and professional development, to be discussed later in the implications section of this paper.

A final noteworthy observation in response my first research question surrounds the influence of administrator's criteria over the teachers' criteria for assessing student's fit for Honors courses. While the teachers' overall consensus was that test scores are not holistically representative of students' abilities, today's high-stakes testing culture puts a large emphasis on the worth of a student's standardized test score (Popham, 2010). In fact, according to the administrator, Dr. Lee, who is over the mathematics department at KHS, test scores on the end-of-course exam are the main way that students are evaluated for the Honors Algebra I class. She cites that "the way that makes the most sense would be, of course, use the numbers as far as data", which critical race theorists would claim is perpetuating the myth of meritocracy in schools. Though they were not too clear on the exact school policy of how students are chosen for Honors Algebra I, all six teachers correctly had an inkling that test scores played a large role in the final decision. Ms. A even stated that she had gotten pushback on one of her student recommendations for Honors Algebra I because the student had not met the minimum standardized test score mark. That being said, it appears that even though the teachers feel that test scores are not an accurate representation of a student's mathematical abilities, they are still used as one of the main criteria for making recommendations because of the influence that high stakes testing has on the culture of the school. It seems that the teachers would turn to other subjective measures to justify if a student was near, but not quite at, the minimum standardized test score range. Mr. Y spoke about this distinction during the group conversation:

> I think we're focused on a lot of the student body in general. I was thinking . . . like the margin of 80 percent on a EOC [end-of-course] exam. Like, does that really mean that

> you're 20% away from an Honors class or are you pretty much already there? . . . I don't know. But I think that - my thought is that we're talking too much about all students. And maybe it's really those students in the margins.

Here, Mr. Y implies that rather than focusing on evaluating all students for recommendation for Honors Algebra I, perhaps the teachers should only be focusing on the consideration of a small group of students who are in a margin of a certain percentile on the end-of-course (EOC) exam. However, this statement is contradictory to previous statements about avoiding test scores as a criteria due to racial bias because if only a small margin of students who are near a certain EOC cut-off score are considered for recommendation into Honors, then the students who are ultimately moved into Honors are chosen from an inherently biased group. It is clear that despite teachers proposing that test scores should not be the *sole* measure by which to evaluate students for Honors Algebra I, the test score criteria used by administrators heavily influence mathematics track placement, and in reality, is one of the primary ways students are filtered for consideration.

In summary, there are many key points from the data that responded to the first research question: “What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?”. Most of the relevant data was grouped into Theme 1: “I don’t think that test scores are representative of the whole child”. Similar to previous research, the teachers in my study used a plethora of subjective criteria such as motivation, work ethic, interest, parent request, and home life when deciding which students to recommend from General Algebra I to Honors Algebra I. Interestingly, even though all the teachers stated that test scores should not be the main criteria due to racial biases which are present in standardized testing, given administrator input and high-stakes testing culture, it appears that the test scores are still used as *one of the first* criteria for filtering students before

turning to those aforementioned subjective measures to differentiate into final recommendations. An even more interesting observation in the group discussion was that even though the teachers were worried about the current racial divisions of mathematics tracking at KHS, there was no spontaneous mention of using race as a criteria for consideration when recommending students into the Honors Algebra I class. The discussions about race came after a prompt by the researcher to discuss the hypothetical vignettes, and then Mr. S brought up an idea about using affirmative action in high schools to ensure that the Honors class demographics reflected the school demographics. This initiated a group discussion on deeper issues such as the equity of the current tracking system, which I will discuss in the next section.

Conceptualizations of Equity

To discuss my second research question, "How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?", I provide context of my teachers' own K-12 tracking experiences alongside their observations at KHS and how it corresponds with the literature on mathematics tracking. Then I will discuss my teachers' conceptualizations of equity in mathematics track recommendations by speaking on the data from Theme 2: "Why is Honors something that seems like so few people have access to?"; Theme 3: "Teachers are vulnerable to bias and a subjective perspective"; and Theme 4: "The Honors classes should reflect the population of the school". Concurrently, I compare my findings to the literature in preparation for providing discussion on the implications of my research.

As referenced in Chapter 2, the tracking literature is clear that mathematics tracks reproduce social inequities and this has been a topic in the scholarly community for well over 30 years (Ansalone, 2009; Bowles & Gintis, 1976; Darling-Hammond, 2013; Davis & Jett, 2019a; Gamoran, 1987; Oakes, 1982, 2005). When it comes to the K-12 experience of my six Algebra I

teachers and their observations at Kingston High School (KHS), the lack of equity between the students in the lower-level mathematics tracks and the higher-level mathematics tracks is quite obvious. All of my six participants attended public schools in their K-12 schooling, and those who came from schools with diverse racial demographics agreed that the racial difference between the Honors mathematics courses and the General mathematics courses was noticeably inequitable. Mr. Y, a White male, reflected on his past experience in the Honors track, "I was in a pretty diverse school, but geez, I don't know any Black men who were in my classes." On that same note, Mr. S and Ms. R, who both identify as Black, commented that they were often one of a few Black students in the advanced mathematics courses. In fact, all of my teacher participants, with the exception of Mr. N who grew up in another country, noted that their own K-12 tracking experience included being in a honors mathematics course where the number of White students grossly outnumbered the students of color.

The racial inequities of mathematics tracking, to no surprise, also manifest at KHS with disproportionately more White students in the honors courses, and disproportionately more Black and Hispanic students in the lower math tracks. My participants were quick to comment on the stark differences between the tracks at KHS. Ms. R said, "I just see this a lot at our school. You know, it's like one side and then there's a whole other side". It was the discussion on the teachers' earlier personal experiences as students alongside their later experiences as teachers that informed Theme 4: "The Honors classes should reflect the population of the school". As mentioned in the previous section, Mr. S brought up the idea that high schools should implement affirmative action like in universities in order to maintain a racially diverse group in the Honors mathematics course that is similar to the demographics of the school. When asked about this idea and whether race should be considered in making tracking decisions, the majority of the teachers

agreed that race should be a student criteria for consideration. As shown in the past research, affirmative action has worked to increase diversity in schools (Davis & Jett, 2019b; Delgado & Stefancic, 2017; Hu-DeHart, 2004), and supports the CRT idea that in order to push for true equity in education, there must be policies in place that center race. Bell (1980) speaks on one issue with affirmative action related to interest convergence, highlighting that White individuals will not want to surrender their privileges (in the case of tracking, access to higher level mathematics courses) to Black individuals. However, after a discussion with Dr. Lee at KHS, I found that there is no limit to the number of students who can be in honors courses. Nevertheless, this "scarcity mindset" about seats in the Honors mathematics classes is a phenomenon I found from this research that affects how many of the teacher make recommendations, which I discuss in the following paragraph.

Unlike spaces for college enrollment, at KHS, there is not a limit on "seats" in an Honors class. Dr. Lee, the administrator at KHS, clarified that the number of Honors Algebra I class sections is not capped, but rather directly dependent on how many students enroll in the course. In this section I discuss my participants' conceptualizations of equity in relation to Theme 2: "Why is Honors something that seems like so few people have access to?" Critical race theorists in mathematics education say that the very rules and structures organizing school mathematics today are a tool for maintaining White supremacy so that mathematics remains a privileged subject reserved only for White individuals (Bullock, 2019). For this research, these rules and structures refer to the very nature of tracking (separating students by ability), supporting a myth of meritocracy by using test scores as ways to measure student's fit for Honors math, and generating the façade that Honors classes are spaces that only some students deserve entry into. The teachers in my study spoke about this by referencing a "scarcity model or mindset" that

teachers have when it comes to making recommendations for students from General Algebra I to Honors Algebra I. As Ms. A said, “I do think a lot of teachers operate from a scarcity mindset when it comes to honors and gifted recommendations, just because I think those courses have a connotation of exclusivity.” To many of my participants’ surprise, when I told them Dr. Lee had said there is no limit to the number of students who can enroll in the Honors Algebra I course, many of them had a shift in mindset. After hearing that a seat in the Honors class is not a limited resource, Mr. N had a different response to the hypothetical vignette survey: “Well, yes, rather than try to restrict it to promote just one of [the students]. You know, I'm- all three - I would go out and promote all three.” Ms. R also brought up the opportunity gap (Ladson-Billings, 2013) that many students of color face, and she asked: “How will the students know what they like or what they are capable of if they aren't exposed?” It was clear from the data in Theme 2 that the teachers view equity in mathematics tracking as allowing all students the opportunity, chance, or access to the Honors Algebra I class instead of making it a restricted space.

To help provide more students the opportunity to access Honors mathematics classes, teacher recommendations are known to influence student placement into either low or high mathematics tracks (Bernhardt, 2014a; Hallinan, 1996; Lucas, 1999; McFarland, 2006; Oakes, 1992). However, due to the known risk of teacher recommendation bias involving anti-Blackness (Faulkner et al., 2014; Joseph & Cobb. 2019; Larnell, 2019), many of my teacher participants suggested that to make the mathematics course recommendations more equitable, they should be made based on a panel of individuals rather than just one teacher’s opinion as it currently is. Most importantly, my teachers wanted to speak directly with or involve the opinion of the receiving Honors Algebra I teacher. Similar to findings by Bernhardt’s (2014b, 2018) study on three social studies teachers, the lower-track teachers did not consult with high-track teachers on

the student criteria needed for success. Moreover, the teachers in this research study admitted to now knowing exactly how the Honors course differed from the General Algebra I course. The lack of communication and transparency between the tracks implicates another area for improving equity for students transitioning to higher tracks in the future so they are set up for success on both ends. Mr. N reflects on experiences from the past:

> One of the complaint[s] I hear from teachers who teach Honors . . . is the kids that that is being recommended for Honors - They are not true Honors kids and it makes it extremely difficult. Maybe we, you know, teachers who are recommending- probably not doing [a] just service either.

Mr. N's comment about "not doing [a] just service" for the kids that are recommended without the proper communication with the Honors Algebra I teacher represents another way that the teachers are conceptualizing equity in mathematics track recommendations. Blindly pushing a student to Honors without ensuring they have the prerequisite knowledge or a supporting receiving teacher willing to mentor them in the transition is not fair for students either.

In summary, there many key findings from Themes 2, 3, and 4 data that responded to the second research question: "How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?" First, it was important to note that the participants themselves had experienced the racial segregation of mathematics tracking in their K-12 experience as a student and also afterwards as a high school teacher. This is not surprising since tracking, particularly how it perpetuates societal inequities, has been a topic in the scholarly community for over 30 years (Ansalone, 2009; Bowles & Gintis, 1976; Darling-Hammond, 2013; Davis & Jett, 2019a; Gamoran, 1987; Oakes, 1982, 2005). Given personal experience and professional observation of the racial inequities between the

mathematics tracks, the teachers conceptualized equity as occurring when the Honors demographics matched the student demographics of the school, rather than appearing majority White. To accomplish this, one teacher suggested using affirmative action to recruit more students of color into the Honors track classes, and other teachers agreed that race should be considered an important criteria when making track recommendations. Additionally, to ensure more students of color are recommended into the Honors Algebra I class, the teachers suggested getting rid of a "scarcity mindset" when it comes to Honors seats, and also using a panel of individuals, including the Honors Algebra teacher, when discussing student recommendations. Next, I discuss two other noteworthy observations from the findings and finally will conclude with a summary of the discussion on both the research questions.

Discussing Race in Schools: The Significance of a Tiered Approach to Conversation

As mentioned in Chapter 4, the tiered approach to the data collection with the participants (first hypothetical vignette survey, then group discussion, and finally individual follow-up interviews) aided in the growing discussion of race in schools, particularly as it pertains to mathematics tracking. This observation is significant because it speaks to how this type of study design proved helpful in gathering rich data on topics of race and racism, something that the participants had limited experience within prior workplace meetings. In this section, I discuss how although the progression of race discussion over time was not directly related to my two research questions, it is a noteworthy emerging finding related to study design that provides the impetus for future CRT-grounded research studies.

The first data collection tool used in this study was a digital survey filled with three hypothetical vignettes involving teacher exchanges regarding mathematics tracking. Each participant was asked to individually fill out the survey prior to attending a group discussion.

Leading with the hypothetical vignette survey was intentional because this research was grounded in Critical Race Theory, and hypothetical vignettes are known to help ease participant comfort when discussing potentially sensitive issues such as race and racism (Finch, 1987; Skilling & Stylianides, 2019; Taylor, 2006). Hypothetical vignettes are also a good tool to start off the data collection because participants may find the fictitious scenarios enjoyable to respond to (Schoenberg & Ravdal, 2000). I found this to be true as evidenced by Mr. N and Ms. R calling me during after-school hours to proclaim how excited they were that I was conducting this research.

Another benefit to starting this mathematics tracking research with the hypothetical vignettes was that it gave me, as the researcher, an enriching way to facilitate the group discussion, which took place after all the participants had finished the survey. Given that my theoretical framework is grounded in CRT, one of my goals in this research was to ease the conversations on teacher recommendations in mathematics tracking from a generic level to one that explicitly moves into the realm of race and racism. As Jett (2019) said, if we as mathematics researchers are "to move beyond the lip service espoused in much of the social justice rhetoric, then we must engage in a systematic and more sophisticated treatment of race and racism" (p. 176). Therefore, similar to the tiered approached of data collection (first hypothetical vignette survey, then group discussion, and finally individual follow-up interviews), the hypothetical vignette survey also systematically had three "levels" of scenarios, increasing from a generic conversation about test scores and culminating with one of the fictitious teacher's frustration in systemic racism in tracking. Giving the research participants time to respond to the hypothetical vignettes before the group discussion was beneficial in the facilitation of a natural flow in the conversation, and by the end of the discussion, the teachers appeared to be more comfortable

bringing up issues of race along with their opinions on how it relates to mathematics tracking recommendations.

Finally, the last portion of the data collection with the participants involved individual follow-up interviews. By this point, the participants had already responded to the hypothetical vignette survey, discussed ideas such as affirmative action policies in the group discussion with their colleagues, and were now sitting one-on-one with me, the researcher, to go into individual detail on select topics. The conversations I had with the participants in the individual interviews were rich with discussions on their own racialized tracking experiences, thoughts on whether race should be used as a criteria for making tracking recommendations, and perspectives on equity from their experiences as a teacher. These discussions flowed naturally from the first two tiers of data collection (the hypothetical vignettes and the group discussion), and the participants seemed to exhibit a growing comfort with discussing race in a mathematics education setting.

Overall, my observation on the tiered study design, which used three levels of participant data, was that it served very well in facilitating race discussions in a team of Algebra I teacher colleagues who had otherwise never spoken in this capacity before. Using hypothetical vignettes as a starting point of conversation, transitioning into a group discussion facilitated by the vignettes, and then finally ending with individual interviews on topics from the previous two data collection sessions proved to be a good way to increase participant comfort in discussing topics such as race and equity in mathematics tracking decisions. Another key variable that aided in the richness of this study was the researcher and colleague relationship I had with my research participants. This critical relationship cannot be ignored, and I will discuss how researching from within my own school setting was a significant factor in obtaining valuable data for my research questions.

Researching from Within: The Significance of the Researcher-Colleague

In addition to using the hypothetical vignettes and a tiered approach to race discussions in this research study, I attribute a good portion of the richness of the conversation to the rapport I had already established with my colleagues prior to beginning the research. Researching from within, or insider research, is defined as research that takes place inside one's institution or organization (Brannick & Coghlan, 2007). I chose to conduct this case study at Kingston High School (KHS) not only because of the mathematics tracking structures and phenomenon, but also because of my personal and professional interests in the students and my colleagues. While I am not currently an Algebra I teacher at KHS, I had worked with the participants in this study as an Algebra I teacher colleague in a couple years prior. Serving as the researcher in this study, while also sharing a contextual pre-understandings and experience with the participants, was an added benefit to the research design and for obtaining rich data (Brannick & Coghlan, 2007; Fleming, 2018).

Researching within one's own institution also lends itself to challenges surrounding researcher bias (Fleming, 2018). However, as detailed in Chapter 3, I did my best to practice epoché (Hamill & Sinclair, 2010; Husserl, 1960), or bracket my own opinions and assumptions, in order to support meaningful dialogue and uncovering of the reality of my participants. The questioning I used in the interviews were supported by the participants' responses to the vignettes and also topics brought up by group's discussion. Additionally, as supported by techniques mentioned in Fleming (2018) and Flodén (2019), I made sure my participants knew that participation in the study was voluntary, and I continued to check along each step of the data collection that my interpretations of their words were as they intended for the meaning to be. Ultimately, my position as the researcher with a good relationship to my participants gave me the

unique ability to dig deep and allow them to open up comfortably in the discussions (Brannick & Coghlan, 2007; Fleming, 2018; Flodén, 2019). Given our common experience, the participants could see that the research was mutually beneficial to us all, and therefore, the depth and honesty of our conversations was only possible given my position as their former teammate. Later, I will discuss the implications for this as it pertains to the realm of teacher retention.

Summary of the Discussion

The goal of this study was to investigate the following research questions:

1) What criteria do 9th grade mathematics teachers use when recommending General Algebra I students upwards to the Honors Algebra I track?
2) How do General Algebra I teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school?

There were important findings for both questions supported with rich data from the hypothetical vignette survey, the group discussion, supplemental administrator interview, and individual teacher follow-up interviews. The group conversation started off fairly basic, beginning with the findings grouped in Theme 1: “I don’t think that test scores are representative of the whole child”, which answered the first research question. Overall the teachers felt that test scores should not be the only factor in deciding if a student should be recommended for Honors, but rather students should be evaluated holistically on numerous other subjective criteria that a teacher would only come to know from “getting to know” the student. Interestingly, even though the teachers wanted to avoid the racial biases present in utilizing test scores as a measure of a student’s ability, none of them suggested considering race as a criteria when making recommendations. In fact, many of the teachers implied that test scores and grades actually do play an initial role in the filtering system of which students to ultimately consider for Honors.

They cite that test scores are used as an initial filtering system because of what the administration looks for and what the school values in a high-stakes test course such as Algebra I.

Following a prompt from the researcher to discuss their thoughts on hypothetical vignette #3, which featured a fictitious pair of teachers infuriated by the racist tracking system, the group discussion took a deeper turn into conversations on equity that served to provide answers to the second research question. The teachers conceptualized equity in mathematics tracking at their high school in the following ways: 1) All students should be given opportunity and access into the Honors class 2) General Algebra I teachers should communicate with a panel of individuals, including the receiving Honors Algebra I teacher to set students up for success in moving up to the higher mathematics track, and 3) The racial demographics of the Honors class should reflect the diversity of the school's student body. These discussion support equity ideas in CRT such as affirmative action, centering race and racism, closing opportunity gaps, and building advocacy for all students (Delgado & Stefancic, 2017).

In discussing how the findings supported my two research questions along with other noteworthy observations on study design and researcher-participant relationships, I uncovered implications for how this research may be used to support current teachers, school and district leaders/administration, and future teachers. Additionally, there are areas that provide space for future research in teacher recommendations in mathematics tracking. All of these topics will be addressed in the next few sections.

Implications

The implications of my research can be categorized as significant for three key groups: current teachers, school or district leadership, and teacher education programs. The first group, current teachers, refers to the teachers at my study site and also any current teachers who may be

in a similar school setting or teaching position. The second group, school or district leadership, describes any school or district leaders in charge of mathematics tracking policies or anything, such as teacher professional development, that may impact mathematics tracking. The last group, teacher preparation programs, is related to future teachers or pre-service teachers enrolled in a teacher preparation program. In these next sections, I discuss how my findings from the study offer valuable insight for these three key groups and I also suggest opportunities for future research. I believe it is important for these various stakeholders to understand their role in improving the equity of mathematics tracking and the teacher recommendation process for historically marginalized students.

Current Teachers

When reflecting on the findings from this study, there was the most direct impact for the six Algebra I team members who participated in the research. However, I hope that other current teachers who may work in a similar team environment and with a similar school tracking system may read this research also reflect on their own decision-making criteria or processes when making recommendations for mathematics tracking. Overall the most powerful and direct implication of this research was that it encouraged the six teacher participants to come together as a team and engage in an initial reflection and discussion of their practices or belief systems. Next, I use ideas from CRT along with the participants' revelatory comments throughout the study to affirm the transformational value of this research and provide implications into how future research may progress.

The first implication from this research is that when asked to make recommendations for students to move from a lower mathematics track to a higher one, teachers should engage in critical reflection of their recommendation criteria to ensure they are looking beyond implicit

racial biases or simply just test scores (Faulkner et al., 2014; Glock et al., 2015). Critical race theorists would call for an intentional centering of race and racism in mathematics education and a debunking of the myth of meritocracy (Davis & Jett, 2019b; Delgado & Stefancic, 2017). I found out from this study that many of the team members had never thought about their previous decision-making in such depth before and therefore emerged from the study with a new lens on making equitable recommendations. Mr. N, who had grown up as a student in Jamaica, reflected on his transformation: "This research has forced me to look back at the overall student because in the past, I just recommend based on the standardized test score. Because of this research, it forced me to think in the future to look at the whole student." Future research may look at how teachers transform through a series of reflective assignments at various timestamps throughout the school year, including the time period at the end of the school year when recommendations are normally written.

Another implication that emerged from this research is the value of utilizing regularly scheduled team meetings to discuss mathematics course recommendations in collaboration with colleagues. Previous research noted in Chapter 2 found that teachers usually act autonomously and independently when making recommendations (Bernhardt, 2014b, 2018), and the same was true of the Algebra I teachers at KHS. "It's not like we sit down as a cadre [team] and look at all the kids and their data and then talk about it and defend the decision to send them [to Honors] or not send them. [The decision is] made by one person," Ms. A reported when sharing her thoughts on the hypothetical vignettes. Mr. S followed up with, "I feel like it should be more of a, like a collaborative effort of deciding if it's going to be best for each child." The teachers then made two suggestion which I will describe next: 1) that teachers truly need to evaluate each student 2)

the recommendations should be made based of a panel of key individuals, rather than just one teacher.

One regret that a couple of the teachers in the study had was not making enough or any recommendations in the past. A key topic of conversation that emerged from the discussion was the large "opportunity gap" (Ladson-Billings, 2013) in advanced mathematics course access between Black and Brown students and their White peers. All the teachers agreed that recommending a student to Honors Algebra I was giving them access and exposure that they may have never had before. None of the teachers regretted ever moving a student up to a higher track, but rather only regretted not pushing some students in the past. "I would always be more likely to regret not recommending a student than recommending a student", said Ms. A. Some students may had also inadvertently been overlooked for consideration because of extremely low test scores which unfortunately play a large role of evaluating students in today's high stakes testing culture (Joseph & Cobb, 2019; Popham, 2010). Another teacher, Mr. Y, who is currently now in his second year of teaching, reflected on his experience last year when he was not even aware he had the power to make recommendations: "I didn't know that I could have made recommendations." This shows that just like students and families may not know how tracking decisions impact future academic trajectory (Giustinelli & Pavoni, 2017; LeTendre et al., 2003; Useem, 1991), some teachers may not know about their role in tracking decisions either, leaving implications for future training and professional development which I will speak on in a later section.

Another suggestion that the teachers in my study had was to include a panel discussion of individuals in the decision-making team for recommending students from General Algebra I to Honors Algebra I. Specifically, all of my participants (all General Algebra I teachers) noted that

they have never had a conversation with the Honors Algebra I teacher about the requirements or pre-requisites for students entering the Honors level class. This is a similar finding to Bernhardt's (2014b, 2014a) study on social studies teachers that found that teachers were making recommendations blindly without understanding the pre-requisite for the course they were recommending students into. Current teachers should consider speaking with their colleagues who teach the higher-level mathematics tracks about the differences or pre-requisites needed to be successful in the course so that the students they are recommending are set up to enter Honors Algebra I with a solid foundation.

Finally, all of the implications above for current teachers would be more easily implemented with the help of supportive administration or other school leadership. From providing professional development to train teachers on making equitable recommendations, to allowing departmental meeting time devoted to team discussions on tracking, to encouraging cross-course conversation between the low-track and high-track teachers, to conversing with more transparency to teachers on school politics, to revamping school or district policy or handbooks on mathematics tracking assignment, there is a lot that can be done by administration to aid teachers and help create a more equitable mathematics educational experience for all students. Current teachers can do a lot of internal work and critical reflection on their own recommendations for students, but the influence would be greater with institutional change. Next, I speak on the implications for my research at the school or district leadership level.

School and District Leadership

This research may initially have direct implications for current teachers of high school mathematics students, but the power of the findings will be exponentially greater when extended to the next level, school and district leadership. My supplemental interview with the school

administrator, Dr. Lee, revealed some areas where change should occur to help promote greater mathematics educational equity, especially for Black and Brown students, in the realm of mathematics tracking. In this section, I speak on the implications of my research for the following areas influenced by school and district leadership: 1) Professional development 2) Intra-departmental meetings 3) School policy and 4) Teacher training.

The first implication for school and district leaders is in the area of professional development, both at the school and district levels. In Larnell et al.'s (2016) piece, they speak about rethinking teaching and learning mathematics for social justice (TLMSJ) from a critical race theory (CRT) perspective. One of CRT's main aims is the critique of liberalism, which is critiquing the view that the law should enforce equal treatment in order to maximize social justice for all people (Delgado & Stefancic, 2017). The issue with liberalism is that it minimizes issues of race in an attempt to treat everyone equally (Delgado & Stefancic, 2017; Larnell et al., 2016), and as we have seen in the literature and with this research, rather than ignore race, it needs to be placed at the forefront of decision-making for equity considerations. School and district level personnel should utilize funds to provide professional development centered on TLMSJ from a CRT perspective. This will help teachers understand the historical ramifications of race and racism in the United States, and how any decisions with the goal of improving educational equity need to center student race rather than ignore it (Anderson, 2019; Davis & Jett, 2019b; Jett, 2019; Larnell et al., 2016). Additionally, by focusing professional developments with a CRT lens, it will help teachers become more comfortable talking about issues of race in schools with each other.

As I saw from my research, having my six General Algebra I teacher participants sit down and discuss the hypothetical vignettes and their opinions on mathematics tracking was the

first time that this team had come together to discuss matters involving school equity, race, and racism. School or departmental leadership could help facilitate these discussions by holding intra-departmental meetings, meaning meetings where mathematics teachers of different courses come together- for instance, the General Algebra I teachers and the Honors Algebra I teachers. Currently at KHS, the groups of teachers mostly meet separately to discuss the distinct curriculum and pacing for each course, but I posit that these meetings would be more effective for the entire student body if the teachers from high and low tracks met with each other. As witnessed in previous research (Bernhardt, 2014b, 2018) and my own, low track teachers are making recommendations for students to move to the upper track without understanding what the upper track mathematics course entails. Similarly, it would help if school leaders allocated some team meeting times for discussion of tracking and recommendations. From my research and the literature, the hypothetical vignettes proved to be an effective and enjoyable tool to facilitate these conversations (Schoenberg & Ravdal, 2000).

The next implication for school and district leaders involves school policies on tracking. The teachers in my study were unclear on school tracking policies or how students get allocated into General Algebra I or Honors Algebra I. Dr. Lee, the administrator, confirmed for me that scoring a “proficient” or “distinguished” on the state standardized test, the Georgia Milestone, is one of the primary way students are evaluated for the Honors mathematics track. Given that standardized test score measurements of mathematical proficiency are racially biased (Larnell, 2019), and that any gaps in standardized testing numbers are the result of an inequitable system and not indicative of a student’s true knowledge or worth (Joseph & Cobb, 2019), it is therefore unfair to students of color if used as the sole or part of the criteria to judge an honors-worthy student. School and district leadership need to re-examine school tracking policies and re-

evaluate the equity impacts of using test scores and grades as “meritocratic” measures of student ability. In fact, a very recent turn of events, on December 21, 2020, the Georgia Department of Education voted to approve State School Superintendent Richard Woods' recommendation of a for the Georgia Milestones End-of-Course (EOC) exams to count as .01% of a student’s final course grade weight for the 2020-21 school year (The Georgia Department of Education, 2020). This is a significant decrease from the previous 20% course grade weight. While this decision to decrease the weight of the EOC exam from 20% to .01% came in light of the added stress from the 2020 COVID-19 pandemic, this new change may represent the beginning of a shift away from such a heavy focus on standardized test scores. Without a focus on standardized test scores, schools may turn to other measures for assigning students to mathematics tracks, or may even begin discussion de-tracking altogether (Domina et al., 2019; Watanabe, 2006). Another alternative is to begin implementing an affirmative action policy, as suggested by critical race theorists, as well as the teachers in this study, to ensure that there is equitable representation of all students in the tracks.

A final important implication for school and district leaders that emerged from my research findings centers around intentional teacher training on making equitable recommendations for students to move from the General Algebra I track to the Honors Algebra I track. To date at KHS, there has not been any official training regarding teacher recommendations, and one of the teachers in my study even cited that he did not know he had the power to make recommendations in his first year as a teacher. This type of training would promote the much needed transparency between administration, school policy, and teachers that is currently lacking (Bernhardt, 2014b, 2018; Buckley, 2010; LeTendre et al., 2003; Watanabe, 2006). This training should include principles of CRT, open discussion on the various

mathematical trajectories in the school and their impacts on post-secondary life, how to speak with students and their parents on course options, and agreement on equitable ways to make recommendations, and a vow to consider each student in the General Algebra I course rather than filtering the top students based on test scores or grades. Training should also be given to the teachers to look beyond other commonly racially biased subjective measures such as student behavior (Carter et al., 2008). While this training could happen at a mathematics department meeting near the beginning of the school year, ideally, this type of training should occur well before teachers enter the workforce, in pre-service teacher training programs. The implications for teacher training programs are described in detail next.

Teacher Education Programs

The effects of racial inequities are not just evident in impacts of mathematics tracking and inside classrooms, but also widespread across teacher education programs across the U.S. These teacher preparation programs are facing challenges in adequately preparing teachers for working with diverse children and recruiting and retaining teachers of color (Brown, 2014; Cook, 2015; Ladson-Billings, 1999). In this section, I offer suggestions for improving equity on teacher recommendations and mathematics tracking by leveraging the power of a teacher education program centered on the tenets of CRT. I speak on preparing teachers with the knowledge of CRT in mathematics education and their role in dismantling White hegemony culture, recruiting a more diverse teaching workforce to work with an increasingly diverse student body, and leveraging the power of the narrative by bringing in current teachers and students to tell their stories to future teachers in the teacher education programs.

Previous literature shows that preservice mathematics teachers are thinking about and concerned with issues of equity and providing equitable mathematics environments, yet are

failing to bring up race as a point of discussion in equity-related conversations (Max, 2017). I found this to be true with my research on teacher recommendations and mathematics tracking as well: the teachers discussed how using standardized test scores as a criteria for recommendation to Honors Algebra I is inequitable because test scores are racially biased, yet none of the teachers brought up considering student race as a criteria that they use in making recommendations. The conversation took a turn to focus on race when I, the researcher, asked the participants to comment on their thoughts of the hypothetical vignette responses (one of which involved a fictitious exchange between two teachers discussing race). Using a CRT framework in teacher education programs "allows room for a more robust analysis of the social, cultural and historical practice of race and racism in schools and classrooms and more importantly, the students in those schools and classrooms" (Cook, 2015, p. 234). Adopting a CRT lens will help teachers be more prepared to challenge the traditional notion that Honors mathematics courses are a White institutional space by offering recommendation and course assignments remedies that center race, avoid colorblindness, and dismantle the myth of a meritocracy in schools (Cook, 2015; Delgado & Stefancic, 2017).

The second way that teacher education programs can help improve equity outcomes on teacher recommendations and mathematics tracking is by recruiting and retaining more teachers of color into the programs (Davis & Jett, 2019a), particularly Black teachers for a school like Kingston High School that is pre-dominantly Black. Research shows that Black teachers often have higher perceptions of their student ability and higher expectations for their Black students than non-Black teachers (Gershenson et al., 2016). Unfortunately, Black mathematics teachers, similar to Black students, have been historically limited by a false perception of their mathematical ability as well (Frank, 2019). Teacher education creates inequitable gatekeeping

practices through the use of standardized entrance exams into programs, discriminatory hiring practices in schools, and unwelcoming or culturally insensitive experience in mathematics departments (Cook, 2015; Frank, 2019; Joseph & Cobb, 2019). Pre-dominantly Black schools like KHS would benefit from having more teachers of color, especially Black mathematics teachers. CRT calls for an intentional re-examination of the currently White dominated teaching force, and asks that teacher preparation programs to transform gatekeeping practices, better support Black teachers in the field, and honor culturally relevant work that Black teachers bring to the field of mathematics education (Frank, 2019).

In addition to recruiting more Black teachers and other teachers of color into the workforce, teacher education programs should utilize current teachers and their mathematics students as guest speakers to provide first-hand insight to preservice teachers. CRT emphasizes the power of the narrative and story-telling from teachers and students of color to emphasize from personal experience how those experiences either confirm or counter traditional narratives (Delgado & Stefancic, 2017; Jett, 2019; Ladson-Billings, 1999; Solórzano & Yosso, 2002). In reference to my research on teacher recommendations and mathematics tracking in a diverse, urban high school, I posit that it would be greatly beneficial for preservice teachers to hear from current teachers and students of color that experienced a shift in their educational trajectory due to moving from a lower to a higher-level mathematics track. Seeing a real-life success story and the power of having a teacher recognize great mathematical potential in a student may be just what a future teacher needs to see in order to take their future positions in schools with a heightened sense of equity and responsibility.

In summary, CRT is a valuable tool for examining race and issues in educational equity in qualitative research (Parker & Lynn, 2002). Teacher education programs would benefit from a

CRT-centered curriculum, especially in the application of training future mathematics teachers on evaluating students for track placements. Also, teacher education programs may adopt some of the same measures as revised tracking policies by re-evaluating gatekeeping measures such as standardized test scores that keep otherwise overlooked teachers of color from the teaching profession (Joseph & Cobb, 2019). Just as schools should avoid and critique a colorblind approach to mathematics tracking, so should teacher preparation programs when recruiting the brilliant teachers of the future. From current teachers, to school and district leadership, to teacher preparation programs – all play a critical role in ensuring more equity in mathematics tracking for future generations. Next, I speak on areas where future research may explore.

Future Research

This research was critical in understanding the criteria that a team of General Algebra I teachers use to recommend students into the Honors Algebra I course, and also in understanding how these teachers conceptualize equity in mathematics track recommendations. Future research could benefit from a longitudinal study design to see how the conversations on race and equity in track recommendations evolve over the course of a school year. This study was conducted in the fall semester, whereas most recommendations occur during the spring semester, so it would be beneficial to see how the team conversations affect the actual course recommendations. Additionally, the longer study duration could allow for more time to involve the Honors Algebra I teachers or administrators into the meetings and conversations with the General Algebra I teachers. This would enhance the depth of the dialogue and also alleviate some of the confusion and lack of transparency between course prerequisites and also school policies on tracking.

One of the greatest successes in this research was the transformational component for the six General Algebra I teacher participants and myself as a new researcher who had never before

come together to discuss teacher recommendations and the implications for mathematics tracking with a lens of race and racism through CRT. While I did not engage as a participant in the group conversation, conducting this research gave me the window to reflect on my own values regarding educational equity and actions in making teacher recommendations. This study gave me insight for future studies. For instance, while the topic was not introduced in this research, it may be worthwhile for future research to open the dialogue into realm of de-tracking schools completely, similar to the conversations held in the inquiry groups by Watanabe's (2006). All the teachers in my study felt that tracking in schools is necessary to help differentiate students who may have different mathematical goals, but this claim of the "necessity of tracking" is somewhat contradictory to the observation that tracking has perpetuated clear racial separation of students in schools. Given that CRT rejects traditional civil rights discourse of incrementalism and slow, step-by-step change (Delgado & Stefancic, 2017), perhaps future research in schools like KHS should pose a complete overhaul of an outdated system, and offer de-tracking as an option in a hypothetical vignette, requiring teachers to unpack their perspectives on the need for separating students by ability and intelligence.

Finally, given that tracking is contextual and dependent on the school or even academic department level (Bernhardt, 2014a; Cogan et al., 2001; Kelly, 2007; LeTendre et al., 2003; McFarland, 2006), future research may apply this study design with CRT framework, hypothetical vignettes, and group discussion to schools in various contexts across the U.S. It would be interesting to see the findings of the same research questions applied to schools with different student and teacher populations than KHS. I can only hope that the impact will be as transformational for those teachers as they were for my group. Next, I conclude with my final thoughts from this research experience.

Final Thoughts

As I reflect on this research and experience conducting this study, I am reminded that mathematics tracking has shaped many of our life trajectories, especially those of us educators who end up becoming mathematics teachers. It is not surprising that my research participants, six successful and passionate Algebra I teachers, had grown up experiencing mathematics in the Honors classrooms. As their colleague, I too from very early on in elementary school when I was recommended by a teacher for entry into a gifted academic program, experienced advanced mathematics courses on an academic trajectory that propelled me to where I am today. However, I cannot help but acknowledge the racialized experiences that come with our mathematically privileged pasts. While I, as an Asian American, and the two White teachers along with one Multi-Racial (Asian and White), had experienced being in a mathematics classroom with the majority of our peers that looking like us and sharing similar cultures, it was a different experience for the other teachers. For the Black American teachers in my study, their Honors mathematics track experience also came with feelings of isolation and being one of only a few Black students in their advanced mathematics classes.

Now fast forward decades later, and all of us teachers are *still* seeing the very same phenomenon of disproportionately fewer Black and Brown students in the Honors level mathematics classes at Kingston High School. It is a vicious cycle that history repeats itself, that deceptively promising events and movements such as Brown v. Board of Education or No Child Left Behind continue to perpetuate a society where mathematic education remains a White institutional space. If this pattern continues, the U.S. will continue to have an educational system, and therefore, entire societal power structures that are racially segregated. To put an end to this system violence against Black and Brown students, I challenge current teachers, as I have done

in this study, to come together and reflect on their belief systems about student's ability and intelligence. I view teachers as critical agents in a student's life, and that if there is an opportunity to help shift a student's future from dead-end to a future full of potential, then it is imperative they seize that opportunity. In this research I focused on the power that a 9th grade Algebra I teacher has in making recommendations for a student to move to the higher mathematics track. I challenge teachers to stop viewing mathematics a politically neutral subject, to challenge claims of a meritocracy in tracking, and most importantly, to center and value student's race in all academic decisions.

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Appendix A: Teacher Consent Form

Georgia State University
Department of Middle and Secondary Education
Informed Consent

Title: Is Race a Criteria?: A Case Study on Algebra I Teachers' Conceptualizations of Equity in Track Recommendations
Principal Investigator: Dr. Pier A. Junor Clarke
Student Principal Investigator: Pam Liu

Introduction and Key Information
You are invited to participate in a research study. It is up to you to decide if you would like to volunteer for the study. The purpose of this study is to investigate the criteria that 9th grade teachers use when recommending General Algebra I students to the Honors Algebra I track as well as how these teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school. Your role in the study will last approximately 3 hours 15 minutes over select days across 3 weeks. You will be asked to do the following: participate in a digital survey (45 min), a virtual group discussion during one regularly scheduled Algebra cadre meeting (90 minutes), and an individual follow-up virtual interview (60 minutes). Participating in this study will not expose you to any more risks than you would experience in a typical day.

Purpose
The purpose of the study is to investigate mathematics teacher recommendation criteria and conceptualizations of equity when recommending students move from General Algebra I to Honors Algebra I. You are invited to participate in this research study because you are a teacher who has taught Algebra I in the last 4 years. A total of 7-8 Algebra I teachers will be invited to participate in this study and 1-2 administrators familiar with Algebra teachers.

Procedures
If you decide to take part, you will be asked to participate in a digital survey, a group discussion, and an individual follow-up interview if necessary. The digital survey will be administered through Google Forms and take about 45 minutes of time to complete at your convenience in one sitting. Second, you will participate in a group discussion with the entire Algebra I cadre during one normally scheduled team meeting. Finally, you may participate in an individual 60-minute interview scheduled at your convenience. The group and individual discussions will be audio-recorded.

Voluntary Participation and Withdrawal
You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time.

Confidentiality
We will keep your records private to the extent allowed by law. The following people and entities will have access to the information you provide:

- Pam Liu and Dr. Pier A. Junor Clarke

- GSU Institutional Review Board
- Office for Human Research Protection (OHRP)

Audio-recorded files will be stored in a password-protected laptop. Hard copy data will be stored in a locked cabinet. Consent forms will be stored separately from the data. Electronic data will be kept safe through laptop encryption. We will use a pseudonym rather than your name on study records. When we present or publish the results of this study, we will not use your name or other information that may identify you. If identifiable data are inadvertently collected, it will not be transcribed. Original audio-recordings and any links to identifiable data will be destroyed after 5-10 years.

Contact Information

Contact Pam Liu at 919-260-5447 or pliu7@student.gsu.edu or Dr. Pier A. Junor Clarke at 678-571-5295 or pjunor@gsu.edu if you have questions about the study or your part in it. You may also call if you have questions, concerns, complaints, or believe you may have been hurt in the study.

Consent

We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research, please sign below.

_____
Printed Name of Participant

_____ _____
Signature of Participant Date

_____ _____
Principal Investigator or Researcher Obtaining Consent Date

Appendix B

Hypothetical Vignettes

1. Montrell, a Black student who qualifies for free lunch, has a grade of 80% in his 9th grade General Algebra I class and scored barely above passing on the End of Grade Math Test in 8th grade. He has had a number of unexcused absences this year (as of September) but tends to be fairly punctual to class when he is at school. Montrell does not always complete the independent classwork but seems to enjoy mathematics and asks great questions in class when he is focused. He is not afraid to volunteer answers and is easily upset when the teacher doesn't call on him. Recently, Montrell has gotten a couple of ISS (in school suspension) for disruptive behavior in the classroom. While Montrell seems concerned about his grades and passing his classes, he does not consistently finish all his assignments nor come to after-school tutorial. Most of his time outside of school is spent in marching band practice or at home with his younger brother. Montrell also has two older sisters, one of whom is a senior at the same high school and the other who is currently working. He has expressed interest in becoming an engineer and become the first in his family to attend college.

2. Paige, a White student whose family just moved into a new neighborhood in the school district, has an average of 88% in her 9th grade General Algebra I class and had scored an average, yet passing score on the End of Grade Math Test in 8th grade . She has three absences in the first semester (as of September), but they were all excused doctors' visits. Paige only answers questions when the teacher calls on her. She seems uninterested in the math class material and has been removed from the class multiple times due to socializing with friends and playing games on her cell phone. A school guidance counselor noted her classroom behavior is common across all her core academic classes. Paige only seems passionate about her school theatre class and performs at all the school plays. At the school open house earlier in the year, Paige's parents asked if she could be considered for Honors Algebra I placement.

3. Eduardo, a Hispanic student from a lower middle-class family, has an average of 82% in his General Algebra I class and scored poorly on the 8th grade End of Grade Math Test. He recently exited the English Language Learner (ELL) program. Eduardo has had no absences or tardies (as of September). In class, he finishes most of the classwork but sometimes struggles with the mathematics vocabulary. Nevertheless, he seems to enjoy learning and all his teachers report him being a great student. He also enjoys hanging out with his small social group at school, which consists mainly of other Spanish speakers. Eduardo is quite savvy with technology and has told his teacher he would love to work with computers in the future. He does not know if college is for him because most of his family members have seemed to find jobs with nothing more than a high school degree. Eduardo expressed interest in staying after-school for tutorial hours but usually has to watch his younger siblings at home.

Background: Every year, teachers at Middlebrook High School are asked to recommend students for mathematics course assignment in the following year. Ms. Scott, Ms. Edwards, Mr. Jones, and Mr. Lopez are four General Algebra I teachers discussing which 9th grade students they would recommend to move up to Honors Algebra I for the Spring semester. Montrell, Paige, and Eduardo are three students in the General Algebra I track who are under consideration. Below is an excerpt from their conversation during the weekly mathematics department meeting. Please respond to each exchange and give your thoughts as if you were a part of their team discussions.

Exchange 1

Ms. Scott: I think to be the most fair we have to look strictly from a numbers standpoint. Paige has the highest grades and state test scores, so I would recommend her be placed in Honors Algebra I next year.

Ms. Edwards: I agree they need to have high grades and scores, but some kids just don't test that well. Montrell is in my 4th period class and while he can act immature in class, I see a strong sense of problem-solving ability in him. Plus he told me he wants to be an engineer and be the first in his family to go to college.

Exchange 2

Mr. Jones: Montrell reminds me of when I was a kid. I was in band, played on the drumline, had too much energy in class, annoyed the hell out of my teachers. I didn't love math, but I was pretty good at it. Let him move to Honors Algebra I, it may give him a better shot at applying to colleges.

Mr. Lopez: Mmhm. Montrell's sister was in my class a couple years ago--bright kid as well. You know, I just remembered that Eduardo's parents run the local Mexican grocery store down the street. He's a good kid, nice family. I suspect his grades could be even better in math if it weren't for some of the language barriers, but he's young, he will pick up the vocabulary in no time. I say recommend all three of them up to Honors!

Exchange 3

Ms. Edwards: In a perfect world, we wouldn't be using test scores to measure our babies. Paige, over Montrell or Eduardo, would probably get moved up to Honors Algebra because of her grades, but is that fair? Montrell has aspirations to be an engineer, doesn't he deserve a chance to be in the Honors class too? And poor Eduardo is trying to do better but he has to babysit.

Mr. Jones: Well there's a bigger issue and it is pretty clear if you look at our Honors classes versus the rest of the school. Can anyone disagree with me? You got all the White kids in Honors and everyone else over here with us! Now I love the students I teach, but I'm going to say what everyone else is avoiding-- the whole system is racist and we need to do whatever we can so all students have a chance! I guarantee you all these students will be just fine in an Honors class, we just need to give them that chance.

Appendix C

Group Discussion Guiding Protocol

Who: Algebra cadre (5-6 team members) + Researcher

Where: virtual meeting (Zoom link TBD)

When: August 2020, week of August 10th or 17th; 90 minutes

Introduction (5 min)

Good morning and thank you for your time. As you all know, I am in a doctoral program and conducting research on the teacher recommendation process in mathematics tracking. I appreciate your honest thoughts and please note that although this session will be audio-recorded, your personal information will remain confidential and all comments by you will be represented by a pseudonym. My role in this discussion is to serve as moderator and facilitator. Is everyone ok with proceeding?

Establishing Group Norms (10 min)

Next, we will set some group norms to ensure a comfortable and respectful environment. Please think of what you think a good group norm will be during our time here together and type it in the chat box of our virtual room. For example, you may type something like "Give everyone a chance to speak", or "Listen respectfully".

Once everyone has suggested their norms and typed them in the chat box, I will read them out loud and ask if everyone agrees. Then I will type the final norms in the chat box.

Group Discussion (60 min)

Email each Algebra team member a copy of the student vignettes and teacher exchanges.

Guiding Questions (#1-3 adapted from Bernhardt (2018)):

1. What are your initial thoughts from the hypothetical vignette analysis?
2. What were the most important criteria you looked at in making recommendations for students to move from General to Honors Algebra? Why were these criteria important to you?
3. Is there anything missing from the vignettes that you feel would be important to add when recommending mathematics course placement?
4. In reference to Exchange #3, a couple of you responded _____. What are your thoughts on the equity of our mathematics tracking or recommendation system?
5. How clear are you on school-wide policy or criteria needed to advance a student to the Honors Algebra I course?
6. How (if applicable) will the vignette analysis affect your future actions?

Concluding Remarks (15 min)

Does anyone have any final thoughts from our discussion?

Give participants 5-10 minutes to add any remarks.

Thank you all for your time. Would any of you like to read over my interpretation of your responses before I submit the write-up to my committee?

Take down names of participants who would like to meet up again at another time to check my interpretation of their comments.

Thank you, and we will be in touch soon! I may reach out to you individually for a follow-up.

Appendix D

Probing Questions (individual follow-up interviews)

Who: each Algebra I teacher individually
Where: virtual meeting (Zoom link)
When: Time (~60 minutes) of participant choice, to take place in the week after group discussion

1) Reflecting on your own past experiences, what successes and/or challenges have you seen with the students whom you recommended to move to Honors Algebra I?

2) Have you ever re-considered your course recommendations (or lack thereof) for any students?

3) Why did you choose to become a mathematics teacher? In retrospect, how do you think mathematics tracking may have affected your experience as a high school student and as a teacher?

Appendix E: Administrator Consent Form

Georgia State University
Department of Middle and Secondary Education
Informed Consent

Title: Is Race a Criteria?: A Case Study on Algebra I Teachers' Conceptualizations of Equity in Track Recommendations
Principal Investigator: Dr. Pier A. Junor Clarke
Student Principal Investigator: Pam Liu

Introduction and Key Information
You are invited to participate in a research study. It is up to you to decide if you would like to volunteer for the study. The purpose of this study is to investigate the criteria that 9th grade teachers use when recommending General Algebra I students to the Honors Algebra I track as well as how these teachers conceptualize equity in mathematics track recommendations at a diverse, urban high school. Your role in the study will last approximately 60 minutes. You will be asked to do the following: participate in a virtual interview (60 minutes). Participating in this study will not expose you to any more risks than you would experience in a typical day.

Purpose
The purpose of the study is to investigate mathematics teacher recommendation criteria and conceptualizations of equity when recommending students move from General Algebra I to Honors Algebra I. You are invited to participate in this research study because you are an administrator who is familiar with Algebra I teachers at the research site. A total of 7-8 Algebra I teachers will be invited to participate in this study and 1-2 administrators familiar with Algebra teachers.

Procedures
If you decide to take part, you will be asked to participate in a virtual interview (60 minutes) scheduled at your convenience in Fall 2020. The interview will be audio-recorded.

Voluntary Participation and Withdrawal
You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time.

Confidentiality
We will keep your records private to the extent allowed by law. The following people and entities will have access to the information you provide:

- Pam Liu and Dr. Pier A. Junor Clarke
- GSU Institutional Review Board
- Office for Human Research Protection (OHRP)

Audio-recorded files will be stored in a password-protected laptop. Hard copy data will be stored in a locked cabinet. Consent forms will be stored separately from the data. Electronic data will be kept safe through laptop encryption. We will use a pseudonym rather than your name on study records. When we present or publish the results of this study, we will not use your name or other

information that may identify you. If identifiable data are inadvertently collected, it will not be transcribed. Original audio-recordings and any links to identifiable data will be destroyed after 5-10 years.

Contact Information

Contact Pam Liu at 919-260-5447 or pliu7@student.gsu.edu or Dr. Pier A. Junor Clarke at 678-571-5295 or pjunor@gsu.edu if you have questions about the study or your part in it. You may also call if you have questions, concerns, complaints, or believe you may have been hurt in the study.

Consent

We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research, please sign below.

_____
Printed Name of Participant

_____ _____
Signature of Participant Date

_____ _____
Principal Investigator or Researcher Obtaining Consent Date