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Elvira Abrica
University of Nebraska-Lincoln, elvira.abrica@unl.edu

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Revisiting the Complexity of Racial Understandings and Subjective Experiences of Race Among Students of Color in Stem Higher Education: Toward a Racial Reappraisal Framework

Elvira J. Abrica

Department of Educational Administration,
University of Nebraska–Lincoln, Lincoln, NE 68588, USA;
email: elvira.abrica@unl.edu

ORCID https://orcid.org/0000-0001-6140-5325

Abstract
Despite significant investment in expanding post-secondary access and success for racially minoritized populations within science, technology, engineering, and mathematics (STEM) fields, persistent educational disparities remain. While the literature has importantly identified and described the myriad ways in which students of color experience exclusion within STEM fields on the basis of race (and, perhaps, other social identity statuses), this area of scholarship is not always theoretically grounded in an understanding of racial hierarchies, processes of racialization, or theories of race and racism. That is, despite the abundant

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literature on students of color in STEM, there is comparatively limited theoretical attention to race itself, which limits conceptual understanding of the complexities associated with navigating and negotiating STEM contexts. For example, an emphasis on the presumed detrimental or beneficial experiences and outcomes associated with racial minority status may oversimplify the complexity of how race and racism are subjectively experienced at the individual level. Specifically, an individual's attempt to understand, navigate, negotiate, or reappraise their racialized status and persist in an inherently stratified, racialized system of educational opportunity is lost when applying essentialist ideas about race, thus reinforcing dichotomous ideas about advantageous or detrimental consequences of racial minority status. To address this, this paper advances a new conceptual model— the racial reappraisal framework—that more fully accounts for the complex cognitive work students of color engage in when they consider and experience racialization and racism.
Keywords: racism, higher education theory, racial theory, agency

1. Introduction

Racial disparities are documented within a cannon of higher literature outlining the myriad ways in which students of color experience exclusion within science, technology, engineering, and mathematics (STEM) fields on the basis of race (and other social identity statuses). As important factors in STEM persistence and degree completion, extant literature highlights academic preparation and performance, campus and classroom experiences (e.g., perceptions of learning environments, experiences with racial microaggressions, quality and nature of interactions within and outside the classroom), psychosocial dimensions of experiences (e.g., sense of belonging, self-confidence, self-efficacy, etc.), and identity development. This rich tapestry of information about students' experiences and outcomes has informed a range of practices, strategies, and interventions generally aimed at promoting sense of belonging (e.g., Abrica et al., 2020) and affirming students' developing social identity statuses (e.g., Rincón and Rodriguez, 2021).

Despite significant investment in interventions designed to expand post-secondary access and success for racially minoritized populations in STEM fields, persistent educational disparities

remain, arguably because efforts to be more inclusive of Black, Latina/o/x, Native American, and othered bodies** have not changed the nature of racial oppression and White supremacy as they manifest within the organizational, cultural, and structural milieu of STEM disciplines.

Generally, the cannon of STEM research on students of color invests in, rather than disrupts, enduring and unequal racial hierarchies while simply retooling efforts to maintain U.S. hegemonic Whiteness and economic competitiveness. As Stein (2019) posits, participation, inclusion, and/or access to higher education may beget a greater degree of socioeconomic equality, but to what end? Socioeconomic mobility, for example, be-comes a "primary horizon of justice" (Stein, 2019, p. 8) but does little to change oppressive social and economic structures or their dehumanizing consequences. Particularly in STEM contexts, the desire to promote success for underrepresented racial minorities is often framed as an issue of U.S. economic interest.

Students of color, consequently, are framed as a domestic labor pool that is of value insofar as it can be leveraged to support U.S. economic and military expansion (Abrica, 2015; Baber, 2015; Vossoughi and Vakil, 2018). This broader ideological context sets the

** Students of color refers to individuals identified in extant higher education research as racially and ethnically minoritized, such as individuals who are identified as or identify as American Indian or Alaska Native, Asian, Black, African American or of African descent, Native Hawaiian or other Pacific Islander, Chicanx, Hispanic, Latinx, or multiracial. Generally, I will tend to use the term students of color when discussing or in reference to STEM higher education literature, as this is the conventional term. However, I prefer to use "racially minoritized individuals" to refer to anybody prescribed a racially minoritized status within a hierarchical system of White supremacy. I define racially minoritized status as the condition of one's identity or body reflecting a racially dominated, oppressed, marginalized, or subjugated social group as a function of broader social forces (i.e., White supremacy, racial domination, colonialism, etc.). Racial marginality can extend to individuals belonging to a group that is statistically not underrepresented in STEM (e.g., Asian Americans are typically not identified as "underrepresented" in STEM and thus are not often centralized in conversations about race and racism). Thus, students of color is used to signal the use of common nomenclature, while I use "racially minoritized" to draw attention to racialization and racism. "Students" is inclusive of undergraduate and graduate students.

stage for a proliferation of STEM higher education scholarship ostensibly focused on students of color but with limited theoretical attention to race, racialization, and racism. As Cabrera (2018) points out, the absence of racial theory, even in purportedly critical projects attentive to racial oppression, delimits opportunities to explicitly challenge dominant paradigms and more fully outline context-specific, dynamic, and contemporary manifestations of White supremacy in educational contexts and spaces. This theoretical article engages the problem of limited theoretical attention to race and racism in literature on students of color in STEM by revisiting the complexity of racial understandings and subjective experiences of race among students of color in STEM higher education. The article advances a new conceptual model—the racial reappraisal framework—to more fully account for the complex, cognitive work students of color engage in when they consider and experience racialization and racism. The proposed racial reappraisal framework is a direct response to calls for critical frameworks and methodologies that help us "(re)think, (re)analyze, and (re)define common educational processes" (Museus et al., 2015, p. 28) and move toward alternative framings of problems and solutions in STEM higher education research. Reimagining and transforming STEM requires explicit and meaningful engagement with race and racism as well as the complexities associated with navigating and negotiating racialized STEM contexts.

In the literature review that follows, I draw on three distinct strands of thought from an interdisciplinary literature base: 1) theories of racialization, race, and racism; 2) subjective experiences of race and conceptual understandings of race; and 3) psychological and cognitive work associated with racial reappraisal processes. By weaving these areas together, I aim to offer the field of higher education one possible approach to arrive at greater conceptual specificity in determining *how* oppressive social conditions ultimately limit oppressed people's capacity for expressing individual agency within STEM educational settings. This specification is necessary because STEM higher education literature often assumes, conveniently and practically, that racially oppressed people have a shared awareness of their own oppression. There is an implicit and unchallenged assumption that racial justice aims are

probable, or even possible, if it be the will of well-meaning individuals (Abrica et al., 2021). I do not have space in this paper to specifically explicate the relationship between STEM and colonialism as a racialized system of domination (for example, see Vakil and Ayers [2019]; Vossoughi and Vakil [2018]). However, a basic assumption of this work is that, by definition, colonization and conquest *require* obfuscation of racial meaning and perspective among both the colonized and the colonizer (Memmi, 1965). Rather than uncritically continue to invest in the idea that through some concerted effort of well-meaning actors (Bonilla-Silva, 2010) redress of racial inequities in STEM would be possible or even expected, I think it is more useful to unpack the vestiges of colonialism, racial domination, and White supremacy as they shape individual identity, experience, and perception. To ignore racialized contexts in which students of color exist is to reinforce essentialist perspectives of people of color and White supremacist projects. Rather than relying on simplistic portrayals of either positive or negative consequences associated with ethnoracial and cultural identities, I argue that we can instead try to understand the cognitive effort students engage in to navigate, negotiate, and reappraise both their global understanding and their subjective experience of these constructs (race and racism) and identities (racially minoritized status). Conceptualizing students' racial (re)appraisal invites a more fluid and dynamic way of understanding the experiences of students of color.

2. Literature Review: Theories of Race, Racialization, and Racism

STEM higher education literature, like most higher education literature (Abrica, 2015, 2019; Abrica and Dorsten, 2020; Abrica et al., 2020, 2021) and social science research more broadly (Williams, 2019), often relies on essentialist interpretations of race. Racial essentialism is the idea "that racial identities are obvious and easily demarcated, that racialized groupings are homogenous, and that ancestry is all-determining" (Martín Alcoff, 1999, p. 17). In higher education, racial essentialism takes form as race, and its

associated social processes and meanings are reduced to a background variable or to a singular, static identity experience, often resulting in "positive" or "negative" educational outcomes (Abrica and Hatch-Tocaimaza, 2019; Abrica et al., 2021). Higher education invests in applied knowledge and practical solutions for supporting student diversity, often resulting in a theoretical treatment of race in studies of students of color. To this end, race is often operationalized in ways that reinforce the idea that race is a "fixed characteristic of human populations" (James, 2001, p. 236) rather than a "constitutive element of fundamental, everyday embodied existence and social interaction" (Martín Alcoff, 1999, p. 17), and a "dynamic phenomenon rooted in political struggle" (James, 2001, p. 236). Those who engage explicitly with race and racism in higher education research are often met with resistance (Lynn et al., 2002) and challenged by a domain that rewards (i.e., publishes) work relying on reductionist, essentialist operationalizations of race (Abrica and Hatch-Tocaimaza, 2019; Abrica et al., 2021; Stein, 2019). In other words, racial essentialism and atheoretical treatment of race obfuscate the nature of social oppression, and this is not to be understood as entirely accidental.

What is race? While social science research more generally may espouse the idea that race is "socially constructed," it often fails to operationalize *how* it is constructed or to conceptually pinpoint the meaning of racial categories (Williams, 2019, p. 657). While race can certainly refer to biological distinctions between racial groups, race refers to particular social, historical, and political contests that are reinscribed and negotiated in everyday life. In this way, race is both real (i.e., a physical marker of difference) and also "fictitious" (i.e., something that is socially constructed and contested) (James, 2001, p. 236). Individuals are consequently *racialized*, prescribed a position within social hierarchies on the basis of race, through their social interactions (Omi and Winant, 1994). Racialization is thus a social process through which individuals come to be positioned within a racial hierarchy as they move through social spaces and contexts. Ultimately, essentialist portrayals of race as static, unchanging, or fixed deny the complexity of race itself and the nature of racialization as a significant social process that is negotiated among human actors across

social contexts (Omi and Winant, 1994). Race and racialization, ultimately, are distinct concepts, but they are obviously interconnected. Understanding these constructs is important because it allows for an understanding of how the interaction between individuals and the social structures and environments around them ecologically shape the experience of race in dynamic and contested ways (Kendig, 2011; Lee, 2019).

Limited theoretical treatment and essentializing approaches to race lead to a general lack of specificity around the implications of racial, ethnic, and cultural membership status or identity for students of color in STEM. As Warikoo and Carter (2009) explain, the consequences of ethnoracial membership for students of color are sometimes described positively while other times seen through a deficit-oriented lens and assumed to be detrimental to educational success. For example, STEM higher education research may document the cultural wealth, assets, or strengths of minoritized populations as they move through STEM contexts. While this is certainly preferable to emphasizing cultural deficiencies among students of color, "students are embedded in a web of social identities" that cannot be teased out from one another, and thus, "It is simply dangerous to attribute schooling behaviors to a singular racial, ethnic, or cultural identity" (Warikoo and Carter, 2009, p. 385). A focus on racially minoritized populations' cultural attributes mistakenly assumes culture as an extension of a presumed racial identity. Culture is "framed as the developing expression of an ordinary logic rather than the effect of negotiations from multiple sources" (Martín Alcoff, 1999, p. 17). The point here is not that culture or ethnicity do not matter or that any status matters more than another. Rather, the point is that operationalizing race as a singular identity status and then attributing cultural attributes to that status is an essentializing approach. The question becomes, then, how do we center race and critically challenge racial dominance while not relying on essentialist approaches?

One critical theory of race and racism is hegemonic Whiteness (Cabrera, 2018; Cabrera et al., 2017). Importantly, as Cabrera (2018) explains, a theory of racism is one that contextualizes individual experience within a specified structure of racism. An explanation of consequences or experiences of racism does not

constitute a racial theory. Instead, racial theory must not only name the conditions resulting from racial oppression (i.e., consequences) but also identify the superstructures creating those conditions. Racial theory identifies the socially situated nature of racial meaning (James, 2001, p. 243), inviting greater understanding of how race matters and how power is differentially reinscribed within post-secondary environments. Taking Charles Mills's articulation of White supremacy as a global superstructure and applying Gramsci's discourse on hegemony, Cabrera articulates hegemonic Whiteness as the "cultural and discursive practices" that "serve to naturalize unequal social relations along the color line" (Cabrera, 2018, p. 223). Within the context of the study of STEM higher education, hegemonic Whiteness becomes a theoretical tool for understanding how White supremacy is dynamically produced and reproduced—both culturally and structurally—rather than for documenting the detrimental effects and consequences of presumably shared racial and other forms of oppression.

To be clear, my argument is not that we need to move away from individual-level analysis. Rather, my argument is that individual-level analysis should be contextualized, and the experiences of individuals should be socially situated within a broader system of White supremacy. Simply put, the reality of racial oppression or its deleterious *collective consequences* for any hope of an equitable and just society is not in question. What is in question is the extent to which we are fully and explicitly challenging White supremacy by repeatedly documenting (presumably) uniformly negative (or positive) racial consequences among students sharing a racially minoritized identity and assuming shared cultural experiences, racial identity, and understandings of racism.

Indeed, the very nature of White supremacy and racial domination is such that there is no collective, shared, or uniform experience, response, or understanding of race and racism. By design, systems of oppression insist on de facto assumptions about individual members of colonized or oppressed groups while denying collective mobilization, memory, and identification that would serve attempts to resist such oppression (Memmi, 1965). My emphasis in this paper is on articulating dimensions of individual-level experience that detail how systems of White supremacy potentially

delimit individual agency and collective resistance to racial or other forms of oppression. This emphasis is decidedly different from the en vogue tendency to identify forms of capital, asset, or wealth among nondominant groups. For example, McDonough and Abrica (2021) explicated the ways in which asset-based perspectives of students of color, when relying on capital or wealth metaphors for culture (Yosso, 2005), undermine an understanding of the symbolic violence that schools are designed to perpetuate (McDonough and Abrica, 2021, p. 7). They argue that oppressed individuals, by design, are not taught to recognize how inequalities are built in to educational systems. Moreover, "institutions founded on historical legacy of exclusion, which in the U.S. context has taken on multiple forms of racial, gendered, ethnic, and social class exclusion, are by design never going to be inclusive of non-dominant forms of capital" (p. 12).

With this understanding in mind, a focus on cultural strengths, wealth, and/or capital among students of color is decidedly not my approach in this paper.

3 Racial Subjectivities and Complex Racial Understandings

With our general understanding of race, racism, and racialization in mind and a specific theory of hegemonic Whiteness with which to contextualize individual experience among heterogenous people of color, the term *racially minoritized population* still applies because White supremacy is the superstructure at hand (Cabrera, 2018); however, I am focusing on the layer of individual experience and presuming that the experience of marginality, or of being oppressed, marginalized, or racially dominated, is a heterogenous one. Focusing on the individual implications of White supremacy, I will now highlight individual-level psychosocial processes associated with racial oppression and/ or racially oppressive conditions. In essence, the task is to understand how hegemonic Whiteness dynamically shapes individual experience in ways that move beyond dichotomous depictions of negative or positive experience (Abrica and Hatch-Tocaimaza, 2019; Abrica

et al., 2021). First, I will establish that racially essentialist portrayals of students of color fundamentally deny that which is germane to White supremacy and domination: the erasure of a shared critical or racial consciousness. Second, I will articulate why and how emphases on perception of discrimination and/or identity development are insufficient constructs for capturing the ways in which individuals may make meaning of race, racism, and/or racializing experiences. Finally, I will explain why racial meaning making, and what I call "racial appraisal and reappraisal," are potentially useful constructs for exposing the cognitive toll of hegemonic Whiteness at the individual level. The cognitive (racial) appraisal work individuals are forced to engage in under White supremacist structures, along with the spiritual, emotional, physical, and other psychological implications of this work, perhaps give a fuller portrait of the depth and heterogeneity of human or agentic expression among racially dominated groups.

In relying on racially essentialist notions of race, racism, and racialization that, generally, reduce these constructs to a social identity variable and/or link them with amorphous cultural assets (or deficits), we inevitably fall short of challenging systemic White supremacy. For example, in advocating for an understanding of how students of color may navigate racially oppressive STEM contexts, scholars may emphasize forms of cultural wealth or dimensions of racial resistance that students employ to persist despite the challenges they face. To expressly not put forth deficit perspectives of these populations as inherently prone to failure, scholars may emphasize or assume ways in which students successfully pursue their academic goals by drawing on their familial or community contexts as sources of strength, racial resistance, or support. However, this focus on experiential knowledge stemming from experiences with racism enforces a presumption of racial solidarity (Cabrera, 2018, p. 225–226) and is at odds with anti-essentialist approaches to understanding racism (Delgado and Stefancic, 2001, as cited in Cabrera, 2018, p. 225). Indeed, people of color can internalize racist ideas, beliefs, norms, and values such that they do not share antiracist, critical racial awareness. Importantly, "the application of hegemonic

Whiteness and its break with the assumption of racial solidarity allows for People of Color to support systemic racism while providing a more heterogeneous view of minority perspectives on the subject" (Cabrera, 2018, p. 226). Furthermore,

> *Instead of treating People of Color as a uniform, oppressed group with a collective, critical consciousness, the hegemony of Whiteness highlights two critical issues. First, there is an increased likelihood that they will be aware of their oppressed condition relative to their White peers, but this cannot be a foundational assumption. Second, there is the possibility (although not the probability) that White people can also become aware of their complicity in the oppression of People of Color and join the struggle as well (Applebaum, 2010; Cabrera, 2018, p. 226).*

An understanding of hegemonic Whiteness allows us to see how students of color may not automatically hold an awareness or critique of racial oppression. Alemán and Gaytán (2017), for example, importantly document that students of color may not be receptive to critical pedagogies because they have internalized White supremacist narratives and ideas. They cite Carillo Rowe and Malhotra (2006), who

> *problematize how students of color are framed as 'already there' when utilizing critical race, critical Whiteness, and anti-racist or social justice 'preclud[ing] a thorough investigation in the ways in which they are interpellated by Whiteness, complicit with its supremacist structures, and/or have internalized compulsions' (Carillo Rowe and Malhotra, 2006, p. 189, as cited in Aleman and Gaytán, 2017, p. 128).*

Consequently, documenting or mobilizing cultural assets among students of color is potentially antithetical to the very nature of social institutions that are fundamentally, when viewed from a critical race perspective, invested in subverting such projects. Hegemonic Whiteness, critical race theory, and a general understanding of colonial conditions of the United States are all perspectives

that point to a tension between ideals of racial liberation and the realities of internalized racism. For example, Acuña (1972) writes:

> *Mexicans – Chicanos – in the United States today are an oppressed people. They are citizens, but their citizenship is second-class at best. They are exploited and manipulated by those with more power. And, sadly, many believe that the only way to get along in Anglo-America is to become 'Americanized' themselves.*
>
> *Awareness of their history—of their contributions and struggles, of the fact that they were not the 'treacherous enemy' that Anglo-American histories have said they were—can restore pride and a sense of heritage to a people who have been oppressed for so long. In short, awareness can help them to liberate themselves (Acuña, 1972, p. 1).*

Internalized dominant norms and values, particularly among those who may phenotypically present as racially White (i.e., White Latina/o/x individuals), are not often described as a dimension of experiences of students of color. Yet, Abrica (2019) provides evidence of how internalized racism prevented later-generation students from establishing friendship and support networks among co-ethnics. In other words, individuals belonging to shared ethnoracial backgrounds held divergent ideas about racism and thus did not automatically form collective spaces of support on campus on the basis of shared experiences with racial marginalization. Similarly, Abrica and Martinez's (2016) study of Latino male community college students' persistence documented the ways in which students experiencing the same oppressive educational conditions responded differently based on their ideas about race and racism. One student in their study, for example, explained how he saw little value in his own (Latino) community and wanted to surround himself with Whites, whom he perceived as *knowing more* (revealing his understanding of Whiteness as something that can be acquired) about how to access power in society. This participant stated:

> *I want to be around White people. I want to be around White people because I feel that if they know something I don't, I want to learn it. Teach me. Show me. I want to listen and be quiet and listen to what they do, how they do it, how they make money (Abrica and Martinez, 2016).*

This participant went on to identify what higher education researchers might presume to be a desire for cross-racial interaction:

> *I love to be around White people because they have a lot of influence in our society as far as government, as far as in the workforce, in the scholars, anywhere… I need to be with White people. I need to be around people that are different than me.*

Internalized ideas, values, and beliefs rooted in Whiteness may be even more present in STEM higher education contexts in which there is, presumably, even less structural diversity (i.e., greater underrepresentation) and greater cultural reinforcement of White norms (Cabrera, 2018) (see James-Gallaway et al., [2021] for further discussion of the relationship between structural diversity, anti-Blackness, and White supremacy). The point of underscoring internalized racism and divergent perspectives around race and racism among Latinos, or any other racially minoritized ethnic group, is not to shift blame to these individuals but to illustrate the deep and personal ways in which Whiteness is perpetuated and reinforced.

3.1 Racial Meaning Making

While understanding the heterogenous and diverse perspectives of students of color around race, racism, and racialization may complicate asset or deficit frameworks in higher education research, there is surprisingly little theorizing of this phenomenon. However, racial meaning making is a potentially important concept that is distinct from the focus on racial identity development that we most often see in higher education literature (Abrica and Dorsten, 2020). Abrica and Dorsten (2020), for example, point out one reason why racial meaning matters:

> *Students may have a sense of their racial identity (such as how they might be racially categorized by themselves or others), but they also hold ideas about race itself and how, why, and when race may matter to their daily lives (p. 71).*

Drawing on prior research (Johnston, 2014; Johnston et al., 2014, 2015; Johnston-Guerrero 2016a,b), Abrica and Dorsten state:

> *Namely, students' ideas about race matter because, like other diversity related perceptions, they influence individual attitudes and behaviors that can inform how they interact and engage on campus (Bowman and Park, 2015; Garcia, 2019; Luedke, 2018) More specifically, when students think about race in more narrow biological ways, they tend to harbor more negative racial stereotypes of other students (Shih et al., 2007) and be less prone to engage with diverse friend groups (Williams and Eberhardt, 2008, as cited in Johnston-Guerrero, 2014). Ultimately, much more research is needed to understand how different ideas about race relate to specific racial attitudes and behaviors, especially in the community college context, but there is evidence to suggest that ideas about race importantly shape perceptions and interaction with implications for how all students may engage others in the campus environment (p. 71).*

Furthermore, Abrica and Dorsten (2020) found that participants talked about the ways in which Latina/o/x, particularly Latino males, experience economic, educational, and social disadvantage on the basis of race. They emphasized that their own reasons for pursuing higher education centered on wanting to serve as role models and leaders for their communities. Yet, they were also invested in negotiating a distance from their communities when they perceived benefits in doing so, at times rejecting structural explanations in favor of cultural essentialist explanations for educational disadvantages. Ethnic sense of belonging and cultural membership seemed to complexly mediate students' understandings of race. In turn, students' subjective understanding of race

may mediate the extent to which they perceive racial discrimination or may mediate their racial identity (Abrica, 2019; Abrica and Dorsten, 2020; Abrica and Hatch-Tocaimaza, 2019). This messiness importantly underscores the notion that students of color do not inherently hold uniform ideologies about race. This is consistent with Johnston's (2014) work, which identified students as holding different ideas about race. Divergent perspectives of race have implications for how students engage within college campuses, guiding the decisions they make and the ways they interact with peers and programs. Divergence in meaning making around race has implications for the STEM educational context that are underexplored. The closest connection to students' meaning and perspectives of race are social psychological concepts that do not always centralize STEM education and/or racial equity issues in education.

4 Racial Appraisal as a Cognitive Process

The notion that students of color can hold divergent ideas about race and racism leads me to assert that there is a particular meaning-making process called "racial appraisal." This concept refers to students' information, ideas, and experiences, all before they can arrive at any presumed critical racial awareness or even internalized racist ideas and beliefs. Racial appraisal involves having to make sense of, negotiate, make meaning of, and cognitively work with race, racialization, and racism. This concept borrows from the psychosocial literature on cognitive appraisal (e.g., Buhle et al., 2014; McRae et al., 2012). I assert that what has been described as a basic human function (cognitive appraisal) is a racial process. In turn, racial processes (e.g., racialization) are cognitive processes. There are cognitive expenditures and costs associated with racial oppression, even if the resultant behavior, response, or action of the individual is, ultimately, to internalize racist ideals and beliefs and act in ways that affirm White norms, ideas, and values. By naming cognitive racial appraisal, we can specify, within STEM or other higher education contexts, students' ideas, beliefs, and meaning-making processes of racializing experiences

in the context of White supremacy. We can understand, then, how observed responses (e.g., internalized racism, resistance to racial oppression) are mediated or shaped by the cognitive processes that dynamically unfold at the individual level.

Recognizing the cognitive load among people of color in STEM, even those who might ultimately espouse and enact racist ideas and beliefs, is an important conceptual turn.

Psychological dimensions of students' experiences, grit, growth mindset, perseverance for long-term goals, self-control, and related constructs are all linked with positive academic outcomes. For example, growth mindset, defined as a belief that intelligence is malleable rather than fixed or a matter of luck, matters in STEM success. Students with a growth mindset see rigorous challenges not as insurmountable obstacles but as opportunities to learn and to grow through a combination of effort, good strategies, and asking for help. Consequently, there is an emphasis on developing growth mindset and related psychosocial competencies, particularly among racially minoritized students who are at greater risk of underperforming in the face of racial and/or gender stereotypes (e.g., Schmader et al., 2008). However, it remains unclear whether and how minoritized groups in STEM contexts may differently rely on such psychological capacities, especially considering the immense intragroup variability and within-group diversity among racially minoritized students. Moreover, implicit in the call to develop grit or growth mindset in the face of perceived racial discrimination is an assumption that one psychological tool will outweigh the burden and/or implications of another. In other words, there is more emphasis on psychological strength, drive, motivation, and grit rather than deleterious psychological consequences associated with racial marginality and other forms of social exclusion.

Stereotype threat (Steele and Aronson, 1995) and related constructions (e.g., perceived discrimination, racial stress, etc.) are all important exports from the social psychology literature that continue to have utility in the STEM higher education literature, as do grit-related constructs. Yet, an overly simplistic portrayal of the relationship between racial stress and cognitive responses does not fully account for the full range of cognitive abilities used among racially minoritized students to navigate STEM contexts.

4.1 Perceptions of Racial Discrimination and Stereotype Threat

Cognitive racial reappraisal might be thought of as an extension of ideas centering the psychosocial and cognitive dimensions of racialized experiences among students of color in STEM. The most popular concept within this vein, undoubtedly, is that of stereotype threat (Steele, 1997; Steele and Aronson, 1995). The basic premise of stereotype threat is that racialized individuals may understand that their performance in a given situation may be interpreted as a reflection of their racial group. When an individual cares deeply about their performance and believes it will be interpreted as confirming evidence of negative stereotypes, there can be negative consequences for their academic performance. The utility of the concept of stereotype threat is demonstrated by its application in so many studies that find that students of color often experience negative stereotypes about their abilities (particularly in math and science), and that these stereotypes threaten academic performance and persistence. Ebony McGee's work is particularly instrumental in extending stereotype threat literature and pointing to the ways in which students respond to and manage stereotypes (e.g., McGee, 2018; McGee and Martin, 2011; McGee et al., 2019; Miles et al., 2019). Importantly, McGee's and her colleagues' work emphasizes that the experience of racial stereotyping exists everywhere and always (and thus cannot be primed in academic situations alone) and that stereotypes do not inherently result in uniform individual responses among racially minoritized groups.

Experiencing negative racial stereotypes can result in a range of cognitive functions (McGee and Martin, 2011). Stereotype management and related concepts underscore the idea that students must manage, receive, and process information and experiences related to race and racialization and that these processes are individualized. Obfuscation of the complexities of race and racism occurs when students of color are portrayed fatalistically and as fundamentally downtrodden or, alternatively, imbued with some amorphous and unambiguous form of wealth or capital. The proposed racial reappraisal framework attempts to guide researchers toward better understanding where and how students' cognitive work occurs.

5 The Racial Reappraisal Framework

The racial reappraisal framework (RRF) proposed herein aims to integrate these ideas to advance the understanding that individuals perpetually and continuously reappraise, reevaluate, reassess, and renegotiate racial meaning. All at once, race can serve as both a significant psychological, emotional, and physical stressor and as something that students must reconcile and develop new ideas around. A central premise of this framework is that the contexts and conditions under which negative consequences associated with racial minority status become detrimental to student success in STEM remain largely unspecified and underexplored. It needs to be made clear that there is a distinction to be made between ethnoracial and cultural identities and that the influences of these identity statuses are in flux and not experienced in static ways by individual students. Simply put, racial identity statuses are not static but complicated and evolving. Individuals hold complex ideas about race in general. A sense of racial identity may also be conditional, shifting, and evolving. Both conceptual and subjective experiences of race and racism, I propose, shape students' racialized experience in STEM. Consequently, a primary task of the proposed framework is to clarify how race and racism are distinct from cultural identities and attributes and to outline how subjective experiences of racism and conceptual understandings of race may inform the experiences of students of color in STEM. **Figure 1** is a visual representation of the RRF.

The framework assumes that individuals are nested within complex socioecological layers (Kendig, 2011; Lee, 2019) fundamentally shaped by White supremacy and hegemonic Whiteness (Cabrera, 2018; Mills, 1997). All social institutions and social processes are embedded within this ecological system and layered context. Individual identity, for example, unfolds within a context of individuals being racialized within a U.S. racial hierarchy that is culturally, structurally, and organizationally reproduced within STEM and any other social context. A Latina living in the United States, say, who identifies as White, may still be racialized as non-White if her skin is dark. Her brown body will be received differently

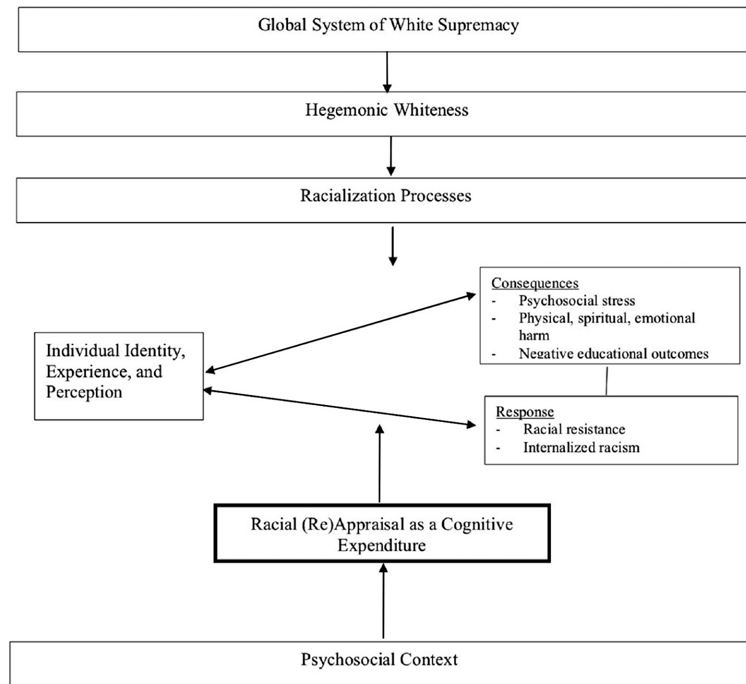

Fig. 1 Racial (re)appraisal as a cognitive expenditure

across social contexts.

Racialization does not deny other social processes by which individuals are positioned within social hierarchies (e.g., gender). These might be collectively described as what Nuñez (2014) calls the historical, economic, and social contexts that importantly and differentially shape the experiences of, say, Californian Latino im/migrant students (who have been the focus of most higher education research literature on Latina/o/x students) and their Latino counterparts who reside in contexts that have seen more recent im/migration of Latinos (p. 90; Abrica et al., 2020a).

White supremacy is taken as the most foundational social context that shapes individuals, institutions, and the structures in the society in which we live. This condition is best described by Charles Mills (1997) as the *racial contract*, a system of global White supremacy that prescribes differential duties, rights, and responsibilities for Whites and non-Whites. Mills argues that the racial contract is “explanatorily superior to the raceless social contract in accounting for the political and moral realities of the world

and in helping to guide normative theory" (Mills, 1997, p. 120). Within this system, as Cabrera applies a Gramscian interpretation of hegemony, is the additional layer of hegemonic Whiteness, which serves as the cultural articulation of the Whiteness superstructure. From this context emanates the process of racialization, among other social processes, conditions, and contexts (e.g., racial privilege, contexts of immigrant reception, socioeconomic structures, etc.) that shape individual identity processes, experiences, and perceptions (e.g., Rincón and Rodriguez, 2021; Rodriguez et al., 2019). All the layers of White supremacy, hegemonic Whiteness, and racialization, I argue, have implications for individuals at the cognitive level that have not been as deeply explored as consequences of racial oppression; these range from spiritual to emotional, physical, and metaphysical harm. The model centralizes the importance of individual identity, experience, and perception and asserts that there are both agentic and nonagentic responses and consequences associated with these constructs. I now clarify the difference between racialized responses and consequences that are mediated by cognitive racial reappraisal processes.

6 Racial Responses

Scholars have used terms like "resistant cultural capital," "transformational resistance," and "resilience" (often relying on capital, wealth, or asset metaphors) to describe students' motivational attributes that are said to be directly linked to experiences of racial marginality (e.g., Abrica, 2019; Garibay, 2018; Luedke, 2020; Rodriguez et al., 2020). This is a critically important body of work that I would describe as invested in centering agentic responses to racial oppression. They are responses because they represent action and behavior resulting from individual perception, identity, and experience. What I am cautioning the field against is the assumption that students inherently possess or have any inherent cultural asset, capital, or wealth as a result of racial oppression because specifying cultural attributes among ethnoracial groups is not possible (Warikoo and Carter, 2009). What we can identify, however, are students' ideas, meaning making, and appraisals

related to race, racializing experiences, and racism, and we can contextualize these as a psychosocial context shaped by White supremacy. Abrica et al. (2020a) emphasize that more attention needs to be paid to factors that may mediate students' responses to racialization and racism. They assert that there is "a need to conceptualize agentic measures that develop in response to students' perceived discrimination and to account for how such measures potentially mediate students' multidimensional perceptions of the campus environment" (Abrica and Hatch-Tocaimaza, 2019, p. 488). By articulating and understanding specifically what racial meaning is being made, what is a response to this understanding or meaning making, and what is a consequence, we begin to arrive at conceptual specificity around the particular aspects of students' experiences that have been attributed to their success (broadly defined) and those that have been empirically linked to motivations for social justice. It is necessary to identify the particular cultural dimensions and the specific conditions and contexts under which experiences with racial marginality translate into a motivation to pursue social justice, so that these cognitive, developmental, and complex processes can be engaged and recognized. Ultimately, we cannot assume that by virtue of a student's status as a person of color

1. that they themselves are not "interpellated by Whiteness, complicit with its supremacist structures, and/or have internalized compulsions" (Alemán and Gaytán, 2017, p. 132), and
2. that they do not respond in agentic ways to racializing experiences that are sometimes beneficial and sometimes not.

7 Racialized Consequences

The consequences of racialization, race, and racism at the individual level may include a host of physical, spiritual, emotional, and other psychosocial implications well documented in extant literature. Importantly, consequences associated with the psychosocial processes thus far described are distinct from the processes themselves. Racially/ethnically minoritized people experience psychosocial stressors unique to their experiences in society. Within this

literature, racism is discussed within the context of perceived discrimination; that is, from the perspective of the target person. Findings from the health literature postulate that perceived discrimination has a direct path to controlled cognitive processes, including cognitive flexibility within the context of interpersonal slights that may be perceived by the target person as discriminatory (Brondolo et al., 2011, 2017). I posit that by borrowing from social psychology literature on the deleterious consequences of racial discrimination, researchers in STEM higher education can better account for and recognize a fuller range of cognitive abilities used among racially minoritized students to navigate STEM contexts. Again, the individual consequences associated with White supremacist structures are not in question, as there is little evidence to dispute them (e.g., Baber et al., 2019; McCoy et al., 2017).

8 Racial (Re)appraisal

Racial appraisal and reappraisal are at the heart of the model in terms of how this process undergirds all the rest. I offer this definition of racial reappraisal:

> *Racial reappraisal is the assessment, understanding, and meaning making of race, racialization, and racism requiring the expenditure of controlled cognitive processes, particularly those related to decision-making, attention, and self-regulation. Racial reappraisal appropriates the psychosocial concept of cognitive flexibility and appraisal to name the ways in which people of color agentically navigate and negotiate conditions of White supremacy.*

Rather than assuming a direct critical racial consciousness manifested in some form of resistance, the model assumes that experience, identity, and perception are all weighed, assessed, and prescribed different meanings, resulting in divergent responses. Individual agency is recognized, but that agency is delimited and racialized by a superstructure of White supremacy. As a result, the humanity of people of color is challenged constantly, requiring

them to make complex decisions around the ways they make meaning and negotiate the milieu of hegemonic Whiteness. The articulation of Whiteness, importantly, must be understood as dynamic, changing, and localized (Abrica et al., 2019a,b; Morales, 2019; Padilla et al., 2021). Morales (2019) articulated, for example, how youth growing up in rural Midwestern contexts are exposed to particular racial ideologies that inform their subsequent engagement with science curriculums and learning. Morales points to the different skills, competencies, and forms of knowledge that students possess that are unique to the contexts in which they work, live, and learn. As a result, rural youth must be cognitively flexible and dexterous to navigate and negotiate these contexts. She posits that rural dexterity is a body of diverse knowledge and skills that has implications for "individual physiological, emotional, and cognitive characteristics" and that when recognized and understood and "leveraged in the classroom, they can be powerful tools for learning across lifespans and for career development" (p. 38).

Consequences of racial oppression may occur whether they have been processed or not and thus are presented separately from responses. Racial reappraisal may include students' understanding of race and racism, defined broadly as encompassing the following: how they view their own selves as members of a racialized minority group, the salience they attribute to race in their own experience, the factors that invoke the salience of their race within a particular context, and the general ways in which they think about race and its relationship (or lack thereof) to educational opportunity. Racial appraisal and reappraisal (an iterative process) is understood principally as a cognitive process. Cognitive appraisal is defined as the cognitive processes by which an individual evaluates and/or re-evaluates the meaning of a given situation to reduce its emotional impact. This is identified as an emotional regulation strategy and is measured using the Emotion Regulation Questionnaire (Gross and John, 2003) and the Cognitive Emotion Regulation Questionnaire (Garnefski and Kraaij, 2007). Combining my concept of racial appraisal, encompassing meaning making, and understanding of race, racialization, and racism with the concept of cognitive appraisal, the model identifies racial reappraisal.

9 Discussion and Implications

Reimagining STEM higher education research fundamentally requires a shift in our focus on students identified as being "of color" to explicit engagement with race and racism.

Specifically, attention to whether a student is identified as Hispanic or Black and the design of targeted interventions for underrepresented groups have superseded the disruption of White supremacist norms, logics, and culture that make necessary such interventions in the first place. To reimagine STEM higher education is to challenge the many organizational, cultural, and psychological ramifications of White supremacy that insidiously present themselves as issues of "diversity" and "inclusion."

The proposed racial reappraisal framework described in this paper aims to centralize the individual implications of global White supremacy as they may unfold in STEM contexts.

The aim of this framework is not necessarily to document the negative consequences of racialization for students of color. The psychological stress and spiritual, emotional, and physical harm associated with racial oppression have been documented elsewhere (see Serpas, 2021; Serpas et al., 2020; Watson, 2019). Rather, the aim of this framework is to cast students of color not only as immediately victimized by negative racial experiences—which they very well may be—but also as agentic, thinking beings who differentially make meaning of race, racism, and their own racialized experiences in abstract and embodied ways. The nature of White supremacy is such that the oppressed are not taught how to understand oppression or how to overcome it (Memmi, 1965). While racialization may inherently disadvantage non-White and othered bodies, minority status or experiences of oppression do not automatically dictate individual meanings and perceptions of that status or experience. The prescription of developmental opportunities to cultivate a growth mindset, grit, and the like almost requires students of color to deny, ignore, and suppress any critical objection or developing awareness of their racialized realities. Such interventions teach students to mask racial harm and violence.

Rather than assume uniform and uncomplex ways of thinking

among students of color, we must better understand the cognitive expenditures required to engage with race and racism experientially and also conceptually. For example, some students of color may hold a critical awareness of racial injustice and want to leverage their STEM degree to make social change.

Rather than cultivate this desire, STEM environments often ignore students' "social agency" (Garibay, 2020) and the potentially unique ways in which students of color can advocate for social change (Garibay, 2018). Abrica identifies this concept as a "transformational impetus" among marginalized students (Abrica, 2015; Abrica and Hatch-Tocaimaza, 2019; Abrica et al., 2021). Transforming experiences and perceptions of social oppression into opportunities for social change is different from more general psychological resources like grit or growth mindset, which are not inherently responses to social oppression. Future research should consider the contexts and conditions under which students differentially develop critical awareness and a transformation impetus (Abrica, 2015, Abrica and Hatch-Tocaimaza, 2019) as well as other maladaptive responses like internalized racism and persevering at the cost of physical and emotional harm. This kind of research would extend, but be distinct from, prior work related to identity development and intersectionality.

The RRF emphasizes that individuals perpetually and continuously reappraise, reevaluate, reassess, and renegotiate racial meaning. This moves us beyond a static depiction of racial identity status as experienced by students of color. It more fully recognizes the ways in which students themselves may be interpellated by a system of hegemonic Whiteness, White supremacy, and racial oppression. It emphasizes agency rather than assuming a structurally deterministic vision of the subjective realities of students of color. A significant implication of this work is that it can not only drive us away from static, essentialist views of students of color but also move us away from misapplication of capitalist metaphors like cultural capital and wealth (McDonough and Abrica, 2021) to explain academic achievement. For example, students of color may be described as having various forms of cultural wealth. This work often identifies the familial, cultural, and community resources that motivate persistence and success among racially minoritized

groups in higher education (McDonough and Abrica, 2021, p. 13). The problem with these kinds of asset-based frames is that, like cultural deficit explanations of the past, they rely on casting dimensions of culture among ethnoracial groups as universally advantageous (or disadvantageous) (Warikoo and Carter, 2009). The ways in which capital is activated, transmitted, or translated into social power (Rios-Aguilar et al., 2011) remain unclear. Focusing on the cognitive processes associated with the racial (re)appraisal process can move the field toward a more specific understanding of how individuals belonging to racially minoritized groups differentially appraise and respond to racializing experiences. Clarifying how race and racism are distinct from cultural identities is a much-needed area of research that would more meaningfully address race and racism in STEM.

10. Conclusion

Despite significant investment in expanding post-secondary access and success for racially minoritized populations in STEM fields, persistent educational disparities remain. A cannon of higher literature documents the myriad ways in which students of color experience exclusion within STEM fields on the basis of race (and, perhaps, other social identity statuses). This area of scholarship is not always theoretically grounded in an understanding of racial hierarchies, processes of racialization, or theories of race and racism. That is, despite the abundance of literature on students of color in STEM, there is comparatively limited theoretical attention to race itself, which subsequently limits conceptual understanding of the complexities associated with navigating and negotiating STEM contexts. For example, an emphasis on the presumed detrimental or beneficial experiences and outcomes associated with racial minority status may oversimplify the complexity of how race and racism are subjectively experienced at the individual level. Specifically, an individual's attempt to understand, navigate, negotiate, or *reappraise* their racialized status and persist in an inherently stratified, racialized system of educational opportunity is lost when we apply

essentialist ideas about race and/or reinforce a dichotomous idea about advantageous or detrimental consequences of racial minority status. This theoretical paper advanced a conceptual model—the racial reappraisal framework—to more fully account for the complex cognitive work students of color engage in when they consider and experience racialization and racism.

References

Abrica, E. J. (2015). "Thank God I'm Mexican": Cognitive racial reappraisal strategies among Latino engineering students [Doctoral dissertation, University of California].

Abrica, E. J. (2019). Later-generation Mexican Americans and the development of a transformational impetus. *Association of Mexican American Educators (AMAE) Journal*, 13(1). https://doi.org/10.24974/amae.13.1.437

Abrica, E. J., & Dorsten, A. (2020). How students think about race: Exploring racial conceptions and their implications for student success among Latino male community college students. *New Directions for Community College*, 2020(190), 69–85. https://doi.org/10.1002/cc.20388

Abrica, E. J., & Hatch-Tocaimaza, D. (2019). Exploring the multidimensional nature of oppressive campus environments and the development of a transformational impetus. *The Review of Higher Education*, 43(1), 483–517. https://doi.org/10.1353/rhe.2019.0103

Abrica, E. J., Hatch-Tocaimaza, D., & Abrica, B. (2020a). Sueños de los flyover states: Narratives of Latino males in the great plains. *Community College Journal of Research and Practice*, 44(3), 224–237. https://doi.org/10.1080/10668926.2019.1567405

Abrica, E. J., Hatch-Tocaimaza, D., & Rios-Aguilar, C. (2021). On the impossibilities of advancing racial justice in higher education research through reliance on the campus climate heuristic. *Journal of Diversity in Higher Education*. https://doi.org/10.1037/dhe0000323

Abrica, E. J., Lane, T. B., Zobac, S., & Collins, E. (2020b). Sense of belonging and community building within a STEM intervention program: A focus on Latino male undergraduates' experiences. *Journal of Hispanic Higher Education*. https://doi.org/10.1177/1538192720974884

Abrica, E. J., & Martinez, E. (2016). Strategies for navigating financial challenges by race, gender, and immigrant generation: Implications for persistence of Latino male community college students. *Journal of Applied Research in the Community College*, 23(2), 59–72.

Abrica, E. J., Morales, A., & Naveja, E. (2019a). *"A passion for helping people": How Latina community college students' altruistic motivations contribute to forward momentum*. Paper presentation at annual meeting of American Education Research Association (AERA), Toronto, CA.

Abrica, E. J., Xiong, S., & Yao, C. (2019b). *"We always look happy": Racial meaning-making among AAPI women in community colleges*. Paper presentation at annual meeting of American Education Research Association (AERA). Toronto, CA.

Acuña, R. (1972). *Occupied America: A history of Chicanos*. New York: Harper Collins.

Alemán, S. M., & Gaytán, S. (2017). 'It doesn't speak to me': Understanding student of color resistance to critical race pedagogy. *International Journal of Qualitative Studies in Education*, 30(2), 128–146. https://doi.org/10.1080/09518398.2016.1242801

Baber, L. D. (2015). Considering the interest-convergence dilemma in STEM education. *The Review of Higher Education*, 38(2), 251–270. https://doi.org/10.1353/rhe.2015.0004

Baber, L. D., Chapman, R., Cox, M. F., Madden, K., Pereira, P., Rezvi, S., & Thomas, K. M. (2019). *Diversifying STEM: Multidisciplinary perspectives on race and gender*. Rutgers University Press.

Bonilla-Silva, E. (2010). *Racism without racists: Color-blind racism and the persistence of racial inequality in the United States* (3rd ed.). Lanham, MD: Rowman & Littlefield Publishers.

Brondolo, E., Blair, I. V., Kaur, A., Major, B., Dovidio, J. F., & Link, B. G. (2017). *The Oxford handbook of stigma, discrimination, and health*. Oxford University Press.

Brondolo, E., ver Halen, N. B., Libby, D., & Pencille, M. (2011). Racism as a psychosocial stressor. In R. J. Contrada & A. Baum (Eds.), *The handbook of stress science: Biology, psychology, and health* (p. 167–184). Springer Publishing Company.

Buhle, J. T., Silvers, J. A., Wager, T. D., Lopez, R., Onyemekwu, C., Kober, H., Weber, J., & Ochsner, K. N. (2014). Cognitive reappraisal of emotion: A meta-analysis of human neuroimaging studies. *Cerebral Cortex*, 24(11), 2981–2990. https://doi.org/10.1093/cercor/bht154

Cabrera, N. L. (2018). Where is the racial theory in critical race theory?: A constructive criticism of the crits. *The Review of Higher Education*, 42(1), 209–233.

Cabrera, N. L., Franklin, J. D., & Watson, J. S. (2017). Whiteness in higher education: The invisible missing link in diversity and racial analyses. *ASHE Higher Education Report,* 42(6), 7–125. https://doi.org/10.1002/aehe.20116

Garibay, J. C. (2018). Beyond traditional measures of STEM success: Long-term predictors of social agency and conducting research for social change. *Research in Higher Education,* 59(3), 349–381. https://doi.org/10.1007/s11162-017-9470-2

Garibay, J. C. (2020). Can Holland's person-environment fit theory produce troubling outcomes for racial/ ethnic underrepresented students in STEM? An analysis of social agency. *JCSCORE,* 6(2), 136–176.

Garnefski, N., & Kraaij, V. (2007). The cognitive emotion regulation questionnaire. *European Journal of Psychological Assessment*, 23(3), 141–149.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

James, A. (2001). Making sense of race and racial classification. *Race and Society*, 4(2), 235–247. https://doi.org/10.1016/S1090-9524(03)00012-3

James-Gallaway, C., Abrica, E., & Swarat, S. (2021). *Anti-Blackness within a four-year Hispanic serving institutional context: How Black male narratives trouble "cross-racial" interactions*. Paper presentation at annual meeting of American Education Research Association (AERA). Virtual conference.

Johnston, M. P. (2014). The concept of race on campus: Exploring the nature of college students' racial conceptions. *Journal of College Student Development*, 55(3), 225–242. https://doi.org/10.1353/csd.2014.0023

Johnston, M. P., Ozaki, C. C., Pizzolato, J. E., & Chaudhari, P. (2014). Which box(es) do I check? Investigating college students' meanings behind racial identification. *Journal of Student Affairs Research and Practice*, 51(1), 56–68. https://doi.org/10.1515/jsarp-2014-0005

Johnston, M. P., Pizzolato, J. E., & Kanny, M. A. (2015). Examining the significance of "race" in college students' identity within a "postracial" era. *Journal of College Student Development*, 56(3), 227–242. https://doi.org/10.1353/csd.2015.0023

Johnston-Guerrero, M. P. (2016a). Embracing the messiness: Critical and diverse perspectives on racial and ethnic identity development. *New Directions for Student Services*, 154, 43–54. https://doi.org/10.1002/ss.20174

Johnston-Guerrero, M. P. (2016b). The meanings of race matter: College students learning about race in a not-so-postracial era. *American Educational Research Journal*, 53(4), 819–849. https://doi.org/10.3102/0002831216651144

Kendig, C. (2011). Race as a physiosocial phenomenon. *History and Philosophy of the Life Sciences*, 33(2), 191–221.

Lee, W. C. (2019). Pipelines, pathways, and ecosystems: An argument for participation paradigms. *Journal of Engineering Education*, 108(1), 8–12. https://doi.org/10.1002/jee.20241

Luedke, C. L. (2020). Lifting while we climb: Undergraduate students of color communal uplift and promotion of college-going within their communities. *The Review of Higher Education*, 43(4), 1167–1192. https://doi.org/10.1353/rhe.2020.0016

Lynn, M., Yosso, T. J., Solórzano, D. G., & Parker, L. (2002). Critical race theory and education: Qualitative research in the new millennium. *Qualitative Inquiry*, 8(1), 3–6. https://doi.org/10.1177/107780040200800101

Martín Alcoff, L. (1999). Towards a phenomenology of racial embodiment. *Radical Philosophy*, 95, 15–26.

McCoy, D. L., Luedke, C. L., & Winkle-Wagner, R. (2017). Encouraged or "weeded out" in the STEM disciplines: Students' perspectives on faculty interactions within a predominantly White and a historically Black institution. *Journal of College Student Development*, 58(5), 657–673. https://doi.org/10.1353/csd.2017.0052

McDonough, P., & Abrica, E. (2021). Toward a (re)integrated application of Bourdieuan theory. *Urban Education*. https://doi.org/10.1177/00420859211016517

McGee, E. (2018). "Black genius, Asian fail": The detriment of stereotype lift and stereotype threat in high-achieving Asian and Black STEM students. *AERA Open*, 4(4). https://doi.org/10.1177/2332858418816658

McGee, E., Griffith, D., & Houston II, S. (2019). "I know I have to work twice as hard and hope that makes me good enough": Exploring the stress and strain of Black doctoral students in engineering and computing. *Teachers College Record*, 121(4), 1–38.

McGee, E. O., & Martin, D. B. (2011). "You would not believe what I have to go through to prove my intellectual value!" Stereotype management among academically successful Black mathematics and engineering students. *American Educational Research Journal*, 48(6), 1347–1389. https://doi.org/10.3102/0002831211423972

McRae, K., Ciesielski, B., & Gross, J. J. (2012). Unpacking cognitive reappraisal: Goals, tactics, and outcomes. *Emotion*, 12(2), 250–255. https://doi.org/10.1037/a0026351

Memmi, A. (1965). *The colonizer and the colonized*. Boston: Beacon Press.

Mills, C. (1997). *The racial contract*. Cornell University Press.

Miles, M. L., Buenrostro, P. M., Marshall, S. A., Adams, M., & McGee, E. O. (2019). Cultivating racial solidarity among mathematics education scholars of color to resist White supremacy. *The International Journal of Critical Pedagogy*, 10(2).

Morales, A. R. (2019). Valuing rural dexterity: Experiential funds of knowledge, science education, and rural kids. *Great Plains Research*, 29(1), 33–40. https://doi.org/10.1353/gpr.2019.0004

Museus, S. D., Ledesma, M. C., & Parker, T. L. (2015). Racism and racial equity in higher education. *ASHE Higher Education Report*, 42(1). https://doi.org/10.1002/aehe.20067

Núñez, A. M. (2014). Employing multilevel intersectionality in educational research: Latino identities, contexts, and college access. *Educational Researcher*, 43(2), 85–92. https://doi.org/10.3102/0013189X14522320

Omi, M., & Winant, H. (1994). *Racial formation in the United States: From the 1960s to the 1990s*. Routledge.

Padilla, M., Yañez, J., Abrica, E. (2021) *Cosechando Esperanza*: *Rural Latino/a/x students access and success in postsecondary education*. Paper presentation at annual meeting of the American Association of Hispanics in Higher Education (AAHHE). Virtual conference.

Rincón, B. E., & Rodriguez, S. (2021). Latinx students charting their own STEM pathways: How community cultural wealth informs their STEM identities. *Journal of Hispanic Higher Education*, 20(2), 149–163. https://doi.org/10.1177/1538192720968276

Rios-Aguilar, C., Kiyama, J. M., Gravitt, M., & Moll, L. C. (2011). Funds of knowledge for the poor and forms of capital for the rich? A capital approach to examining funds of knowledge. *Theory and Research in Education*, 9(2), 163–184. https://doi.org/10.1177/1477878511409776

Rodriguez, S. L., Bukoski, B. E., Cunningham, K. J., & Jones, A. (2020). Critiquing oppression and desiring social justice: How undergraduate Latina students in STEM engage in acts of resistance. *Journal of Women and Gender in Higher Education*, 13(3), 251–267. https://doi.org/10.1080/26379112.202 0.1838297

Rodriguez, S. L., Doran, E. E., Sissel, M., & Estes, N. (2019). Becoming la ingeniera: Examining the engineering identity development of undergraduate Latina students. *Journal of Latinos and Education*, 1–20. https://doi.org/10.1080/15348431.2019.1648269

Schmader, T., Johns, M., & Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review*, 115(2), 336–356. https://doi.org/10.1037/0033-295X.115.2.336

Serpas, D. G. (2021). Everyday discrimination and mental health symptoms among Hispanic and non- Hispanic students of color attending a Hispanic serving institution. *Health Equity*, 5(1), 316–323. https://doi.org/10.1089/heq.2020.0095

Serpas, D. G., García, J. J., & Arellano-Morales, L. (2020). A path model of racial/ethnic discrimination and cardiovascular disease risk factors among college students of color. *Journal of American College Health*, 1–5. https://doi.org/10.1080/07448481.2020.1841772

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69(5), 797.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52, 613–629.

Stein, S. (2019). Beyond higher education as we know it: Gesturing towards decolonial horizons of possibility. *Studies in Philosophy and Education*, 38(2), 143–161. https://doi.org/10.1007/s11217-018-9622-7

Vakil, S., & Ayers, R. (2019). The racial politics of STEM education in the USA: Interrogations and explorations. *Race Ethnicity and Education*, 22(4), 449–458. https://doi.org/10.1080/13613324.2019.1592831

Vossoughi, S., & Vakil, S. (2018). Toward what ends? A critical analysis of militarism, equity, and STEM education. In A. I. Ali & T. L. Buenavista (Eds.), *Education at war: The fight for students of color in America's public schools* (pp. 117–140). Fordham University Press. https://doi.org/10.1515/9780823279111-007

Warikoo, N., & Carter, P. (2009). Cultural explanations for racial and ethnic stratification in academic achievement: A call for a new and improved theory. *Review of Educational Research*, 79(1), 366–394. https://doi.org/10.3102/0034654308326162

Watson, K. T. (2019). *Revealing and uprooting cellular violence: Black men and the biopsychosocial impact of racial microaggressions* (Doctoral dissertation, UCLA).

Williams, D. T. (2019). A call to focus on racial domination and oppression: A response to "racial and ethnic inequality in poverty and affluence, 1959–2015." *Population Research and Policy Review*, 38(5), 655–663. https://doi.org/10.1007/s11113-019-09538-x

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education*, 8(1), 69–91.