Risk and resilience: A preliminary examination of the race-based disparities in stress and sleep in context model among black medical students

By

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A dissertation submitted in partial fulfillment of

the requirements for the degree of

Doctor of Philosophy

(Counseling Psychology)

at the

UNIVERSITY OF WISCONSIN—MADISON

2019

Date of final oral examination: 2/26/2019

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ABSTRACT

Black medical students experience unique race-based stressors within the medical training environment that compromise their psychological and professional well-being, as well as their motivations to remain in medicine. Such detriments may undermine broader efforts to diversify the medical workforce, and by extension, reduce health disparities. The Race-based Disparities in Stress and Sleep in Context (RDSSC) model predicts that specific coping resources may alter racial minority students' appraisals of race-based stressors and facilitate coping responses that promote psychological and educational well-being. This study examined the validity of race-based stress and coping pathways theorized within the RDSSC model among a national sample of Black medical students. An online survey was administered that assessed participant demographics and measures of race-based stressors, internal and external coping resources, coping response, psychological distress, and educational outcomes. Regression analyses were conducted to examine coping response as a mediator of the relationship between race-based stressors and mental health and educational outcomes, and between coping resources and mental health and educational outcomes. Structural Equation Modeling was employed to assess the overall fit of study data to the RDSSC model. Partial support was found for race-based stress and coping pathways theorized within the RDSSC model. Study findings regarding the influence of race-based stressors, coping resources, and coping response on mental health and educational outcomes have implications for medical education and Black medical student well-being. Additional institutional and individual-level interventions to reduce the occurrence of race-based stressors and increase the availability of coping resources among Black medical students are warranted.

Acknowledgements

"Change will not come if we wait for some other person or some other time. We are the ones we've been waiting for. We are the change that we seek." –Barak Obama

I extend my sincerest gratitude to my family, friends, and lifelong mentors for their steadfast guidance and support throughout the dissertation process. I would also like to thank and acknowledge the countless faculty, staff, and medical students across the country who helped (and encouraged) me to complete this special project. We did it.

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Chapter I

INTRODUCTION

Statement of the Problem

By the year 2050, the U.S. Census Bureau estimates that racial/ethnic minorities will comprise the majority of the total population in the United States (U.S. Census Bureau, 2010). As such, it is essential that institutions of higher education work towards cultivating a more diversified and inclusive learning community and workforce. This is particularly true in the field of medicine where a history of racial exclusion and discrimination continues to contribute to an underrepresentation of practicing Black physicians and medical students (Nivet, 2010; Steinecke & Terrell, 2010; Sullivan & Mittman, 2010). Currently, Black Americans make up roughly 12 percent of the general population, yet just six percent of the medical student body (AAMC, 2015). This rate has remained stagnant for over 20 years (Nivet, 2010; Sullivan & Mittman, 2010). A persistent underrepresentation of Black physicians and trainees not only stymies the development of a more culturally representative medical workforce, but also threatens efforts to reduce ongoing racial disparities in health and education.

Race-Based Stressors

A review of the literature suggests that Black medical students endure considerable social challenges throughout their medical training, some of which directly relates to their minority racial identity status. Salient racial experiences documented among this group include marginalization, prejudice and discrimination, difficulty establishing peer-support networks and working relationships, and lack of same-race role models and mentors (Ansell & McDonald, 2015; Bright, Duefield, & Stone, 1998; Bullock & Houston, 1987; Coombs & King, 2005; Strayhorn & Frierson, 1989). The occurrence of such race-related experiences within an academic

environment is considered a psychological and sociocultural stressor that uniquely impacts racial minority students above and beyond the everyday rigors of academic learning (Cabrera, Nora, Patrick, Pascarella, & Hagedorn, 1999; Greer & Brown, 2011; Greer, Ricks, & Baylor, 2015).

Research suggests that Black students experience racially discriminatory events and prejudicial attitudes at the individual, collective, and institutional level (Brondolo, Brady Ver Halen, Pencille, Beatty, & Contrada, 2009). Moreover, perpetrators of racial prejudice and discrimination include peers and academic instructors (Benner & Graham, 2013). For instance, D'Augelli and Hersberger (1993) found that 41 percent of Black college students reported frequently hearing racial remarks and 59 percent reported being the target of racial insults within their institutional environments. In a qualitative examination of perceptions of racism among Black medical students, Bullock and Houston (1987) found that 30 out of 31 participants reported experiencing racism in medical school. Specifically, participants most commonly reported being treated as intellectually inferior to their White counterparts, feeling invisible to peers and faculty, feeling unfairly evaluated by clinical supervisors, and overhearing negative attitudes expressed towards Black patients (Bullock & Houston, 1987).

A growing body of literature indicates that race-based social stressors may contribute to negative outcomes among racial minority students. Within the medical training environment, scholars posit that race-based stressors undermine Black medical students' psychological adjustment and well-being (Perry et al., 2015) and place them at greater risk for academic difficulties (Bright et al., 1998; Strayhorn & Frierson, 1989). Over the long term, some scholars conjecture that chronic exposure to race-based stressors may compromise the career productivity and engagement of Black physicians (Nunez-Smith et al., 2007). For example, studies demonstrate associations between workplace discrimination and physician job turnover, career

satisfaction, and career change (Glymour, Saha, & Bigby, 2004; Nunez-Smith, Pilgrim, Wynia, Desai, Bright, et al., 2009; Nunez-Smith, Pilgrim, Wynia, Desai, Jones, et al., 2009). Nunez-Smith and colleagues (2007) argued that these career-related outcomes may be a consequence of "racial fatigue", which they defined as, "the potential emotional and psychological sequelae of feeling isolated in a work environment in which race regularly influences behavior but is consistently ignored" (p. 49).

Theoretical Framework: Race-Based Disparities in Stress and Sleep in Context Model

Given the heightened exposure of racial minorities to race-based social stressors, and its implications for psychological, educational, and occupational well-being (Brondolo et al., 2009; Levy, Heissel, Richeson, & Adam, 2016), considerable effort has been put towards developing conceptual frameworks to further explicate the stress-distress process. Preexisting conceptual models of discrimination (e.g., R. Clark, Anderson, Clark, & Williams, 1999) build from Lazarus and Folkman's (1984) stress and coping paradigm. Lazarus and Folkman (1984) asserted that psychological stress arises out of an individual's relationship, or "transaction", with an environment that taxes or exceeds the availability of coping resources (p. 63). More recent extensions of this work proposed relationships between various biopsychosocial factors (e.g., sociodemographic, psychological, and behavioral factors) and perceptions of discrimination and specific health-related outcomes (e.g., depression, heart disease, blood pressure; Clark et al. 1999). While informative, such frameworks preclude an explanation of how perceived discrimination, a type of race-based stressor, might influence other significant life domains such as educational and occupational well-being. Levy, Hiessel, Richeson, and Adam (2016) recently addressed this deficit by proposing a comprehensive model linking race-based stressors and coping processes to mental and physical health, as well as educational outcomes.

The Race-Based Disparities in Stress and Sleep in Context model (RDSSC; see Figure 1.1; Levy et al., 2016) contends that educational and workforce disparities are partially explained by race-based stressors, such as perceived discrimination, and by an individual's underlying psychological and biological responses to such stressors. According to RDSSC, psychological (i.e., anxiety and distress) and biological responses (i.e., hormonal alterations and cardiovascular reactivity) to race-based stressors affect cognitive functioning, academic motivation, and performance. These impacted domains, in turn, have implications for educational and occupational achievement, as well as for mental and physical health outcomes. The RDSSC further posits that individual and environmental factors such as lifelong exposure to environmental stressors, access to resources and supports, and individual coping efforts influence racial/ethnic minority individual's perceptions of and responses to race-based stressors. These factors are posited to attenuate or exacerbate the negative impact of race-based stress on academic and career outcomes, as well as overall well-being (Levy et al., 2016). For example, racial/ethnic minority students from low resourced environments may experience a greater magnitude of daily stressors (e.g., familial financial strain, neighborhood safety), further compounding the negative effects of race-based stressors within academic contexts (Levy et al., 2016; Myers, 2009). These students also may have fewer resources and supports (e.g., invested teachers, positive racial socialization messages, and academic role models) to promote coping and self-efficacy in response to race-based stressors occurring in school (Levy et al. 2016). Together, these inputs may increase students' vulnerability to poor psychological health and academic underperformance and disengagement.

Given the recent development of the RDSSC theoretical framework and its potential contribution to research in racial disparities in health and education, additional testing of its

proposed pathways is warranted. To date, no empirical investigation has used a comprehensive model such as the RDSSC to examine within-group variabilities in the impacts of race-based stressors such as perceived discrimination among Black medical students. Consequently, little is known about factors facilitative of psychological and educational well-being among this high achieving group. Applying the RDSSC framework to the Black medical student population offers an opportunity to empirically investigate the extent to which specific internal and external resources may alter perceptions of and responses to race-based stressors such as perceived discrimination. Further elucidation of the proposed pathways outlined in the RDSSC model, and its influence on psychological and academic well-being represents an essential step in addressing current racial disparities in achievement and well-being within the medical workforce.

Impacts of Discrimination on Mental Health and Educational and Career Outcomes

A body of research substantiates the negative impacts of perceived race-based discrimination on a range of mental health outcomes including depression, psychological distress, anxiety, and well-being (Brondolo et al., 2009; R. Clark et al., 1999). Findings from a meta-analytic review indicate that strong associations exist between perceptions of discrimination and each of these mental health outcomes in samples of children, adolescents, and adults (Pascoe & Smart Richman, 2009).

Detrimental effects of perceived race-based discrimination on mental health also extend to Black students (Brody et al., 2006; Burrow & Ong, 2010; English, Lambert, & Ialongo, 2014; Greer & Brown, 2011; Pieterse, Carter, Evans, & Walter, 2010; Smith, Peterson, Degenhardt, & Johnson, 2007). For example, Brody et al. (2006) found that perceptions of racial discrimination among Black adolescents related positively to depressive symptoms and stress and related negatively to self-esteem and psychological well-being. Research conducted among Black

medical students demonstrated similar findings. Utilizing baseline data from a larger national longitudinal cohort study of 4,732 medical students, Perry and colleagues (2015) examined the impact of racial discrimination on dimensions of psychological well-being and feelings of social acceptance among 243 Black medical students. Self-report data demonstrated that everyday discrimination positively predicted depression, anxiety, perceived stress, and fatigue. Experiences of discrimination were also negatively associated with self-esteem and feelings of acceptance within the medical school environment.

In addition to its impacts on mental health, research suggests that perceived race-based discrimination also may affect educational and occupational pursuits across multiple stages of development. Among racial/ethnic minority students, perceptions of racial discrimination negatively affect educational outcomes such as academic motivation and engagement (Chao, Mallinckrodt, & Wei, 2012; Chavous, Rivas-Drake, Smalls, Griffin, & Cogburn, 2008; Eccles, Wong, & Peck, 2006; Okeke, Howard, Kurtz-Costes, & Rowley, 2009). For example, Eccles, Wong, and Peck (2006) found that experiences of perceived racial discrimination from teachers and peers predicted declines in Black adolescent students' grades, academic self-concept, and academic task values. In another study, Chao, Mallinckrodt, and Wei (2012) examined archival data from 1,555 Black college students and found associations between perceptions of racial discrimination and negative academic outcomes such as increased test anxiety and decreased levels of institutional adjustment. Studies conducted among racial/ethnic minorities in the workforce indicate negative associations exist between perceived racial discrimination, job satisfaction, and organizational commitment (Ensher, Grant-Vallone, & Donaldson, 2001; Gutek, Cohen, & Tsui, 1996; Nunez-Smith, Pilgrim, Wynia, Desai, Bright, et al., 2009; Sanchez & Brock, 1996). Perceptions of racial discrimination also have been linked to decreased levels of

organizational participation, career advancement, and skill development (Mays, Coleman, & Jackson, 1996). Taken together, based upon findings from prior literature and the pathways posited in the RDSSC, the following hypotheses related to perceived race-based discrimination were proposed:

- **Hypothesis 1a:** General experiences of perceived race-based discrimination will positively relate to symptoms of stress, anxiety, and depression.
- **Hypothesis 1b:** General experiences of perceived race-based discrimination will negatively relate to academic performance and career commitment.
- **Hypothesis 1c:** Perceptions of adverse institutional racial climate will positively relate to symptoms of stress, anxiety, and depression.
- **Hypothesis 1d:** Perceptions of adverse institutional racial climate will negatively relate to academic performance and career commitment.

Internal Coping Resources and Buffers

Principles of stress and coping assert that the individual impact of a stressor depends upon how threatening an individual appraises the stressor to be (Lazarus & Folkman, 1984). The appraisal of a stressor partially depends upon the availability of ones' coping resources (Burchfield, 1979; R. Clark et al., 1999; Levy et al., 2016). As such, bolstering internal resources that may influence their perceptions of, and responses to, race-based stressors seem essential.

Dimensions of racial identity have been identified as an influential individual resource for Black Americans exposed to race-based stress. Some scholars posit that racial regard, a dimension of identity that reflect feelings of pride and belonging, may foster general feelings of well-being among Black Americans (Brondolo et al., 2009). Studies suggest that private racial regard, in particular, which is defined as feelings of positivity towards being Black (e.g., Sellers,

Chavous, & Cooke, 1998), may act as a psychological buffer against some of the negative effects of perceived discrimination (Brondolo et al., 2009). For example, among Black youth, higher private racial regard has been demonstrated to attenuate the effects of discrimination on academic outcomes (Eccles et al., 2006; Wong, Eccles, & Sameroff, 2003) and psychological well-being (Caldwell, Zimmerman, Bernat, Sellers, & Notaro, 2002; R. Sellers, C. Caldwell, K. Schmeelk-Cone, & M. Zimmerman, 2003). Similar findings have emerged among Black graduate students. Burrow and Ong (2010) examined the impact of two dimensions of racial identity on perceptions of discrimination among 174 Black doctoral students. These researchers found that individuals with higher private racial regard were less likely to report perceptions of daily encounters of racial discrimination compared to those lower in private racial regard, and that racial regard negatively correlated with trait-level depression. Given such findings, these scholars posit that racial regard shapes the meaning that one places on their group membership and alters perceptions of and responses to race-based stressors (R. Sellers et al., 2003).

Private racial regard may operate as an individual psychological resource that is particularly facilitative of well-being among Black students in academic contexts. When faced with racially stressful environmental stimuli, medical students with positive racial regard may be less likely to experience a stress response that undermines their psychological health and academic performance. Over the long term, this resource may increase their commitment and engagement within a medical career. Based upon these findings and the pathways posited in the RDSSC, the following hypotheses were proposed:

- **Hypothesis 2a**: Private racial regard will negatively relate to symptoms of stress, anxiety, and depression.

- **Hypothesis 2b**: Private racial regard will positively relate to anticipated academic performance and career commitment.

External Coping Resources and Buffers

Social support, conceptualized as an external coping resource in the RDSSC, is posited to play a buffering role in the stress-distress relationship (S. Cohen & Wills, 1985; Cutrona & Russell, 1987; Dumont & Provost, 1999; Levy et al., 2016). Social support includes various forms of support (ex. informative, emotional, and instrumental) from multiple sources (e.g., family, friends, mentors, etc.; Cutrona & Russell, 1987). Researchers contend that social support serves a number of protective functions within an interpersonal context including emotional nourishment, self-esteem promotion, information and feedback transmission, and provision of tangible assistance (Cutrona & Russell, 1987). Literature on racial/ethnic minorities suggests that general social support may act as a buffer against the psychological effects of race-based stressors (Seawell, Cutrona, & Russell, 2014).

Within an academic domain, scholars (Brown, 1995; Hackett & Byars, 1996) contend that role models provide a specific source of support facilitative of racial minority student well-being. According to Brown (1995), the occurrence of race-based stressors within academic environments (i.e., perceived discrimination) threatens the career development of Black students by eroding their academic and career self-efficacy beliefs. Role models may serve as exemplars that promote positive career-related expectations as well as efficacy to persist through obstacles and setbacks (Brown, 1995; Hackett & Byars, 1996; Lent, 1994; Nauta & Kokaly, 2001; Zirkel, 2002). A small body of empirical evidence supports this notion. For example, a longitudinal study conducted by Zirkel (2002) found that academic performance and achievement-related goal setting was greater among racial minority students who identified as having a role model

compared to those without a role model. Extending these findings to the medical school environment, where little is known about the impact of role models on Black students' academic performance may offer promising insights into its protective function. Based upon these findings and the pathways posited in the RDSSC, the following hypotheses were proposed:

- **Hypothesis 3a:** General social support will negatively relate to symptoms of depression, anxiety, and stress.
- **Hypothesis 3b:** General social support will positively relate to academic performance and career commitment.
- **Hypothesis 3c** Academic and career support from an influential other will relate negatively to symptoms of depression, anxiety, and stress.
- **Hypothesis 3d:** Academic and career support from an influential other will relate positively to academic performance and career commitment.

Psychological and Physiological Responses to Stress

The stress and coping literature posits that the appraisal of a stressful stimulus activates both a stress and coping response (e.g., R. Clark et al., 1999; Lazarus & Folkman, 1984). Extensive research suggests that stress responses to race-based stressors, such as perceived discrimination, commonly include anxiety, anger, and psychological distress (Brondolo et al., 2009; R. Clark et al., 1999; Pascoe & Smart Richman, 2009). At a physiological level, stress responses cause disruptions to the autonomic nervous system, the hypothalamic-pituitary-adrenal (HPA) axis, the immune system, and sleep (G. E. Miller, Chen, & Zhou, 2007). In turn, research suggests that these physiological detriments may also compromise key cognitive processes needed for optimal learning and performance (Levy et al., 2016). Specifically, researchers posit that the confluence of psychological and physiological disruptions occurring during a stress

response occupies one's attentional resources, leading to deficits in information processing and encoding (Hubbard & Blyler, 2016). Among students, multiple studies demonstrate that stress and anxiety inhibit academic learning via decrements in working memory and attention (Andrews & Wilding, 2004; Beilock & Decaro, 2007; Eysenck, Derakshan, Santos, & Calvo, 2007; Liston, McEwen, & Casey, 2009; Schmader, Johns, & Forbes, 2008). Consistent with these findings, the RDSSC theorizes that race-based stressors such as perceived discrimination will elicit negative psychological and physiological reactions that undermine the psychological health and academic performance of racial minority students (Levy et al., 2016).

Cognitive Reappraisal as a Mediating Coping Response

Stress and coping theory posits that the intensity and duration of one's psychological and physiological stress response will be mediated by their coping response to the stressor (Burchfield, 1979; R. Clark et al., 1999; Lazarus & Folkman, 1984; Levy et al., 2016). Coping responses broadly describe any efforts used to deal with stressful events and generally involve the management of ones' thoughts, emotions and behaviors. While adaptive coping responses mitigate harmful psychological and physiological stress responses to race-based stressors, maladaptive coping responses further exacerbate psychological and physiological arousal (Burchfield, 1979; R. Clark et al., 1999; Selye, 1976). Therefore, understanding the extent to which racial minority students are impacted by race-based stressors within their surrounding environment not only requires insight into their appraisal processes, but also their coping processes. For this reason, the RDDSSC proposes that students' individual coping responses mediate the relationship between race-based stressors and psychological and academic outcomes.

Emotion regulation represents one dimension of an individual's coping response to stress that may have significant implications for one's subsequent functioning and well-being (J. Gross,

2002; J. Gross & John, 2003; J. Gross & Thompson, 2007; J. J. Gross, 1998; Levy et al., 2016; Melka, Lancaster, Bryant, & Rodriguez, 2011). Emotion regulation pertains to behavioral and cognitive strategies used to change the valence of an emotional experience (J. Gross & Thompson, 2007). Literature on coping suggests that individuals vary widely in the specific emotion regulation strategies they employ in response to perceived stressors, and that some strategies provide greater benefit than others (Troy, Wilhelm, Shallcross, & Mauss, 2010). For example, cognitive reappraisal, an emotion regulation strategy that involves mentally reframing an event into a more positive light, has been identified as a particularly useful emotion regulation strategy. A growing body of literature suggests that compared to other emotion regulation strategies, the use of cognitive reappraisal in response to stressful stimuli promotes better psychological well-being and performance (Johns, Inzlicht, & Schmader, 2008; Troy et al., 2010). Studies have linked cognitive reappraisal with greater interpersonal functioning and prosocial behaviors among samples of adolescents and adults (Gomez-Ortiz, Romera, Ortega-Ruiz, Cabello, & Fernandez-Berrocal, 2015; J. Gross & Thompson, 2007; Nezlek & Kuppens, 2008).

Within performance domains, researchers posit that reappraisal strategies help individuals to view perceived threats more objectively, which in turn decreases the extent to which psychological and physiological arousal depletes the availability of one's cognitive resources needed for learning and performance (Gross & Thompson, 2007). To this end, the RDSSC model proposes that cognitive reappraisal may be a specific emotion regulation strategy that facilitates more adaptive coping responses to race-based stressors among racial minority students (Levy et al., 2016). Support for the utility of this strategy within an academic context comes from John, Inzlicht, and Schmader (2008) who examined the impact of reappraisal

strategies on the test taking performance of racial/ethnic minority college students. Findings indicated that students who were taught reappraisal strategies (e.g., instructed to view their anxiety as helpful rather than harmful) performed better on math and working memory tasks when compared to students instructed to suppress their emotions.

To date, no studies have assessed the specific emotion regulation strategies used among Black medical students experiencing and coping with race-based stressors within their training environments. Examining the extent to which cognitive reappraisal may mediate associations between race-based stressors, coping resources, and psychological and career-related outcomes among this group of students warrants further investigation. Based upon this research and pathways posited in the RDSSC model, the following hypotheses were proposed:

- **Hypothesis 4a:** Cognitive reappraisal will mediate the relationship between ambient racial discrimination (e.g., perceived racial discrimination) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 4b:** Cognitive reappraisal will mediate the relationship between ambient racial discrimination (e.g., perceived racial discrimination) and educational outcomes (e.g., perceived academic performance and career commitment).
- **Hypothesis 4c:** Cognitive reappraisal will mediate the relationship between ambient racial discrimination (e.g., perceptions of institutional racial climate) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 4d**: Cognitive reappraisal will mediate the relationship between ambient racial discrimination (e.g., perceptions of institutional racial climate) and educational outcomes (e.g., perceived academic performance and career commitment).

- **Hypothesis 4e:** Cognitive reappraisal will mediate the relationship between coping resources (e.g., private racial regard) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 4f:** Cognitive reappraisal will mediate the relationship between coping resources (e.g., private racial regard) and educational outcomes (e.g., perceived academic performance and career commitment).
- **Hypothesis 4g:** Cognitive reappraisal will mediate the relationship between coping resources (e.g., general social support) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 4h:** Cognitive reappraisal will mediate the relationship between coping resources (e.g., general social support) and educational outcomes (e.g., perceived academic performance and career commitment).
- **Hypothesis 4i:** Cognitive reappraisal will mediate the relationship between coping resources (e.g., academic and career support) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 4j:** Cognitive reappraisal will mediate the relationship between coping resources (e.g., academic and career support) and educational outcomes (e.g., perceived academic performance and career commitment).

Summary

In addition to the inherent rigors of medical school training, the surrounding training environment may impose racially salient threats upon Black medical students. These race-based stressors may not only compromise Black students' psychological well-being but also may negatively impact their academic performance and career motivations within the medical

profession. The RDSSC model (Levy et al., 2016) suggests that perceptions and impacts of race-based stressors on academic performance and psychological well-being is a function of an intersection of various contextual factors. The presence of specific internal and external resources are posited to operate as buffers against the deleterious effects of stressors like perceived racial discrimination, thereby facilitating psychological well-being and academic performance among racial minority students. At present, little is known about the extent to which these resources may buffer Black medical students from the deleterious effects of race-based stressors. According to the RDSSC (e.g., Levy et al., 2016), internal factors such as positive racial regard and external factors such as social support and influential others may promote more adaptive coping responses among those experiencing perceived race-based discrimination. Greater insight into the protective functions of these coping resources and responses is an essential step towards the advancement of the Black medical workforce and the health of the broader public.

This study utilized the RDSSC framework to examine the extent to which protective coping resources and adaptive coping responses mitigate the impacts of perceived race-based discrimination on mental health and academic well-being in a national sample of self-identifying Black medical students. Based upon the existing literature, and theorized pathways within the RDSSC model, it was hypothesized that Black medical students who possess greater internal (e.g., positive racial regard) and external coping resources (e.g., social support) will experience fewer psychological symptoms and academic difficulties in response to perceived race-based stressors compared to Black medical students with fewer internal and external coping resources. Additionally, cognitive reappraisal was hypothesized to mediate relationships between perceptions of race-based stress, coping resources, and psychological and educational outcomes.

Alternative Theoretical Relationships

While existing coping theories, including the RDSSC model, posit that cognitive appraisal fully mediates the relationship between stress (e.g., predictor) and well-being (e.g., outcome), alternative understandings of these relationships may exist. By accepting the current characterization of coping processes while adhering to the definition of statistical mediation (e.g., Baron & Kenny 1986), we presume that a proposed mediator (e.g., cognitive appraisal) is caused by a predictor variable (e.g., race-based stressors), and that the mediator then causes an outcome variable (e.g., well-being). Within the context of the RDSSC model, this interpretation suggests that experiencing race-based stressors, such as perceived racial discrimination, causes cognitive appraisals, and that these appraisals then cause outcomes such as mental health functioning and career-related performance. Additionally, a full mediation model indicates that no direct relationship exists between predictor (e.g., race-based stressors) and outcome (e.g., well-being) variables once controlling for a mediator such as cognitive appraisal (Baron & Kenny, 1986). Therefore, the RDSSC model predicts that race-based stressors only negatively influence individuals' well-being through the process of cognitive appraisal and that no residual relationship exists between race-based stress and well-being after this mediating variable is accounted for. Such assertions about the role and impact of cognitive appraisal is somewhat unintuitive and possibly overly simplistic, thus warranting further consideration of alternative conceptual explanations of the stress and coping process.

One alternative hypothesis worthy of further investigation is that cognitive appraisal partially mediates relationships between predictor and outcome variables proposed within the RDSSC model. Existing literature on the impact of race-based stressors on well-being and performance suggests that sizable relationships exist between these variables. Given this

evidence, it seems reasonable to conjecture that the magnitude of these relationships will decrease, but remain present, after the mediating effects of cognitive appraisal are considered.

A second alternative hypothesis involves a reconceptualization of cognitive appraisal altogether. For example, it may be more reasonable to characterize cognitive appraisal as a pre-existing psychological trait or personality style that differentially influences how an individual understands and interprets events such as perceived race-based discrimination. Within the RDSSC model, this conceptualization would suggest that one's cognitive appraisals moderate, rather than mediate, the relationship between race-based stressors and well-being. At least one study (e.g., Yoo & Lee, 2005) has embraced this alternative explanation by testing cognitive restructuring as a buffer (e.g., moderator) of the effects of discrimination on well-being. This understanding of the buffering effects of cognitive appraisal may also apply to coping resources proposed within the RDSSC (e.g., coping resources moderate the relationship between race-based stressors and outcomes of interest).

Importantly, statistical mediation and moderation are not mutually exclusive; both theoretical explanations could be correct. Given the possibility that multiple hypotheses might explain observed relationships between major dimensions of the stress and coping process (e.g., race-based stressors, coping resources, coping responses, and educational outcomes), the current study tested alternative pathways among variables in order to help to clarify the theoretical tenets of existing stress and coping process models. To this end, the current study examined cognitive reappraisal as (1) a partial mediator, and (2) a moderator of the relationship between all predictor and outcome variables of interest (see Figures 1.2-1.5). Similarly, proposed coping resources were examined as moderators of the relationship between perceived race-based stress and outcome variables (see Figure 1.6-1.7). Additionally, to assess the extent to which stress and

coping processes influence distinct domains of well-being, each outcome area (e.g., mental health and education) was examined separately. In summary, the following hypotheses were proposed:

- **Hypotheses 5a**: Cognitive reappraisal will partially mediate the relationships between ambient racial discrimination (e.g., perceived racial discrimination and institutional racial climate), coping resources (e.g., private regard, general social support, and academic support) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 5b**: Cognitive reappraisal will partially mediate the relationships between ambient racial discrimination (e.g., perceived racial discrimination and institutional racial climate), coping resources (e.g., private regard, general social support, and academic support) and educational outcomes (e.g., academic performance and career commitment).
- **Hypothesis 5c**: Cognitive reappraisal will moderate the relationships between race-based stressors (e.g., perceived racial discrimination and institutional racial climate), coping resources (e.g., private regard, general social support, and academic support) and mental health (e.g., stress, anxiety, and depression).
- **Hypothesis 5d**: Cognitive reappraisal will moderate the relationships between race-based stressors (e.g., perceived racial discrimination and institutional racial climate), coping resources (e.g., private regard, general social support, and academic support) and educational outcomes (e.g., academic performance and career commitment).
- **Hypothesis 5e**: Coping resources (e.g., private regard, general social support, and academic support) will moderate the relationship between race-based stressors (e.g., perceived race-based discrimination) and mental health outcomes

- **Hypothesis 5f:** Coping resources (e.g., private regard, general social support, and academic support) will moderate the relationship between race-based stressors (e.g., perceived race-based discrimination) and educational outcomes.

Finally, an aspirational aim of this study was to collect a sample large enough to test the full stress and coping model as specified in the RDSSC framework.

Aspirational Structural Equation Modeling Analysis: Data will fit the hypothesized model depicted in Figure 1.8.

Figure 1.1 The Race-Based Disparities in Stress and Sleep in Context model (Levy et al., 2016)

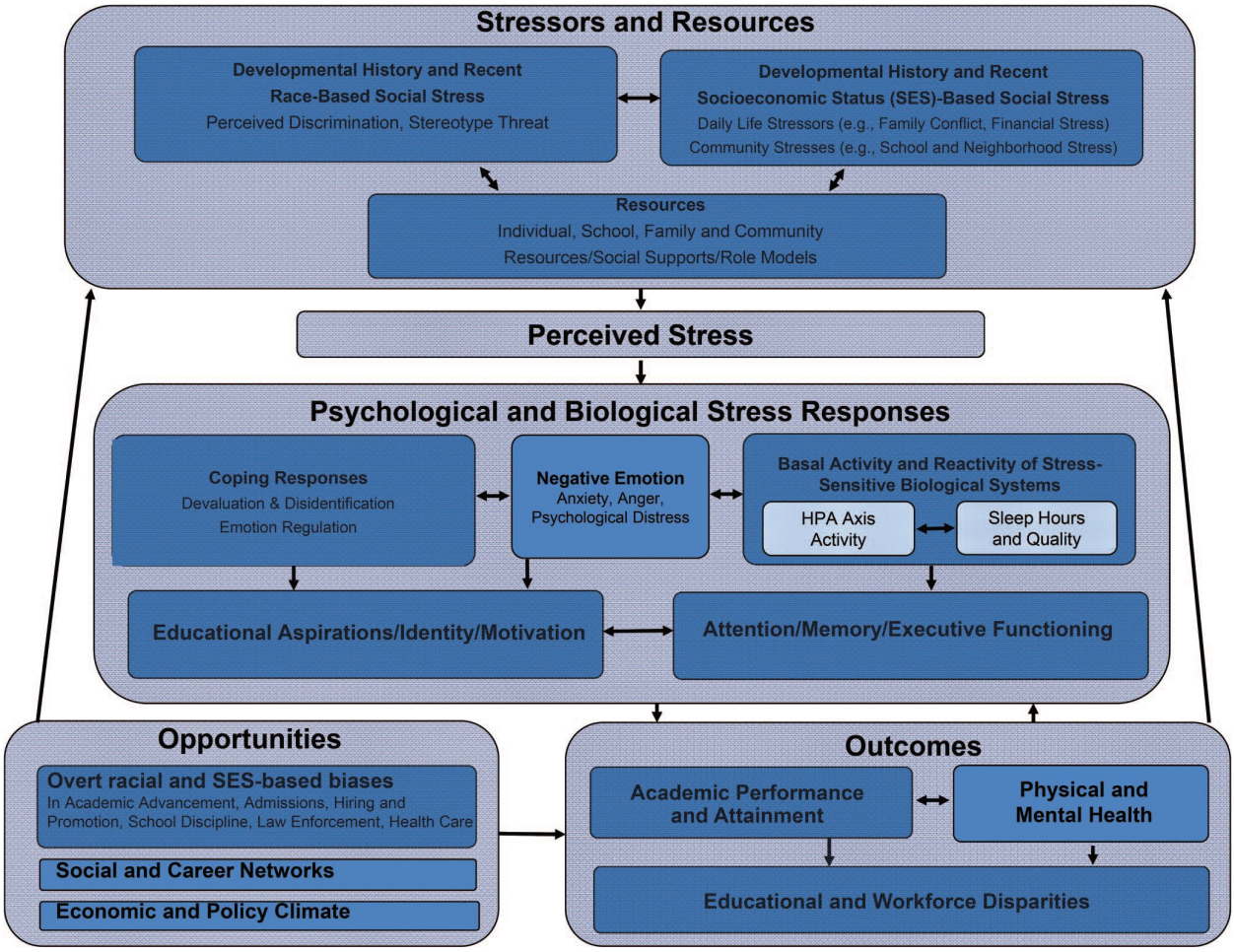


Figure 1.2. Proposed Partial Mediation Model on Mental Health

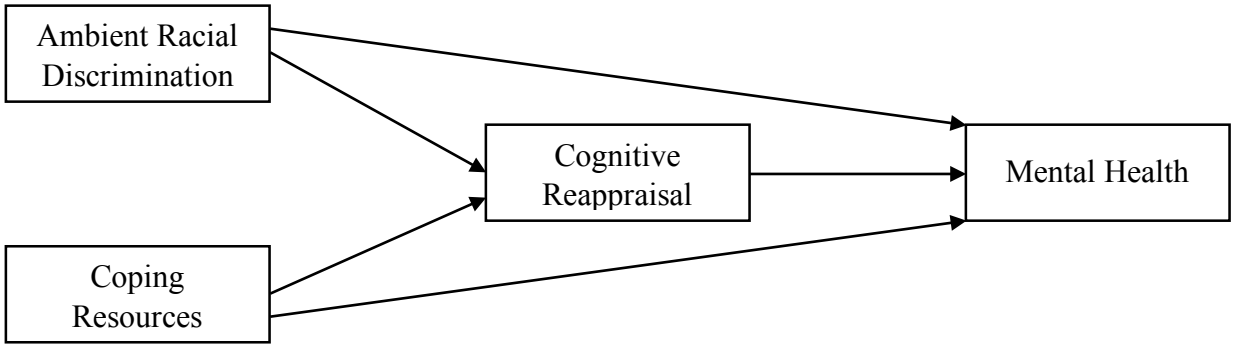


Figure 1.3. Proposed Partial Mediation Model on Educational Outcomes

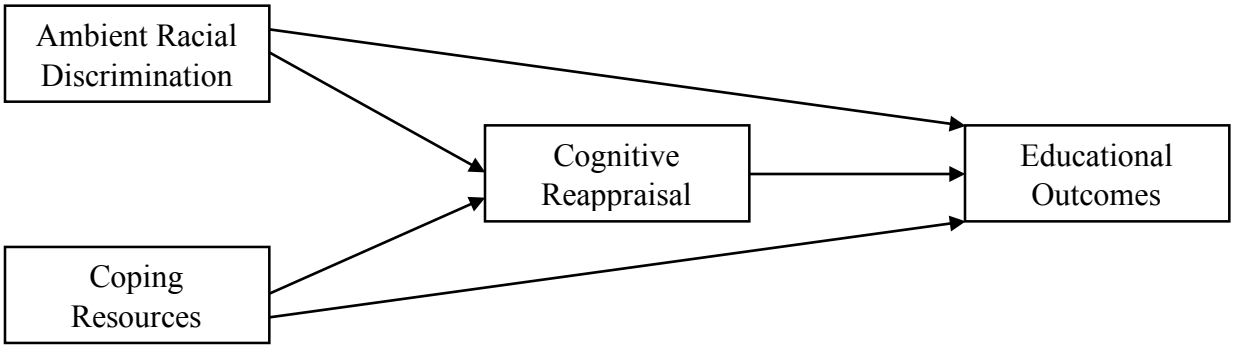


Figure 1.4. Proposed Moderation Model on Mental Health

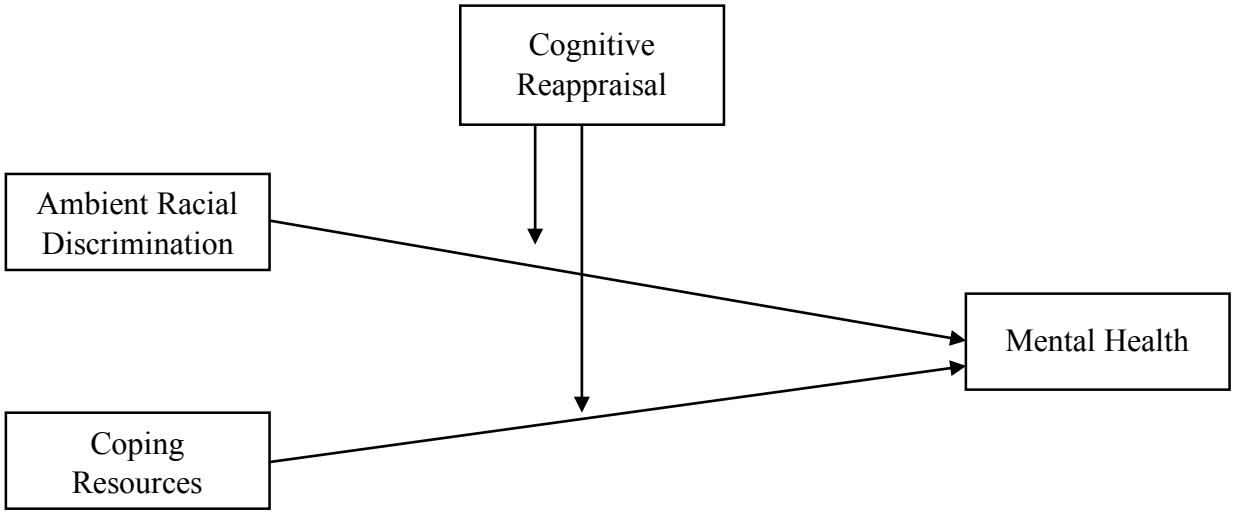


Figure 1.5. Proposed Moderation Model on Educational Outcomes

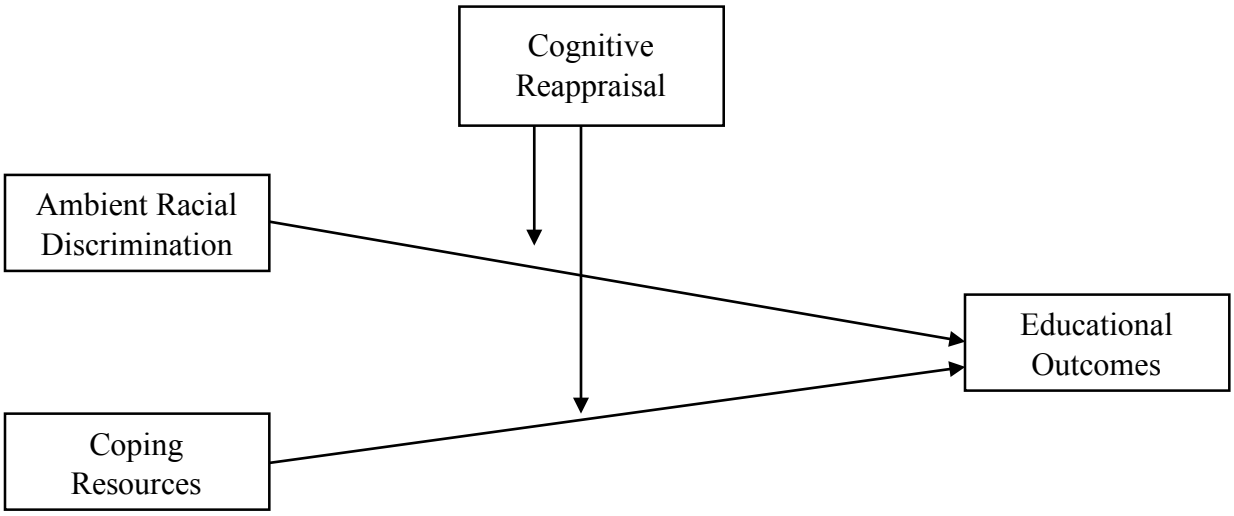


Figure 1.6. Proposed Moderation of Coping Resources on Relationship between Ambient Racial Discrimination and Mental Health Outcomes

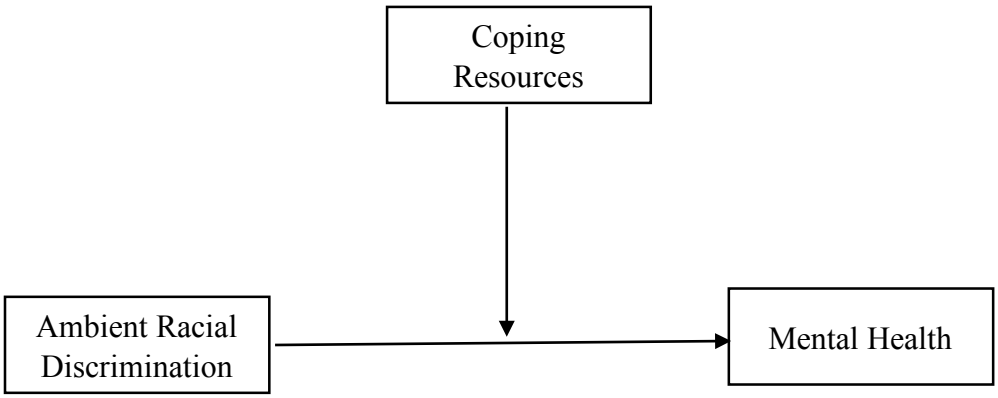


Figure 1.7 Proposed Moderation of Coping Resources on Relationship between Ambient Racial Discrimination and Educational Outcomes

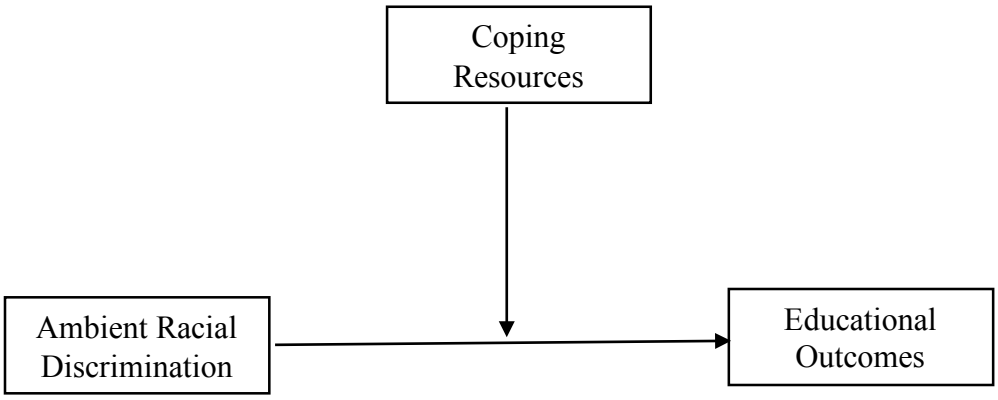
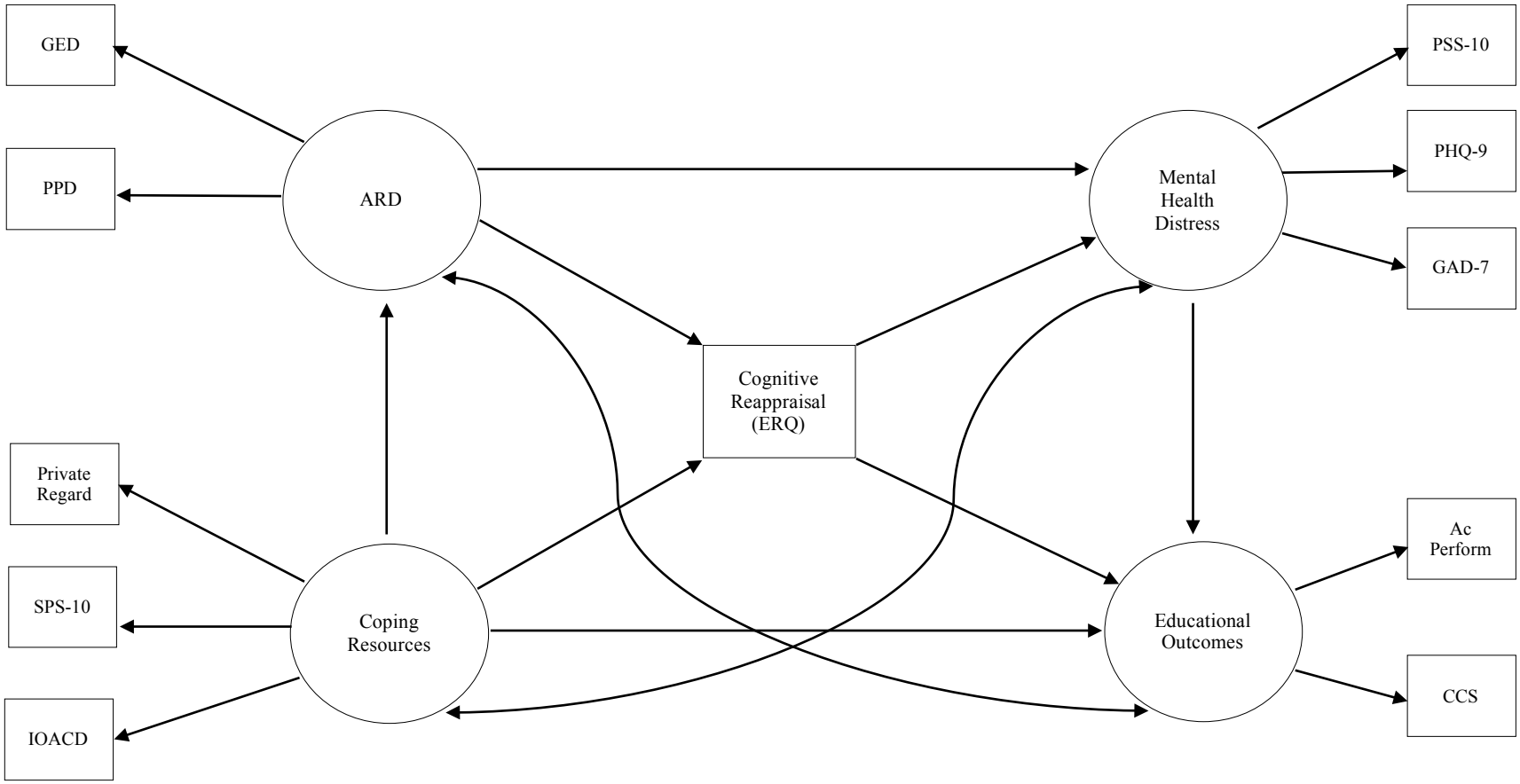


Figure 1.8. Proposed Structural Model



Note. ARD= Ambient Racial Discrimination; GED= General Ethnic Discrimination; PPD= Perceived Prejudice and Discrimination Scale; Private Regard= Multidimensional Model of Black Identity subscale; SPS-10= Social Provisions Scale-10; IOACD= Influence of Others on Academic and Career Decisions scale; ERQ= Emotion Regulation Questionnaire subscale; PSS-10= Perceived Stress Scale-10; PHQ-9= Patient Health Questionnaire-9; Ac Perform= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

CHAPTER II

REIVEW OF THE LITERATURE

The purpose of this chapter is to review literature supporting the significance and rationale for the present study. To this end, this chapter will begin with a brief historical overview of Black participation in medicine, race-based stressors within the academic and professional medical environment, and the impact of race-based stressors on psychological and career outcomes. Next, an overview of stress and coping theory is provided as a framework for understanding and measuring within-group variabilities in perceptions and impacts of race-based stressors. Finally, this chapter reviews literature among graduate and professional students to support the examination of specific contextual factors that may promote more adaptive coping processes among Black medical students navigating stressful learning environments.

A Brief History of Blacks in Medicine

Mired in a historical legacy of racism and segregation, the under-enrollment of Black Americans in medical school is longstanding. During the early 20th century, Black Americans were legally denied access to predominately-White medical institutions in the United States. Widespread racial exclusion, coupled with the failing health of Black communities, led to the creation of nine independent black medical schools (IOM, 2003). Between 1865 and 1910, these independent black medical schools trained the majority of the country's Black physicians (Nivet, 2010). In 1910, the Carnegie Foundation commissioned the Flexner Report for the Advancement of Teaching (Steinecke & Terrell, 2010; Sullivan & Mittman, 2010). Charged with the task of reforming medical education practices in schools across the country, Abraham Flexner toured and evaluated 155 medical institutions. Though generally credited for significantly improving standards of medical training and practice in the U.S. (Nivet, 2010; Sullivan & Mittman, 2010),

the summative report penned by Flexner significantly limited the access and opportunity of Blacks in medicine. In Flexner's view, Black physicians were needed primarily to treat fellow Blacks, whom he considered a "source of infection and contagion" (Sullivan, 2010; p. 248). Fearing the spread of communicable diseases from Black to White communities, Flexner recommended that Black physicians focus on maintaining hygiene, sanitation, and civilization rather than on advanced medical procedures such as surgery (L. E. Miller & Weiss, 2012; Sullivan & Mittman, 2010). This historic report resulted in the closure of 78 medical school, including all but two historically Black medical institutions (L. E. Miller & Weiss, 2012; Nivet, 2010; Steinecke & Terrell, 2010; Sullivan & Mittman, 2010).

In addition to the prejudicial views articulated in the Flexner report regarding the utility of Black physicians, scholars (Ziem, 1977) have argued that the report prompted a financial restructuring of medical schools that further hindered Black student enrollment. Increasing tuition for medical school attendance meant that only predominately upper-class, White, male students could afford such an education. In fact, in the 50 years following Flexner's report, 97 percent of all medical students were White (Nivet, 2010). Meanwhile, 75 percent of the country's Black physicians received training at one of the two remaining Black medical schools: Howard University Medical College and MeHarry Medical College (Sullivan & Mittman, 2010). During this time, Blacks represented approximately 10 percent of the U.S. population and just 2.2 percent of physicians. It was not until the year 1966, and the accompanying civil rights movement, that all US medical schools began admitting and actively recruiting Black students into their ranks (Sullivan & Mittman, 2010).

Current estimates indicate that while Black Americans constitute roughly 13 percent of the U.S. population, approximately six percent hold medical degrees (Capers & Way, 2015;

Steinecke & Terrell, 2010) and roughly three percent work in clinical capacities (Nunez-Smith et al., 2007). Moreover, compared to their majority group colleagues, Black physicians are less likely to pursue placements in higher paying subspecialty areas (Davidson & Montoya, 1987; Palepu, Carr, Friedman, Ash, & Moskowitz, 2000). Black physicians are also less likely to hold senior academic rank within medical institutions (Fang, Moy, Colburn, & Hurley, 2000; Nunez-Smith et al., 2012; Palepu et al., 1998; Petersdorf, Turner, Nickens, & Ready, 1990; Peterson, Friedman, Ash, Franco, & Carr, 2004; Yu, Parsa, Hassanein, Rogers, & Chang, 2013). This persistent underrepresentation of Blacks in the medical profession not only speaks to the lingering effects of exclusionary educational policies and practices, but also stymies efforts to develop a workforce reflective of an increasingly diverse American society.

Current Trends in the Recruitment and Retention of Black Physicians

Despite national policies and initiatives driven by the U.S. Office of Economic Opportunity and the Association of American Medical Colleges (AAMC) to promote greater racial equality in medicine (e.g., Sullivan et al. 2010; Nickens, Ready, & Petersdorf, 2000), the recruitment and retention of Black medical students continues to lag behind that of other racial minority groups (AAMC, 2015). In 2015, a report released by the AAMC indicated that total medical student enrollment had increased by 25 percent since 2002. Among Black students, however, the rise in enrollment was just 1.1 percent. Among Black males specifically, rates for enrollment into medical school in 2014 were lower than they had been in 1978. Stagnantly low enrollment trends among Black medical students, who made up only 7.3 percent of all medical school applicants in 2013 (Capers & Way, 2015), suggests that systemic barriers continue to thwart the cultivation of a larger Black physician workforce.

Even among Black Americans completing medical degrees, a body of research suggests that several challenges exist that may undermine career-related performance and retention in medicine compared to majority group physicians (Nunez-Smith et al., 2007). Nunez-Smith et al. (2007) investigated the impact of physician race on career outcomes and focused specifically on the experiences of physicians of African descent (e.g., African American, African, or African Caribbean). Employing a Grounded Theory methodology, researchers conducted in-depth interviews with 25 physicians residing in the New England area. Study probes assessed general influences of race at work, positive and negative work-related experiences attributable to race, and influences of personal experiences and race during training on one's career trajectory. Participating physicians worked in a variety of specialty areas (ex. family medicine, pediatrics, surgery) and settings (ex. private practice, community health center, academic institutions). Thematic analyses indicated that experiences of racial discrimination in the workplace was common among physicians of African descent and often emerged within patient and collegial interactions. In addition, themes from the interviews suggested that the cumulative stress associated with discriminatory experiences gave way to the experience of "racial fatigue". This fatigue, characterized as, "the emotional and psychological sequelae of feeling isolated in a work environment in which race regularly influences behavior but is consistently ignored," in turn, contributed to greater job dissatisfaction and greater change in job placement among participating physicians (Nunez-Smith et al., 2007, p. 49). These findings were consistent with research conducted by Palepu et al. (2000) who compared the specialty areas, compensation, and career satisfaction of racial/ethnic minority physicians to White physicians. The authors collected self-report survey data on occupational areas of interest from a nationwide stratified random sample of 1,807 full-time faculty, of which 195 identified as an underrepresented racial/ethnic

minority. Statistical analyses revealed that underrepresented minority physicians in academic medicine were significantly less satisfied with their careers and more likely to consider leaving medicine within five years when compared to White physicians (Palepu et al., 2000).

To further validate research findings from their 2007 qualitative study, Nunez-Smith et al. (2009) administered a cross-sectional, national survey to examine associations between physician race, workplace discrimination, and physician job turnover. Among the 469 physicians who completed the survey, data indicated that racially underrepresented physicians were significantly more likely to have left at least one job due to workplace discrimination when compared to White physicians. Prevalence of job turnover was greatest among Black physicians. Multivariate analyses also showed that experiences of racial/ethnic discrimination at work was positively associated with job turnover. Only 45 percent of physicians who reported experiencing workplace discrimination also reported feeling satisfied with their careers, while 40 percent of those who reported experiencing workplace discrimination reported contemplating a career change (Nunez-Smith, Pilgrim, Wynia, Desai, Bright, et al., 2009).

In summary, key metrics reflecting Black participation in medicine remain unchanged across decades. In comparison to the size of the general U.S. Black population, substantially fewer Black students apply and enroll into medical school. These trends persist despite broad efforts to increase the size and diversification of the medical workforce. Moreover, among Black physicians currently working in the field of medicine, notable disparities exist in compensation, positions of leadership, and job satisfaction. Black physicians commonly contribute such work-related difficulties, in part, to their racial minority status. In turn, the accumulative effects of race-related experiences within the profession appear to influence Black physician well-being and job retention.

The additive effects of race in medicine must be considered within the context of the broader medical training environment. Therefore, understanding the experience of Black medical students in training requires a fuller characterization of the surrounding medical school training environment. The following section situates the Black medical experience within a broader body of literature related to medical school culture, racial climate, and academic learning environments.

Medical School Training Environment

Medical school is consistently characterized as a highly stressful and challenging training period. Long working hours, rigorous exams, and regular clinical evaluation are key academic stressors that impact students in training and often result in decreased time for friends, relatives, leisure activities, and sleep (M. Cohen, Kay, Youakim, & Balaicuis, 2009; Dyrbye et al., 2009; Gentile & Roman, 2009). In addition, medical students must acclimate to a culture of medicine that includes exposure to patient suffering and death, rigid physician hierarchies, intercollegial competitiveness, devaluation of emotional expressivity, and a "hidden curriculum" of cynicism (Dyrbye et al., 2009; Gaufberg, Batalden, Sands, & Bell, 2010).

Researchers posit that the inherent stressfulness of the medical school training environment may increase students' susceptibility to a range of mental health difficulties. Medical students evince a high prevalence of depression, anxiety, stress, and burnout (Brazeau et al., 2014; Dyrbye et al., 2011; Dyrbye et al., 2009; Dyrbye, Thomas, & Shanafelt, 2006; Goebert et al., 2009; Guthrie et al., 1998; Jackson, Shanafelt, Hasan, Satele, & Dyrbye, 2016; Jennings, 2009; Mata, Ramos, Kim, Guille, & Sen, 2016). Specifically, several studies show rates of clinical depression ranging between 15 and 25 percent among medical students (D. Clark, Daugherty, Zeldow, Gotterer, & Hedeker, 1988; Givens & Tjia, 2002; Lloyd & Miller, 1997;

Tjia, Givens, & Shea, 2005). A multisite study conducted by Dyrbye (2008) found that 50 percent of participating medical students reported experiencing burnout, a work-related syndrome consisting of emotional exhaustion, cynicism, depersonalization, and reduced personal accomplishment and effectiveness (Brazeau, Schroeder, Rovi, & Boyd, 2010). Dyrbye, Thomas, & Shanafelt (2006) analyzed indicators of psychological distress (e.g., depression, anxiety, and burnout) reported among U.S. medical students in their systematic review of 40 studies. Aggregated results not only indicated a high prevalence of depression and anxiety, but also suggested that levels of overall psychological distress (e.g., depression, anxiety, and burnout) reported among medical students exceeded that of the general population (Dyrbye et al., 2006). Newer investigations of medical student mental health continue to corroborate these earlier findings, suggesting that medical students continue to report a greater prevalence of mental health problems compared to the general population (Brazeau et al., 2014; Dyrbye et al., 2014).

Findings from systematic review of medical student psychological distress (e.g., depression, anxiety, burnout, and related mental health problems) demonstrate that when compared to age-matched peers in other graduate training programs, medical students experience more negative mental health symptomatology (Dyrbye et al., 2006). For example, Behere, Yadav, & Behere (2011) conducted a cross-sectional study to compare levels of perceived stress among students enrolled in schools of medicine, nursing, and engineering. Study authors found that levels of stress were greater among medical students (N=28) compared to those in engineering (N=36) and nursing (N=26). Similarly, Dutta, Pyles, and Miederhoff (2005) completed a literature review evaluating self-reported levels of stress among students in medicine, dentistry, medicine, and pharmacy. Although each of the student groups demonstrated

elevated levels of stress, the highest incidents of stress occurred among medical students (Dutta, Pyles, & Miederhoff, 2005).

Despite overwhelming evidence of mental health difficulties among medical students, at least one study indicates that this student group may begin medical school with mental health profiles similar to their peers. Seeking to understand whether medical students entered medical training with a similar mental health profile to age-similar peers in the general population, Brazeau et al. (2014) compared the mental health symptoms of first year medical students during orientation with age-matched controls from the general U.S. population. In this study, researchers invited all medicals students enrolled at six U.S. medical schools to complete an online survey during their first year orientation. An identical survey was administered to a U.S. probability-based sample of age-similar peers who had completed a four-year college degree. Study authors compared data from 582 medical students and 546 age-similar college graduates. Brazeaua et al. (2014) found that relative to their peers, medical students had lower rates of burnout and depressive symptoms, and higher scores across all domains of quality of life. Trends in the data remained after adjusting for age, sex, relationship status, and race/ethnicity. Based on their findings, Brazeau et al. (2014) concluded that the poor mental health profiles observed among medical students were not due to pre-existing mental health difficulties prior to medical school matriculation. Instead, the study authors argued that features of the medical school training process and the surrounding medical environment appeared to contribute to the deterioration of medical students' mental health over time (Brazeau et al., 2014).

Medical student mental health also has implications for personal and professional functioning and performance. For example, studies have demonstrated that increases in medical student psychological distress are positively associated with frequency of unprofessional conduct

(e.g., and cynicism (e.g., Pagnin & de Queiroz, 2015). Psychological distress among medical students also has been linked to decreases in altruistic professional values (e.g., Brazeau et al., 2014; Woloshuk, Harasym, & Temple, 2004) and empathy (e.g., Brazeau et al., 2010; Brazeua et al., 2014; Thomas et al., 2014). For example, Thomas et al. (2007) implemented a multisite, cross-sectional study to evaluate how medical student distress (e.g., depression and burnout) and well-being (e.g., quality of life) related to empathy. Study authors administered an online survey to 1,098 medical students attending school in the Midwest. The 118-item survey included an assessment of demographic information, as well as measures of burnout, depressive symptoms, quality of life, and empathy. This study assessed empathy by measuring two of its construct domains: cognitive (e.g., perspective taking) and emotive (e.g., empathic concern). Study authors found negative correlations between indicators of psychological distress and students' empathy. Specifically, two domains of burnout (e.g., depersonalization and emotional exhaustion) negatively correlated with emotive empathy while symptoms of depression negatively correlated with cognitive and emotive empathy. Conversely, higher scores on quality of life domains positively correlated with higher empathy scores. When distress and well-being were evaluated together via multivariate analysis, burnout (negative correlation) and well-being (positive correlation) correlated independently with empathy scores (M. Thomas et al., 2007).

Taken together, characteristics of the medical school training environment appear to increase all students' risk for mental health difficulties. All medical students, regardless of race, encounter general stressors within the medical training environment. In turn, declines in mental health compromise aspects of medical students' professionalism and undermines their ability to connect emotionally with patients. These findings are particularly concerning considering that medical students appear to enter the training environment with comparable mental health profiles

to their peers. The following section describes the ways in which unique features of the medical school learning environment may further jeopardize the health and well-being of Black medical students.

Racially Threatening Learning Environments

Given the prevalence of race-related challenges reported among underrepresented minority physicians (Nunez-Smith, Pilgrim, Wynia, Desai, Bright, et al., 2009; Nunez-Smith, Pilgrim, Wynia, Desai, Jones, et al., 2009), it seems reasonable to conjecture that negative racial experiences also may occur among Black medical students. The occurrence of negative racial experiences within the medical school training environment are important to consider because they contribute to the overall quality of the learning environment for Black medical students. Inzlicht and Good (2006) describe threatening learning environments as "settings where people come to suspect that they could be devalued, stigmatized, or discriminated against because of a particular social identity" (p. 3). In such environments, a number of racially salient cues may trigger an awareness of one's social identities and the negative stereotypes associated with those identities (Steele, Spencer, and Aronson, 2002). Researchers consider these experiences a unique psychological and sociocultural process that takes place among racial minorities (Cabrera et al., 1999; Inzlicht, McKay, & Aronson, 2006).

Decades of literature illuminate how Black medical students confront race-related challenges throughout their matriculation in medical school. For instance, Reitzes and Elkhanialy (1976) assessed and compared two groups of Black medical students and the problems that they experienced in medical school based upon whether they attended a predominantly Black or White medical school. Survey data was collected from one group of students who were actively attending medical school between 1971 and 1974 and from a second group of Black physicians

who had graduated from medical school prior to or in 1970 and were physicians at the time of data collection. Domains assessed included: the influence of others on career choice, financial support, perceived discrimination, and student problems/concerns. Regarding the extent to which individuals felt discriminated against during medical school, participants who attended predominately-White medical schools reported greater discrimination than students and physicians who attended predominately-Black medical schools. Among those attending Black medical schools, 11 percent of students and seven percent of physicians reported experiencing discrimination. Among those attending predominately-White medical schools, 60 percent of students and 49 percent of physicians reported experiencing racial discrimination (Reitzes & Elkhanialy, 1976).

Approximately one decade later, Bullock and Houston (1987) conducted interviews to examine perceptions of racism among Black medical students attending predominately-White medical schools. Study investigators interviewed 31 students attending five different medical schools about experiences of racism during high school, college, and medical school. Interview probes related to years in medical school further targeted experiences of racism within students' medical school admission process and preclinical and clinical training. Roughly 50 percent (*N*=15) of the 31 participants reported experiencing racism in high school and approximately 65 percent (*N*=20) reportedly experienced racism during college. During medical school matriculation, 97 percent (*N*=30) of participants indicated experiencing racism. During the pre-clinical years, themes that emerged from the interview data included feeling viewed as or being treated as intellectually inferior and "invisible" by faculty and peers in the classroom. During clinical years, participants commonly discussed feeling unfairly evaluated by clinical supervisors as well as witnessing negative attitudes and stereotypes expressed towards Black patients.

Bullock and Houston (1987) concluded that prejudice and discrimination were additional sources of stress for Black medical students attending predominately-White medical schools and such stressors added to the everyday pressures of medical training.

Frierson (1987) examined the role of faculty and peers in contributing to the negative experiences of Black medical students within medical school. In this study, a 105-item self-report questionnaire examined Black students' perceptions of the medical school environment as it related to negative interactions with faculty and peers. Researchers mailed questionnaires to 117 Black medical students enrolled in medical schools in North Carolina, of which 76 completed the survey. Frequency analyses indicated that over 55 percent of respondents felt negatively affected by the nonverbal behaviors of both White faculty and peers either often or very often. Fifty-five percent of participants perceived White clinical faculty to be insensitive or somewhat insensitive to the needs and backgrounds of Black students. In laboratory settings, 36 percent of participants indicated that they very often or often experienced feeling ignored by White faculty and laboratory assistants. Regarding perceptions of biased grading, 32 percent of participants reported they had either very often or often experienced biased grading practices. Thirty-two percent of participants indicated that they had either very often or often experienced racially biased comments or actions in clinical settings from White faculty, residents, or interns. Importantly, the frequency of negative experiences reported by Black students interacting with Black faculty were lower across all survey domains, indicating that these racially-concordant interactions were perceived more favorably by the students. Frierson (1987) posited that because many Black medical students perceived medical schools as "unfriendly or unsupportive environments" they might be more likely to perceive Black faculty as supportive (p.742).

Continuing this line of inquiry into identifiable barriers influencing the psychosocial and psycho-emotional aspects of medical training for underrepresented students, Bright, Duefield, and Stone (1998) examined the presence of role models and mentors within the training environment. A 63-item survey using Likert-scaled responses was mailed to all fourth year medical students (N=2,128) listed on the American Medical Student Association mailing list. The survey assessed educational experiences, including obstacles students navigated during classroom training, and subjective grading by supervisors during clinical rotations. Responses were analyzed from 564 students who completed the study, of which 71 (12.7%) identified as an underrepresented racial minority. Within the underrepresented minority population, 43 identified as Black, 26 identified as Latino, and two identified as Native American. Chi-square statistics revealed that underrepresented racial minorities were more likely to report that their race affected their medical school experiences compared to White students. In particular, underrepresented minority students reported greater difficulty establishing a peer-support network as compared to White students. They also reported more difficulty establishing good working relationships with their peers. Further, compared to White students, underrepresented minorities reported more difficulties finding same-race role models and same-race mentors to assist with career development. Additionally, underrepresented minorities reported feeling a need to perform better than their White peers did in order to achieve an equal status. Minority students also felt that their race influenced which career options they were encouraged to pursue upon medical school completion (Bright et al., 1998).

More recent investigations of race in medicine continue to demonstrate a preponderance of race-related challenges. For example, Dyrbye et al. (2007) examined differences in the training experiences of racial/ethnic minority medical students as compared to nonminority

students. In this study, researchers mailed surveys to 3,080 medical students attending five medical schools. Survey items assessed students' mental health and the impacts of race/ethnicity on students' training experiences. In order to examine the role of race/ethnicity in medical training, survey prompts directed respondents to provide written responses to survey inquiries. Quantitative and qualitative data was analyzed from the final sample of 1,689 students, of which 410 (24%) identified as a racial/ethnic minority. The racial/ethnic minority sample included 61 Black, 50 Hispanic, 186 Asian, 23 Native American, 8 Pacific Islander, and 82 other non-White students. Data indicated that racial minority students were more approximately five times more likely to report feeling that their race had negatively affected their medical school experience compared to nonminority students. Among racial/ethnic minority students reporting feeling negatively impacted by their race, 70 percent provided written responses specifying the nature of their negative experiences. Content analysis of responses identified the following four themes: racial discrimination, racial prejudice, feelings of isolation, and interpersonal and communication differences related to cultural upbringing. Racially discriminatory experiences included being harassed, experiencing bigotry, and receiving unfair evaluations from clinical supervisors. Instances of racial prejudice included being considered less intelligent or less qualified to be in medicine, and feeling unfairly stereotyped. Experiences related to interpersonal interactions and communication included feeling isolated from faculty and experiencing difficult interactions with faculty and patients due to cultural differences and norms. Study authors concluded that racial/ethnic minority medical students continued to endure unique and significant challenges within medical school and that medical schools should increase their efforts to address the impacts of race/ethnicity of students' training experiences (Dyrbye et al., 2007).

Impacts of a Racially Threatening Learning Environment

Just as experiences of workplace racial discrimination increase minority physicians' risk for career dissatisfaction and job change (e.g., Nunez-Smith et al., 2007; Nunez-Smith et al., 2009), researchers contend that a racially threatening learning environment may result in an array of consequences for minority students (Cabrera et al., 1999; Inzlicht & Kang, 2010; Inzlicht et al., 2006; Inzlicht, Tullett, Legault, & Kang, 2011). Indeed, research demonstrates measurable differences between racial minority and majority medical students regarding their medical school experiences. Among racial minority medical students, racially threatening features of the learning environment, such as perceived discrimination and prejudice appears to jeopardize students' well-being (Dyrbye et al., 2007; English et al., 2014; Fisher, Wallace, & Fenton, 2000; Perry et al., 2015; Wong et al., 2003). Strayhorn and Frierson (1989) conducted a three-year longitudinal study to assess correlations between Black and White medical students' perceptions of the learning environment, their academic performance, and their perceptions of their own well-being (e.g., positive well-being, vitality, depression, and anxiety). Self-report survey data indicated that Black students experienced more stress during medical school and had significantly lower perceptions of their social and mental well-being as compared to their White student counterparts (Strayhorn & Frierson, 1989). More recently, a national longitudinal study initiative called *Medical Student Cognitive Habit and Growth Evaluation (CHANGE)* (Perry et al., 2015) surveyed 4,732 first year medical students. Analyses comparing symptoms of depression and anxiety among the 301 participating Black students indicated that they had an increased relative risk for both mental health indicators as compared to White students (Hardeman et al., 2015).

A substantial body of research suggests racially threatening learning environments might also affect minority students' academic performance and engagement (Brody et al., 2006; Chavous et al., 2008; Eccles et al., 2006; Inzlicht et al., 2006; D. Johnson, Wasserman, Yildirim, & Yonai, 2014; Konold, Cornell, Shukla, & Huang, 2016; Neblett, Philip, Cogburn, & Sellers, 2006; Nora & Cabrera, 1996; Rollins & Valdez, 2006; Wong et al., 2003). Given the importance of mental health and academic performance for the successful matriculation of all medical students, racial disparities in these domains seem particularly important to examine and understand. Psychological and academic difficulties stemming from racially threatening aspects of the surrounding medical school training environment may not only threaten students' career development, but also might undermine efforts to grow the Black medical workforce. The following sections describe literature that has demonstrated the negative relationship between perceived racial discrimination and psychological and academic well-being.

Perceived Discrimination and Mental Health

A review of the extant literature suggests that experiences of perceived racial discrimination commonly result in in feelings of anger, sadness, or fear (Brondolo et al., 2009; R. Clark et al., 1999; Levy et al., 2016). Experiences of racial discrimination also have been associated with mental health difficulties including heightened stress, anxiety, and depression (Brondolo et al., 2009; Pascoe & Smart Richman, 2009). The majority of research investigating the relationship between perceptions of discrimination and mental health have focused on samples of community adults (e.g., Clark et al., 1999; Thompson, 2006; Brondolo et al., 2009; Sellers et al., 2003; Spence, Wells, Graham, & George, 2016), adolescents (Fisher, Wallace, & Fenton, 2000; Thomas, Caldwell, Faison, & Jackson, 2009), and college students (e.g., Cooke, 2002; Metzger et al., 2016; Rucker, Neblett, & Nkemka, 2014; Szymanski, 2016). An

accumulation of evidence, however, suggests similar trends exist among racial minority students in medicine.

For example, a study conducted by Dyrbye et al. (2007) examined the impact of race-related experiences on the mental health symptoms of racial minority and nonminority medical students. Specifically, study researchers administered a survey assessing symptoms of burnout, depression, and quality of life (QOL). This study analyzed data from 1,689 medical students, of which 410 (24%) identified as a racial minority. Study researchers used forward stepwise logistics regression to evaluate associations between demographic variables and indicators of psychological distress. Results indicated that racial/ethnic minority students who perceived that their medical training experiences were negatively impacted by their race were more likely than minority students who did not report being negatively impacted by race to have high emotional exhaustion and depersonalization scores (subscales of burnout), and to meet criteria for burnout. Compared to their minority student peers, minority students negatively impacted by race were also more likely to meet diagnostic criteria for depression, and more likely to have lower mental QOL scores (Dyrbye et al., 2007).

Using a similar methodology, Perry et al. (2015) examined the impact of everyday discrimination on Black medical students' well-being. Baseline data collected from a national longitudinal cohort study of medical students (N =4,732), known as CHANGE, was used to specifically examine associations between perceived racial discrimination and indicators of psychological well-being and self-esteem. Indicators of well-being in this study included depression, anxiety, fatigue, and perceived stress. Investigators employed regression analyses among data specifically from a subsample of 243 self-identifying Black medical students. Results indicated that increases in incidents of everyday discrimination were associated with

increases in depression, anxiety, and perceived stress. Additionally, as every discrimination scores increased, self-esteem decreased. Based upon these findings, the authors concluded that medical school environmental factors such as institutional racial climate might affect some Black medical students' sense of fit and ability to cope during medical school (Perry et al., 2015).

Perceived Discrimination, Academic Performance, and Career Development

While few studies have directly examined the impact of a racially threatening learning environment on the academic performance and career development of Black medical students, scholars have long posited that an adverse relationship exists (Bright et al., 1998; Dyrbye et al., 2007; Frierson, 1987; H. Johnson, 1978; Perry et al., 2015; Strayhorn & Frierson, 1989). This is particularly troublesome given some evidence suggesting that Black medical students may enter into training with less competitive academic backgrounds (Frierson, 1987; Strayhorn & Frierson, 1989) and exhibit higher attrition rates as compared to their White peers (Frierson, 1987). Highlighting this point in a guest editorial, Henry Frierson (1988) remarked, "the average entering Black student is at an academic disadvantage compared with his or her nonminority counterparts in the very competitive medical school environment…and the presence of additional negative factors often serves to further exacerbate or initiate problems related to adjustment, academics, and so forth" (p. 387).

Concerning career development, it is also worth reemphasizing findings from Bright, Duefield, and Stone (1998) that demonstrated that racial minority medical students reported difficulties finding same-race role models and mentors and that these students felt that their career development was differentially impacted due to the absence of such individuals. Minority students in this study (e.g., Bright, Duefield, & Stone, 1998) also perceived that their race had influenced which career options they were encouraged to pursue within medicine. While this

study did not specify which career options racial minority students felt encouraged to pursue, the authors concluded that a lack of perceived professional guidance and mentorship likely contributed negatively to career development.

Assessing Mental Health, Academic Performance, and Career Commitment.

Given evidence that negative race-related experiences within the medical environment affect the personal and professional well-being of Black medical students and physicians alike, it seems essential to examine outcome variables across both domains. Assessing psychological symptoms such as depression, anxiety, and stress offers evidence of personal well-being. Mental health is a critical component of personal well-being and, thus, must be considered in relation to perceptions of the surrounding learning environment. Regarding professional well-being, this study focused on academic performance and career commitment as key outcome variables. Successful matriculation through medical school is, in part, predicated upon students' academic performance. Therefore, understanding the extent to which negative race-based experiences occurring within the training environment impact students' academic performance is important. Similarly, efforts to grow the Black medical workforce requires that such individuals persist in their selected occupation. By assessing the career commitment of Black medical students, in relation to their race-based experiences in medical school, this study may glean valuable information regarding the extent to which medical learning environments promote or undermine underrepresented students' motivations to remain in medicine.

Beyond the significance of each of these variables independently, it is also important to recognize the inherent relationships that exist between them. Because mental health, academic performance, and career commitment represent endogenous variables, impairments in one domain likely compromise functioning in another. Therefore, assessing only one domain would

provide an incomplete picture of the career development processes of Black medical students. The interrelatedness of personal and professional well-being further underscores why the current study examined student outcomes across psychological and educational domains.

Summary

Taken together, this review of literature suggests that Black medical students experience unique race-related challenges, such as perceived racial discrimination and prejudice, within their medical training environments. These experiences may not only undermine their psychological health, but also may negatively affect the academic engagement and career longevity of Black medical students, who remain underrepresented in the field of medicine. Attention to specific indicators of well-being among Black medical students, such as mental health, academic performance, and career commitment in the face of environmental stressors, therefore, represents an important step toward understanding how race-based stressors within the medical training environment influence career development.

Theories of Stress and Coping

Stress and Coping Theory

The term "stress," as described by Selye (1976), refers to the effects of anything causing considerable disruption to homeostasis. According to Lazarus & Folkman's (1984) stress and coping theory, stress is a transactional process occurring between an individual and their environment (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Folkman, Lazarus, Gruen, & DeLongis, 1986; Lazarus & Folkman, 1984; Selye, 1976). Stress emerges within this "dynamic, mutually reciprocal, bidirectional relationship" when an individual perceives their environment to tax or exceed their resources and threaten their well-being (Folkman et al., 1986, p. 572).

Principles of stress and coping theory assert that two distinct transactional processes mediate the stressfulness of a person-environment interaction and their immediate and long-term impacts on an individual (Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Folkman, Lazarus, Gruen, et al., 1986; Lazarus & Folkman, 1984; Selye, 1976). First, cognitive appraisal describes the process through which an individual evaluates whether an interaction with their environment compromises their well-being. Within the cognitive appraisal process, an individual makes two specific types of appraisals: primary and secondary. An individual's primary appraisal process entails an assessment of who (i.e., self or close other) or what (i.e., self-esteem, physical body) may be harmed within an environmental transaction. Importantly, stress and coping theory posits that various personal characteristics (e.g., personal values, goals, and beliefs) influence the threats to well-being an individual perceives to exist within any environmental encounter (Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Folkman, Lazarus, Gruen, et al., 1986). For example, an individual who highly values and self-identifies with their occupation may appraise news about the unexpected termination of their job as more harmful and threatening to their well-being than an individual who did not highly value their occupational identity. During a secondary appraisal, an individual evaluates what can be done with one's available resources to overcome or prevent harm to well-being (Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Folkman, Lazarus, Gruen, et al., 1986; Lazarus & Folkman, 1984).

Coping refers to an individual's efforts to manage or reduce the internal or external impacts of a person-environment transaction appraised as taxing or exceeding one's resources. Stress and coping theory asserts that coping efforts can be cognitive or behavioral in nature and generally serve one of two major functions. Coping efforts either involve (1) dealing with or altering the person-environment interaction causing distress (e.g., problem-focused coping), or

(2) regulating the emotions arising from the stressful interaction (e.g., emotion-focused coping). Research suggests that most people use both forms of coping when experiencing a stressful encounter (Folkman & Lazarus, 1988; Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Folkman, Lazarus, Gruen, et al., 1986; Lazarus & Folkman, 1984).

Based on their conceptualization of coping, Folkman et al. (1986) further specified three distinguishable features of this process. First, coping is process-oriented. This process includes what individuals' specifically think or do during a stressful encounter, and how thoughts and behaviors evolve as the encounter unfolds. Resultantly, Folkman et al. (1986) characterized coping as a dynamic rather than static process. Second, coping is context-dependent, such that specificities to each person and environment will uniquely interact to influence which coping efforts one utilizes. In other words, the coping efforts an individual employs is a function of their specific interaction with the environment and the related demands imposed by the environment. Third, coping efforts are not presumed to be inherently "good" or "bad." Rather, examinations of coping processes focus on the efforts individuals use to manage the perceived demands placed upon them within an environmental encounter, regardless of its successfulness (Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Folkman, Lazarus, Gruen, et al., 1986). Taken together, stress and coping theory suggests that experiences of stress occur dynamically between persons and their environments. Key determinants in the impact of a stressor include appraisals of, and coping responses to, perceived stressors.

The Biopsychosocial Model of Racism

Researchers (Brondolo et al., 2009; R. Clark et al., 1999; Landrine & Klonoff, 1996; Outlaw, 1993; V. L. Thompson, 1996; Utsey, Ponterotto, Reynolds, & Cancelli, 2000; D. R. Williams, Yan, Jackson, & Anderson, 1997) widely agree that exposure to racially

discriminatory stimuli can be perceived by Black Americans as stressful. Given the pervasiveness of experiences of racial discrimination among Black Americans and its ability to evoke a stress response, several researchers have hypothesized its link to adverse health outcomes. Numerous studies conducted among Black Americans, for example, have found associations between exposure to perceived racial discrimination and health conditions such as: hypertension (Cuffee, Hargraves, & Allison, 2012; Din-Dzietham, Nembhard, Collins, & Davis, 2004; Dolezsar, McGrath, Herzig, & Miller, 2014; D. R. Williams & Neighbors, 2001), low birth weight (Black, Johnson, & VanHoose, 2015; Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman, 2008), cancer incidence (T. R. Taylor et al., 2007), and negative psychological symptoms (Ayalon & Gum, 2011; Kim et al., 2016; Mouzon, Taylor, Keith, Nicklett, & Chatters, 2017; D. R. Williams et al., 1997).

Despite evidence demonstrating that race-based stressors such as perceived discrimination could negatively affect its targets, early studies offered little insight into the appraisal and coping processes taking place during racially discriminatory encounters. Without this information, Clark et al. (1999) argued that within-group variabilities in exposure to and responses to racial discrimination, as well as its differentiated impacts on health outcomes, remained unclear. To address this gap in the research literature, Clark and colleagues (1999) developed the biopsychosocial model of racism. The biopsychosocial model of racism attempts to elucidate the process through which Black Americans differentially experience and respond to discriminatory events. This comprehensive model builds from Lazarus and Folkman's (1984) theory of stress and coping and asserts that perceptions of a stimulus as racially discriminatory lead to increased psychological and physiological stress responses. Over time, these stress responses negatively influence health outcomes.

Importantly, the biopsychosocial model of racism posits that individuals' perceptions of racially discriminatory stimuli, and their subsequent coping responses, differ based upon a confluence of individual characteristics. Specifically, Clark et al. (1999) contended that constitutional (i.e., skin tone), sociodemographic (i.e., SES), psychological (i.e., self-esteem), and behavioral (i.e., anger suppression or expression) factors all intersect in a manner that uniquely influence the cognitive appraisal and coping processes of Black Americans encountering racial discrimination. A major tenet of the biopsychosocial model, therefore, holds that within-group variabilities among Black Americans should predict differentiated health outcomes that are empirically testable and measurable (Clark et al., 1999). Since its development, this model has

been widely referenced as a conceptual framework to investigate perceptions and impacts of racial discrimination (Brondolo et al., 2009; Brondolo, Rieppi, Kelly, & Gerin, 2003; Dolezsar et al., 2014; Myers, 2009).

Despite the significant contributions of the biopsychosocial model (e.g., Clark et al. 1999), a recent commentary on the state of racial disparities research by psychologist Elizabeth Brondolo indirectly challenged the current utility of this and other models. In her editorial, Brondolo (2015) suggested that additional contextual factors relate to stress exposure and argued that its impact on health among racial minorities remains overlooked and understudied. According to Brondolo (2015), "psychosocial context" pertains to "variables and processes that influence the type, timing, and frequency of one's stress exposure, and one's level of background stress" and must be considered in studying the effects of stress (p. 2). Examples of relevant psychosocial contexts include social environments (ex. work, school, community) and background stressors imposed by these environments (ex. neighborhood crime, pollution, social

evaluative threats). Importantly, Brondolo (2015) argued that psychosocial contexts have implications for the level of demands and resources available to racial ethnic minorities, which by extension affects one's level of risk and resilience in response to psychosocial stressors.

Brondolo (2015) further contended that psychosocial contexts and their influence on stress exposure over time might affect individual-level psychosocial factors such as expectations, motivations, and cognitions. From a transactional model of stress perspective, such psychosocial factors are relevant to consider because they affect one's cognitive appraisals and assessment of internal resources available to cope with stressors (Brondolo, 2015). Taken together, Brondolo asserted that intersecting psychosocial variables "create differences in the underlying mechanisms that contribute to the development of different risk factors for adverse health outcomes" (p. 1). For these reasons, Brondolo (2015) concluded that comprehensively understanding and addressing racial disparities in health requires new theoretical models that further elucidate how psychosocial contexts and their related variables strengthen or undermine individuals' resilience in the face of stress.

Theoretical Framework: Race-Based Disparities in Stress and Sleeping in Context Model

The Race-Based Disparities in Stress and Sleeping in Context Model (RDSSC), developed by Levy and colleagues (2016), is one of the newest and possibly most contextually enriched stress and coping models proposed for the advancement of racial disparities research. The RDSCC maintains core tenets of stress and coping theory (e.g., Lazarus & Folkman, 1984) and broadens its scope in key ways that distinguish it from preceding models. As its name implies, the RDSSC situates individuals within a larger context of environmental stressors and resources in order to facilitate a more critical evaluation of individuals' perceptions of and responses to race-based stressors. In alignment with current thought (e.g., Brondolo, 2015), the RDSSC posits that facets of ones' psychosocial context have implications for the availability of

internal and external coping resources, which in turn, influence psychological and biological responses to race-based stressors. Over time, stress responses, which are influenced by an intersection of psychosocial contextual factors, broadly affect life outcomes including physical and psychological health, and academic and career performance (Levy et al., 2016). Racial disparities in health, education, and the larger workforce, therefore, may represent an accumulation of transactional processes of stress uniquely influenced by contextual factors that impose differential demands and resources upon individuals and groups.

Levy et al. (2016) proposed four interrelated components to the RDSSC model: (1) stressors and resources, (2) opportunities, (3) psychological and biological stress responses, and (4) outcomes. Given the RDSSC's emphasis on the contribution of race-based stress to racial disparities in health and educational outcomes, the model proposes domain specific contextual variables that may significantly affect each component of the model. For example, the stressors and resources component of RDSSC (see Figure 1) gives consideration to one's overall experience of stress, as well as one's access to resources. Stressors include both historical and recent exposures to race-related (e.g., perceived discrimination, stereotype threat) and class-related (e.g., financial strain, familial conflict, neighborhood violence) stressors. Resources include the availability of various individual, familial, school, and communal supports (e.g., racial identity, social support, role models). The opportunities component of the RDSSC includes macro-level factors such as one's social and career networks, and surrounding economic and policy climates. The psychological and biological stress responses component of the RDSSC accounts for individual factors such as ones coping efforts (e.g., emotion regulation), emotionality (e.g., anger, anxiety, sadness), and physiological reactivity to race-based stressors (e.g., HPA axis activity, sleep quality). This component of the model also includes ancillary

psychological and biological stress responses such as motivation, attention, memory, and executive functioning (Levy et al., 2016). Taken together, the model theorizes that within-group variabilities within each of the proposed domains will influence how individuals appraise and respond to race-based stressors. In turn, variabilities in appraisal and coping will result in differentiated risks and resilience to adverse health, educational, and career outcomes among racial minorities.

Given the recent emergence of the RDSSC (Levy et al., 2016), research testing its proposed pathways is warranted. Applying this model to the Black medical student population may be particularly advantageous. Research provides clear evidence that in addition to the daily rigors of medical school training, Black medicals students also encounter unique race-based stressors within their training environments. Investigations among this student demographic suggests that the confluence of these stressors undermine not only medical students' mental health, but by extension, their academic and career well-being. Utilizing the RDSSC framework with this vulnerable population, therefore, offers a much-needed opportunity to measure the extent to which specific contextual variables may promote psychological and career-related resilience. Further clarification around contextual variables associated with resilience among Black medical students will enhance our understanding of stress and coping processes within this population. It will also contribute to the development of more empirically supported interventions aiming to reduce broader health and workforce disparities.

Internal and External Coping Resources

The RDSSC specifies several internal and external coping resources that may protect racial minorities from the negative effects of race-based stressors. Coping resources emphasized in the model all build upon existing bodies of research suggesting their usefulness within

stressful contexts. While an examination of all coping resources proposed in the RDSSC is beyond the scope of the current investigation, existing data from Black and other racial minority students suggests a subset of resources may have particular relevance to the current investigation. Therefore, the current section identifies specific coping resources from the RDSSC model to be included in the present study. The intention of this overview is to provide evidence supporting the relevance, utility, and impact of each coping resource within the stress and coping process of Black medical students navigating racially threatening learning environments.

Private regard: An internal coping resource. Research on Black Americans suggests that racial identity may be an important psychosocial coping variable to consider in relation to race-based stressors such as perceived discrimination. Sellers et al. (1998) broadly described racial identity as a multidimensional construct characterizing to the extent to which Black Americans identify and associate with members of their own racial group. According to this research (e.g., Sellers et al. 1998), racial identity reflects the significance and meaning that Black Americans ascribe to their racial group membership and self-concept (Sellers et al., 1998). Importantly, identification and affiliation with one's racial group infers some degree of shared cultural history, values, and beliefs (Phinney, 1990; Sellers, Smith, Shelton, Rowley, & Chavous, 1998; Vandiver, Cross, Worrell, & Fhagen-Smith, 2002).

Despite its significance, researchers assert that racial identity is a complex component of Black American's self-concept. The Multidimensional Model of Racial Identity (MMRI; Sellers et al. 1998), for example, proposes that four dimensions of identity capture the significance and meaning that Black Americans attribute to their racial group and self-concept. Dimensions of the MMRI include racial salience, centrality, regard, and ideology. Within the MMRI, each of these identity domains represents one way in which Black Americans might experience or express

their racial identity. Thus, this model allows for the examination and measurement of each identity dimension independent of one another (Sellers et al., 1998). The MMRI also posits that different dimensions of Black Americans' racial identity influence how individuals respond and adapt to different situations and events (Sellers et al. 1998).

Given the prevalence of Black Americans' exposure to racially stressful situations, several researchers have attempted to elucidate how different dimensions of racial identity impact individuals' stress and coping processes. Several investigations have studied racial identity domains in relation to perceptions and impacts of racial discrimination (Caldwell et al., 2002; Fuller, 2012; Lee & Ahn, 2013; Neblett et al., 2006; E. K. Seaton, Neblett, Upton, Hammond, & Sellers, 2011; Eleanor K. Seaton, Yip, & Sellers, 2009; R. M. Sellers, C. H. Caldwell, K. H. Schmeelk-Cone, & M. A. Zimmerman, 2003). A review of the extant literature suggests that while some dimensions of racial identity may exacerbate the negative effects of perceived racial discrimination (e.g., racial centrality), other dimensions (e.g., racial regard) may provide a buffer against its deleterious effects (e.g., Sellers & Shelton, 2003; Brondolo et al., 2009; Lee and Ahn, 2013).

Racial regard describes the extent to which an individual feels positively towards their race. This dimension of racial identity reflects feelings of pride and belonging and is considered among racial identity theorists to be an essential component of a healthy racial identity among Black Americans (Sellers et al., 1998). Importantly, racial regard consists of two subdomains: private regard and public regard. Public regard describes how positively or negatively a Black individual believes *others* feel about Black people. Conversely, private regard pertains to how positively or negatively Black individuals feel towards *oneself* for being Black and towards other Black people. Scholars contend that feeling positively towards oneself and ones' racial group

protects individuals from the negative psychological impacts of perceived discrimination in particular ways. Specifically, some researchers speculate that Black Americans who more positively identify with members of their racial group may better understand that experiences of racial discrimination result from social injustice rather than personal shortcomings. Resultantly, individuals' self-concepts may be less impacted by negative racial stereotypes and discriminatory experiences (Pascoe & Smart Richman, 2009). Others postulate that a positive group identification provides a sense of closeness and belonging when individuals feel ostracized from other racial groups (Brondolo et al. 2009; Sellers et al., 2006). Such contentions suggest that positive racial regard may play an instrumental role in the cognitive appraisal and subsequent coping response to race-based stressors such as perceived discrimination.

While existing literature indicates that both private and public regard may provide psychological benefits to Black Americans, the current study and review of literature will focus on the utility of private regard. Unlike public regard, private regard has been demonstrated to be positively related to greater self-acceptance, positive relationships with others, personal growth, and self-esteem (Maxwell, Brevard, Abrams, & Belgrave, 2015; Rowley, Sellers, Chavous, & Smith, 1998; Sellers, Copeland-Linder, Martin, & Lewis, 2006). Furthermore, to date, studies offer conflicting findings in relation to public regard. Whereas some investigations (e.g., Sellers et al., 2006) have found lower public regard to mitigate the negative impacts of perceived discrimination among Black Americans, other investigations (e.g., Sellers & Shelton, 2003) have found higher public regard to offer greater buffering effects.

Several studies provide empirical support for the protective effect of private regard on the negative impact of perceived racial discrimination for Black students' mental health. For instance, Burrow and Ong (2003) examined relationships between racial identity, perceived

discrimination, and mental health among Black doctoral students and graduates of doctoral programs. Researchers recruited participants online by soliciting national fellowship programs, associations, and organizations supporting Black doctoral students. At baseline, participants completed an initial assessment measuring two dimensions of racial identity (e.g., racial centrality and racial regard), positive and negative affect, and depressive symptoms. For 14 consecutive days, participants completed daily measures of racial discrimination, affect, and mood. Study investigators computed intercorrelations for all study variables and used multilevel random coefficient modeling (MRCM) to analyze daily diary data. Results revealed that racial regard (public and private) were negatively associated with exposure to daily racial discrimination and trait-level depression. Additionally, results indicated that individuals who reported greater private regard were less likely to report daily racial discrimination (Burrow & Ong, 2010). This finding suggests that private racial regard may alter the ways in which Black graduate students appraise stimuli in their environments such that a strong sense of racial pride and belonging may mitigate the activation of a stress response to race-based stressors such as racial discrimination. Burrow and Ong's (2003) study findings regarding the buffering effects of private racial regard were consistent with Caldwell et al. (2002) who found an inverse bivariate correlation between private regard and perceived stress related to racial discrimination among Black adolescents.

Lee and Ahn (2013) conducted a meta-analytic review examining relationships between racial identity and psychological distress from discrimination among Black Americans. These researchers sought to identify which specific dimensions of racial identity most strongly related to perceptions of discrimination and psychological distress. Based on study inclusion criteria, a sample of 27 studies published between 1991 and 2010 were included in the meta-analysis. The

total number of participants across all 27 studies was 6,131. Researchers coded study data into cluster variables representing eight different dimensions of racial identity. Private regard was identified as one of the eight measurable aspects of racial identity. Results revealed a significant and positive relationship between racial discrimination and private regard (r = .20). However, findings also indicated that private regard was significantly related to lower levels of psychological distress (r= -.04). Though the magnitude of the relationship indicated a small effect, private regard was one of two aspects of racial identity that provided a buffering effect on psychological distress. The only additional aspect of racial identity associated with decreased psychological distress in this meta-analysis was public regard (r = -.11). Whereas Lee and Ahn (2013) expressed a need for continued research investigating the role of racial identity in the discrimination-stress relationship, they further echoed assertions of other researchers (e.g., Pascoe & Richman, 2009) suggesting that positive group affiliation may offer Black Americans unique protections against the psychological impacts of discrimination.

Social support: An external coping resource. A proliferation of research dating back to the late 1960's highlights the buffering role of social support on the link between stress and poor health (S. Cohen & Wills, 1985; Cutrona & Russell, 1987). Social support, a multidimensional construct, refers to various forms of assistance that individuals receive from others. Major forms of support include emotional, instrumental, and informational support. Whereas emotional support typically refers to gestures and communications that promote one's self-worth (e.g., providing encouragement, talking through a problem), instrumental support refers to tangible forms of help or assistance (e.g., provisions of transportation, money, childcare, housekeeping, etc.). As its name implies, informational support pertains to the transmission of helpful information between persons (Cutrona & Russell, 1987).

When experiencing stressful life events, researchers contend that social support provides individuals with coping resources that buffer against more adverse stress responses (Lazarus & Folkman, 1984; Cohen &Willis, 1983). Evidence for this stems from a substantial body of research demonstrating that individuals reporting greater levels of social support report less psychological distress when faced with significant stressors (Dean & Lin, 1977; Kessler & McLeod, 1985; Kilpatrick et al., 2007). Some scholars (e.g., Cutrona and Russell, 1987) postulate that social support promotes greater self-efficacy and persistence, which in turn, may alter individuals' appraisal and coping processes during stressful environmental interactions. Thus, social support is an important coping resource among individuals navigating stressful situations and environments.

Research assessing the impact of social support among medical students suggests this coping resource may offer protections against psychological threats imposed by the medical school training environment. For example, Dyrbye et al. (2010) conducted a prospective, multi-institutional cohort study among medical students to evaluate factors associated with resilience to, and recovery from, burnout. Study participants completed online surveys at two time points assessing various contextual factors and their relationship to burnout, quality of life, fatigue, and stress. Specific factors included social support, learning climate, life events, employment status, and participant demographics. In this investigation, 1,321 students provided data at time one and 792 at time two. Researchers used the Wilcoxon-Mann-Whitney test and Fisher's exact test to compare students who did not report burnout at either time point (e.g., resilient; $N = 290$) with students who reported burnout at either or both time points (e.g., vulnerable; $N = 502$). Results indicated that resilient students were less likely to experience depression, stress, and fatigue, and reported higher quality of life. Resilient students experienced fewer stressful life events and

perceived their learning climate to be more positive as compared to vulnerable medical students (Dyrbye et al., 2010). Dyrbye et al. (2010) found that resilient students reported significantly higher levels of social support. For each one-point increment in level of satisfaction with social support, students were approximately twice as likely to be resilient.

In a similar examination of psychological resilience, Thompson, McBride, Hosford, and Halaas (2016) explored the role of social support and coping style among medical students. Using a cross-sectional study design, researchers administered online survey measures of depression and burnout, coping strategies, and perceptions of social support among medical students. Study findings from 161 medical students revealed several relationships between social support and mental well-being. Specifically, students who reported that they did not receive the support they needed from family and friends, fellow medical students, or their medical school had increased odds of experiencing moderate to severe depression. Further, students who reported that they did not receive the support they needed from family and friends were five and a half times more likely to experience emotional exhaustion than students who reported receiving the support they needed. Students reporting that they did not receive the support they needed from their medical school were almost three times more likely to experience emotional exhaustion compared to students reporting receiving adequate support in this area. Finally, students who reported that they did not receive the support they needed from fellow medical students or their medical school were more likely to report a low sense of personal accomplishment compared to students who thought they received the support they needed in these two domains (G. Thompson, McBride, Hosford, & Halaas, 2016).

Among Black medical students, research evaluating the buffering effect of social support remains limited. Studies that have more closely examined social support, however, offer valuable

insights into the potential impacts of this coping resource for racially underrepresented students. For example, Pyskoty, Richman, and Flaherty (1990) compared Black, White, and Hispanic medical students in terms of their psychosocial assets and mental health status prior to beginning medical school and one year later. Given their interest in the benefits of social support, Psykoty and colleagues (1990) collected data from Black and Hispanic students who had participated in a pre-enrichment medical program prior to beginning medical school. The pre-enrichment medical program primarily aimed to facilitate a smoother academic and social adjustment for racial minority medical students, in part by fostering community and scholarship. These researchers hypothesized that participation in the pre-enrichment program would provide Black and Hispanic medical students with greater social support, and by extension, greater mental well-being as compared to their White peers at the start of medical school (Pyskoty, Richman, & Flaherty, 1990). To test their hypothesis, as well as to evaluate the long-term effects of pre-enrichment program participation, Psykoty et al. (1990) administered questionnaires to all incoming students at a state medical college. Questionnaires measured personal demographics, perceived social support, self-esteem, locus of control, medical school stress, and indicators of mental well-being. Students completed questionnaires during their first-year registration, and again during the fall of the subsequent academic year. Data from both time points were analyzed from a total sample of 126 students, of which 90 (62.5%) were White, 19 (13.2 %) were Black, and 17 (11.8%) were Hispanic. Approximately half of the participating Black and Hispanic students had completed a pre-enrichment medical program. Study findings indicated that prior to beginning medical school (e.g., Time 1), both Black and Hispanic students reported significantly greater levels or perceived social support and self-esteem compared to White students. At Time 2, however, Black students' perceptions of social support significantly decreased. Although self-esteem

remained high, Black students also demonstrated significant increases in external locus of control and hostility at Time 2. No significant differences emerged between racial groups regarding perceptions of medical school stress or depression.

Based on their study findings, Psykoty et al. (1990) speculated that aspects of the medical training environment might undermine racial minority students' self-efficacy over time, as demonstrated by increases in external locus of control among Black and Hispanic students. The authors further remarked that reductions in self-efficacy might increase minority students' risk for negative psychological symptoms, such as increased hostility among Black students. To facilitate greater self-efficacy, Psykoty et al. (1990) postulated that racial minority students, particularly Blacks, might benefit from additional external resources such as formal support networks.

Odom, Roberts, Johnson, & Cooper (2007) explored informal and formal social supports through a qualitative investigation of barriers to, and facilitators of, personal and professional success among racial minority medical students. Researchers in this study conducted six focus group interviews in six major U.S. cities among 43 medical students. Of the 43 interviewees, 38 (88%) were Black/African descent, four (10%) were Hispanic, and one (2%) was Asian. Specific interview probes included, "What factors have facilitated underrepresented medical students' personal and professional success?" and, "What challenges have inhibited underrepresented medical students' personal and professional success?" Researchers performed content analysis for all six focus groups and grouped comments into categories reflecting their three categories of interest: (1) definitions of personal and professional success, (2) facilitators to success, and (3) inhibitors to success (Odom, Roberts, Johnson, & Cooper, 2007).

Regarding facilitators of success, study participants identified social support received during college and medical school as the most important factor contributing to their personal and professional success. Informal support networks such as family, friends, and classmates respectively provided medical students with emotional support and encouragement, renewed enthusiasm and excitement, and a sense of mutual understanding and bonding. Formal forms of support included professional enrichment programs, advisors, mentors, role models, and minority affairs offices. For example, participants indicated that professional enrichment programs helped to better prepare them for entry into medical school. Students broadly credited advisors, mentors, and diversity offices with helping them to identify opportunities for continued professional development and scholarship support. They also provided students with additional emotional support throughout medical school training. Participants' comments further indicated that mentors encouraged and guided them to pursue a career in medicine, while role models motivated and inspired them towards continued academic achievement, learning, and professional development (Odom et al., 2007).

Odom et al. (2007)'s findings on the positive influences of social supports such as academic mentors and role models on the personal and professional well-being of Black medical students adds to a growing body of literature highlighting the importance of this coping resource. For example, a qualitative study assessing factors contributing to Black men's enrollment into and graduation from medical school also identified academic mentorship, and role modeling as two instrumental forms of support that facilitated students' success (B. Thomas, Manusov, Wang, & Livingston, 2011). In a pilot study evaluating the impact of mentoring and advising on underrepresented medical students who were considered "at risk" for academic difficulties,

Tekian, Jalovecky, & Hruska (2001) found that students who reported having a physician mentor experienced fewer academic difficulties compared to at-risk students without such a mentor.

Similar benefits of mentorship and role modeling have been reported among racial minority students and academicians pursuing careers in other health and science related fields (Beacham, Askew, & William, 2009; O'Brien, McAbee, Hebl, & Rodgers, 2016; Payton, Howe, Timmons, & Richardson, 2013; S. N. Williams, Thakore, & McGee, 2016a, 2016b). For example, O'Brien et al. (2016) examined the buffering effect of supervisory support on the impact of perceived discrimination on the stress, health, and performance of 210 racially underrepresented early career academicians in science, technology, engineering, and mathematics (STEM) fields. Participants were recruited as a part of a larger study through the National Science Foundation's ADVANCE Grant Initiative. Participants completed online surveys that included measures of discrimination, physical health, stress, organizational behavior, and supervisory support. Supervisory support was measured using an adapted instrument that assessed levels of perceived instrumental and emotional support received from a supervisor. Using path analysis to test relationships between variables of interest, O'Brien et al. (2016) found that supervisory support buffered participants' level of stress resulting from experiences of perceived discrimination.

While the existing literature offers limited empirical evidence for the direct buffering effects of social support on the psychological impacts of perceived discrimination among Black medical students, an accumulation of evidence suggests that this psychosocial resource does have implications for ones' interaction with stressful environments. Given that social support has been associated with both psychological well-being and academic performance among Black medical students, it seems to be an important factor to consider in terms of ones' risk or

resilience to race-based stressors like perceived discrimination within the medical school environment. In summary, the RDSSC posits that coping resources such as private racial regard, social support, and academic role modeling may act as a buffer against the negative psychological and academic impacts of race-based stressors such as perceived discrimination. Such coping resources may bolster students' sense of self-esteem and efficacy, which in turn may alter appraisals of stress when faced with adversity. Given the relationship between appraisals of stress and subsequent coping efforts, the following section describes one type of coping strategy that may weaken the negative impacts of race-based stress among students.

Coping Responses: The Mediating Role of Emotion Regulation

Emotion regulation, which broadly refers to cognitive and behavioral strategies that change the intensity and duration of one's emotions, is considered an influential component of one's coping response to stress (Troy et al., 2010). Because coping responses play a mediating role on the impact of stress on psychological well-being (e.g., Lazarus and Folkman, 1984), considerable efforts have been made by researchers to understand how individuals manage their emotional responses to stress. Coping literature suggests that the use of adaptive emotion regulation strategies in response to stressful stimuli may act as a protective agent against negative psychological symptoms (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; S. A. Moore, Zoellner, & Mollenholt, 2008; Troy et al., 2010).

Cognitive reappraisal. Cognitive reappraisal, or reframing one's thoughts about a situation to change its emotional impact, has been identified as a particularly adaptive emotion regulation strategy (J. Gross, 2002; J. Gross & John, 2003; J. Gross & Thompson, 2007; J. J. Gross, 1998; Koole, 2010; Troy, Shallcross, & Mauss, 2013). Several studies demonstrate negative relationships between cognitive reappraisal ability and symptoms of depression and anxiety across samples of both adolescents and adults (N. Garnefski & Spinhoven, 2001;

Garnefski. & Kraaij, 2006; Kraaij, Pruymboom, & Garnefski, 2002). Research suggests the usefulness of cognitive reappraisal is particularly pronounced among people experiencing high levels of stress within contexts where such stressors are uncontrollable (Carrico, Antoni, Weaver, Lechner, & Schneiderman, 2005; Moskowitz, Hult, Bussolari, & Acree, 2009; Pakenham, 2005; Troy et al., 2013). In uncontrollable stressful contexts, where little can be done to change the situation, theorists contend that emotionally regulating oneself may be the only thing that individuals can actively control, thereby making it an important coping process to consider (Lazarus & Folkman, 1984). Others posit that cognitive reappraisal strategies facilitate more adaptive acute stress response, and by extension, promote improved self-confidence, efficacy, and performance (Beltzer, Nock, Peters, & Jamieson, 2014; Jeremy P. Jamieson, Mendes, Blackstock, & Schmader, 2010; Jeremy P. Jamieson, Mendes, & Nock, 2013; J. P. Jamieson, Nock, & Mendes, 2012; L. J. Moore, Vine, Wilson, & Freeman, 2015).

A small body of research suggests that the psychological benefits of using cognitive reappraisal strategies may also extend to racial/ethnic minorities experiencing race-based stressors. For example, Juang et al. (2016) recently examined the influence of emotion regulation strategies on the relationship between discrimination and psychological well-being among a sample of Latino ($N = 489$) and Asian ($N = 790$) college students. Data used in this investigation was part of a largescale, nationwide, online study called the Multi-Site University Study of Identity and Culture (MUSIC). Participants completed measures evaluating two emotion regulation strategies (e.g., cognitive reappraisal and emotion suppression), experiences of discrimination (e.g., denigration and foreigner objectification), and indicators of psychological well-being including, depressive symptoms, anxiety, and aggression. Bivariate correlations and multi-group path analysis was used to analyze study data. Results from the combined sample of

1,279 students indicated that for both ethnic groups, cognitive reappraisal negatively related to symptoms of depression, anxiety, and aggression. Emotion suppression was positively related to depressive symptoms and anxiety, and unrelated to aggression. Analyses further indicated that increases in discriminatory experiences did not relate to increased levels of depressive symptoms or aggression when students reported using a combination of higher cognitive reappraisal and lower emotion suppression. Alternatively, with increasing experiences of discrimination, the combination of lower cognitive reappraisal and higher expressive suppression related to the greater depressive symptoms, anxiety, and aggression (Juang et al., 2016).

At least two additional studies conducted among Latino and Asian American college students demonstrate the adaptive qualities of cognitive reappraisal in relation to perceived discrimination. Yoo and Lee (2005), for instance, implemented a cross-sectional study among 155 Asian American college students to examine relationships between ethnic identity, coping styles, racial discrimination, and psychological well-being. Researchers found that cognitive restructuring, a coping strategy similar to cognitive reappraisal, buffered the effects of discrimination on psychological well-being, as measured by self-reported life satisfaction and positive and negative affect (Yoo & Lee, 2005). Similarly, Soto et al. (2012) investigated the influence of cognitive reappraisal on psychological functioning across racially threatening environments among Latino college students. Study investigators collected data from a nationwide sample of 425 students on cognitive reappraisal tendencies, perceived discrimination, self-esteem, life satisfaction, depressive and anxiety symptoms, and racial composition of one's surrounding community. Latent variable path model analyses revealed that Latino students using higher levels of cognitive reappraisal reported more positive psychological functioning when experiencing racial discrimination in areas with large Latino populations. Latino students

residing in areas with lower populations of Latinos did not benefit from use of cognitive reappraisal strategies (Soto et al., 2012).

Within an academic context, Jamieson, Peters, Greenwood, & Altose (2016) implemented a randomized double-blind field experiment testing the efficacy of cognitive reappraisal on math performance among a sample of predominately-Black community college students. Jamieson et al. (2016) elected to target students enrolled in developmental math courses because these students were considered at greatest risk for academic difficulties and came disproportionately from disadvantaged backgrounds. To conduct this study, study researchers recruited 93 students taking the same developmental math course over the course of five semesters. Of the 93 students, 68.8 percent (*N*=64) were Black and 31.2 percent (*N*=29) were White. Participants were randomly assigned to a treatment or control condition within their classroom and the course instructor remained blind to students' condition. All study data was collected within two class periods. During class period one, students completed paper surveys of math anxiety and stress appraisals. Immediately afterwards, students completed a math exam. During class period two, students assigned to the placebo group repeated identical study measures. However, prior to taking their second math exam, students in the placebo condition read brief summaries that suggested that the best way to improve performance during stressful test taking situations was to ignore the stress and any associated negative thoughts or feelings one experienced (e.g., emotion suppression). Students assigned to the intervention group also completed study measures taken during day one, but received different supplemental information prior to taking their second exam. Unlike students in the placebo condition, students in the intervention group read summaries of scientific articles suggesting that arousal experienced during test taking was not detrimental, but rather an evolutionary mechanism that worked to

enhance an individual's performance (e.g., reappraisal). In addition to collecting students' study measures and exam scores, researchers also collected students' final course grades (Jamieson et al., 2016).

Using Hierarchical linear modeling (HLM), researchers confirmed that no significant differences existed between class cohorts on study measures or outcomes of interest. Standardizes scores and change scores were computed to examine the effects of reappraisal on math anxiety and exam performance. Results indicated that students assigned to the reappraisal group reported increased coping resources and decreased math evaluation anxiety compared to students in the placebo group. Regarding academic performance, students in the reappraisal group performed better on exam two than exam one, compared to students in the placebo group. Additionally, students in the reappraisal condition showed marginally higher end of semester grades compared to students in the placebo condition. Finally, Jamieson et al. (2016) confirmed through bootstrapping mediation analysis that improvements in coping response to stress mediated the relationship between the reappraisal condition and improvements in test performance.

Taken together, this body of research suggests that cognitive reappraisal may be a particularly adaptive emotion regulation strategy to employ during stressful transactions with one's environment. Not only has cognitive reappraisal been negatively associated with psychological difficulties among racial/ethnic minorities, but it has also been shown to facilitate improved academic performance within stressful contexts. Given the psychological and academic rigors of medical school, as well as the uncontrollable occurrence of racially discriminatory events, testing the utility of this coping strategy among Black medical students is relevant and warranted.

Summary

Stress and coping theory suggests that stress is a transactional process that occurs between individuals and their environment (Lazarus & Folkman, 1984). Determining how one appraises and copes with the demands placed upon them, however, may depend on myriad contextual factors and psychosocial assets (Levy et al., 2016; Brondolo, 2015). While a significant body of literature suggests that Black medical students may be at increased risk for experiencing race-based stressors such as perceived discrimination within the medical training environment, little is known about the resilience factors that may protect against the negative impacts of such stressors. Coping resources such as a strong racial identity and social supports may increase Black medical students' efficacy in the face of adversity, altering the ways in which students perceive potential threats within their environment. Additionally, emotion regulation strategies such as cognitive reappraisal may dampen individuals' emotional reactivity to stress, thereby acting as a buffer. Together, the interaction of these resilience factors may promote improved psychological well-being and academic performance among Black medical students navigating stressful academic training environments.

Chapter III

METHODS

Study Sample

The study sample consisted of medical students in the U.S. who self-identified as "African American or Black". Eligible students were 18 years of age or older and enrolled in a medical degree granting program or institution. Based upon an a priori power analysis, a minimum sample of 150 students was recruited into the study. This estimate was calculated for a multiple regression model with six predictor variables, an alpha of .05, a power of .80, and an assumed effect size of .20. In order to test the aspirational hypothesized SEM, an a priori power analysis indicated that a sample size of 376 would result in 80% power to detect an effect size of .20 when $\alpha = .05$ (Soper, 2017).

Procedure

This study utilized a cross-sectional study design to examine stress and coping processes proposed by the Race-based Disparities in Sleep and Stress in Context model (RDSSC; Levy et al., 2016) among a national sample of Black medical students. To recruit study participants, solicitation emails and electronic flyers were delivered to diversity and student affairs offices of U.S. medical institutions, as well as multicultural, professional medical student organizations (e.g., Student National Medical Association [SNMA] and White Coats 4 Black Lives [WC4BL]). Recruitment materials specified that study participation entailed completing one 116-item online survey lasting approximately 25 minutes, and that all eligible participants could elect to receive a $15 electronic-gift card to Amazon.com upon survey completion. Snowball sampling was employed to recruit additional study participants; in particular, participants completing the survey were encouraged to share study information with other eligible classmates and peers. The

University of Wisconsin-Madison Education and Social/Behavioral Science Institutional Review Board approved all recruitment procedures and related materials (see Appendix).

Data Cleaning

The data were cleaned using three criteria. First, all participants who completed less than 80% of the study survey, as recorded by Qualtrics were omitted. This cut-off was determined to be an incomplete survey response. A total of 493 participants began the study and 449 completed at least 80% of all survey items, yielding a completed survey response rate of 91.1%. Next, participants who failed to report demographic information (n= 8), or reported that they were not currently enrolled in medical school (n= 4) were removed from the sample. This resulted in a final sample of 437 participants for data analyses.

Participant Demographics

A demographic questionnaire was included in the survey to assess general participant characteristics. Participant gender, age, sexual orientation, race/ethnicity, relationship status, parental status, class standing, and income levels for self and family was measured. Participants were also asked to report the name of their medical institution. Participants were informed that this information would be used to further assess institutional characteristics (e.g., racial composition, geographic region, institution type, etc.).

Gender and Age. The majority of the study sample identified as female (n= 305; 69.8%), followed by male (n= 127; 29.1%), and transgender (n= 2; 0.5%). One participant identified their gender as "other" and one participant preferred not to report this information. Participants ranged in age from 19 to 27 (M= 25.41, SD= 2.89).

Training Status. With regard to training status, 197 (45.1%) participants reported being in their first-year, 147 (33.6%) in their second-year, 46 (10.5%) in their third-year, 38 (8.7%) in

their fourth-year, and nine (2%) reported being in their fifth year or beyond of medical school training. Almost all participants identified as full-time medical students (*n*= 428; 97.9%). Nine participants (2.1%) identified as part-time medical students.

Race and Ethnicity. All study participants self-identified as Black. When asked to further describe their race, 304 (69.6%) identified as African American/Black, 105 (24%) identified as African/African descent, 58 (13.3%) identified as Afro-Caribbean, 46 (10.5%) identified as multiracial, including Black/African American or African descent, and five (1.1%) identified as "other" (e.g., Afro-Indian, Caucasian/White, Haitian-American, Native Hawaiian). Regarding ethnicity, 406 (92.9%) identified as non-Hispanic and 18 (4.1%) identified as Hispanic.

Social Class. Regarding perceived social class based upon one's past experiences growing up, study participants self-identified as lower class (*n* = 50; 11.4%), working class (*n* = 91; 20.8%), lower-middle class (*n* = 63; 14.4%), middle class (*n* = 146; 33.4%), upper-middle class (*n* = 83; 19.0%), and upper class (*n* = 3; 0.7%). One participant did not report their perceived social class. Participants reported the following combined annual incomes of the person(s) who raised them: 0-$19,000 (*n* = 37, 8.5%), $20,000-$39,999 (*n* = 54, 12.4%), $40,000-$49,999 (*n* =43, 9.8%), $50,000-$79,999 (*n* = 77, 17.6%), $80,000-$99,999 (*n* = 43, 9.8%), $100,000-$119,999 (*n* =57, 13.0%), $120,000-$139,999 (*n* = 26, 5.9%), $140,000-$159,999 (*n* = 12, 2.7%), $160,000-$179,999 (*n* =18, 4.1%), $180,000-$199,999 (*n* = 12, 2.7%), $200,000 or above (*n* = 56, 12.8%).

Caregiver Education. When asked about the highest level of education attained by a primary caregiver (e.g., a parent, legal guardian), participants reported the following: no formal schooling (*n* = 1; 0.2%), some grade school (*n* = 4; 0.9%), 8th grade (*n* = 7, 1.6%), high school or

GED (*n* = 55, 12.6%), some college (*n* = 45, 1.03%), two year college or trade school (*n* = 38, 8.7%), college (*n* = 97, 22.2%), graduate or professional school (*n* = 187, 42.8%). Three participants did not provide information pertaining to caregiver education level.

Partner Status and Sexual Orientation. The majority of study participants identified as single (*n* = 360; 82.4%). Remaining participants identified as married (*n* = 38; 8.7%), divorced (*n* = 5; 1.1%), or not married but living with a partner (*n* = 34, 7.8%). Regarding sexual orientation, participants self-identified as follows: straight (*n* = 386; 88.3%), lesbian (*n* = 1; 0.2%), gay (*n* = 11; 2.5%), bisexual (*n* = 27; 6.2%), queer (*n* = 7; 1.6%), and questioning (*n* = 2; 0.5%). One participant identified their sexual orientation as "other" and one preferred not to answer.

Medical Institution. Participants reported attending 51 different medical institutions. These institutions represented all five major geographic regions of the U.S (e.g., Northeast, Southeast, Midwest, Southwest, and West). Approximately 16 percent of participants (*n* = 69) did not provide identifying information about their medical intuition. Participants belonged to a range of medical institution types (e.g., Public and Private Research Universities [R1], Public and Private Comprehensive Colleges, Historically Black Colleges and Universities [HBCU], Free-standing Medical Schools, and Schools of Osteopathic Medicine).

Measures

Ambient Perceived Discrimination latent variable. The ambient perceived discrimination latent variable was measured by two validated scales.

General Ethnic Discrimination (GED). First, to assess general experiences of racial discrimination, the General Ethnic Discrimination (GED; Landrine et al., 2006) scale was used. The GED scale is a generalized version of the Schedule of Racist Events (SRE; Klonoff & Landrine, 1999) and assesses both the frequency and appraisal of discriminatory events. In

contrast to the SRE, which pertains specifically to Black Americans, the GED can be administered to members of any racial/ethnic group, including Whites. Landrine et al. (2006) suggested that the GED may serve as a more ideal measure of perceived discrimination compared to the SRE because it allows for a consistent point of comparison between racial groups. This 18-item measure evaluates experiences of discrimination within work/school, public places, and healthcare settings. An example item from the GED asks, "How often have you been treated unfairly by your employers, bosses, and supervisors because of your race/ethnic group?"

For each discriminatory event, respondents rate: (1) the frequency of the event during the past year, (2) the frequency of the event during one's lifetime, and (3) an appraisal of the stressfulness of the event. Respondents use a six-point Likert-type scale to rate the frequency of each event. Responses range from 1 (*never*) to 6 (*almost all the time*). The same Likert-type scale is used to rate the stressfulness of each discriminatory event, where responses range from 1 (*not at all stressful*) to 6 (*extremely stressful*). To score the frequency of recent and lifetime discriminatory events, respondents' ratings are summed across all 18 items (total scores range from 18-108). To assess respondents' appraisals of each event, stressfulness ratings are summed across the first 17 items (total scores range from 17-102). Ratings for the three scale components can be treated independently as distinct subscales (Landrine & Klonoff, 1996). In this study, participants only completed items assessing their experiences of discrimination in the last year. Research suggests that examining discriminatory incidents within the last year may be the most useful and reduces the risk of multicollinearity (Moradi & Subich, 2003; Thompson, Her, & Nitzarim, 2014).

A validation study of the GED scale demonstrated strong psychometric support (Landrine, Klonoff, Corral, Fernandez, & Roesch, 2006) (Landrine et al., 2006). In this study,

the GED was administered to a sample of undergraduate and graduate students (N = 868), and community adults (N = 701). Internal-consistency reliability for each of the three GED subscales (Recent Discrimination, Lifetime Discrimination, and Appraised Discrimination) was high (α= .84 ranged from .94 to .95). Among four major racial/ethnic groups, Cronbach's alphas were as follows: Whites = .91 to .92, Blacks = .93 to .95, Latinos = .93 to .94, and Asian-Americans= .91 to .94. One-month test-re-test reliability of the GED was also high (r = .95 to .96). Predictive validity of the GED was assessed by comparing GED scores with indices of psychological distress via the Hopkins Symptom Checklist-58. GED scores were strongly related to symptoms of psychological distress and current cigarette smoking among all racial/ethnic groups (White, Black, Latino, Asian American), providing further evidence of predictive validity (Landrine et al., 2006). Internal consistency reliability for the discriminatory events subscale of the GED among the current sample was high (Cronbach's α = .92).

Perceptions of Prejudice and Discrimination (PDD). To assess perceived discrimination within the medical training environment, this study used the Perceptions of Prejudice and Discrimination scale (PDD; Cabrera & Nora, 1994). The seven-item PDD scale assesses three dimensions of prejudice and discrimination including: racial/ethnic climate on campus, prejudiced attitudes of faculty and staff, and in-class discriminatory experiences. The campus racial/ethnic climate dimension of the PDD scale assesses students' global perception of race-based prejudice and discrimination within a college campus and includes four items. A sample item is, "I have heard negative words about people of my own race or ethnicity while attending classes." The prejudiced attitudes of faculty and staff dimension of the PDD scale examines the extent to which students perceive campus faculty and administrators to harbor prejudiced feelings towards racial/ethnic minorities and includes two items. A sample item from this

dimension is, “I feel there is a general atmosphere of prejudice among faculty at this institution.” Finally, the in-class discriminatory experiences dimension of the PDD scale assess students’ classroom experiences. A single item states, “I have been singled out in class and treated differently than other students.” Respondents rate each item on a five-point Likert-type scale, where responses range from 1 (*strongly disagree*) to 5 *(strongly agree*). Subscale scores can be scored separately or combined into a total score. Higher scores on the PDD indicate greater perceptions of institutional discrimination (Cabrera & Nora, 1994).

The PDD scale has been demonstrated to have adequate psychometric support. A construct validation study (e.g., Cabrera & Nora, 1994) conducted among 879 college students revealed a high degree of internal consistency among the PDD measure items (α= .84). The alpha coefficients for Black Americans, Asian Americans, Hispanics, and White were also consistently high (.87, .83, .83, and .82, respectively). Black, Asian American, and Hispanic students were significantly more likely to perceive prejudice and discrimination on campus and within the classroom than White students, suggesting evidence of construct validity. Black students reported the highest levels of prejudice and discrimination within their institutions (Cabrera & Nora, 1994). Additional investigations using the PDD scale have demonstrated that perceptions and experiences of prejudice and discrimination from the general campus climate are associated with poor academic and social acclimation to the learning environment, demonstrating evidence of predictive validity (Cabrera et al., 1999; Nora & Cabrera, 1996). Internal consistency reliability for this measure among the current sample was strong (Cronbach’s α = .91).

Coping resources latent variable. The coping resources latent variable was measured by three validated scales.

Private Racial Regard. The racial regard scale of the Multidimensional Inventory of Black Identity scale (MIBI; Sellers et al., 1998) was used to assess a single dimension of racial identity. The MIBI scale was developed to operationalize the Multidimensional Model of Racial Identity (MMRI), which proposes three stable dimensions of Black identity (centrality, regard, and ideology). The MMRI contends that individuals' beliefs regarding the meaning and significance of their racial identity may influence the ways in which they appraise and behave in specific situations and that certain aspects of racial identity may be associated with more positive outcomes (e.g., self-esteem, psychological well-being).

The total MIBI scale consists of 56 items and includes three major scales (centrality, regard, and ideology) and seven subscales. Because the MIBI is a multidimensional measure of racial identity, it is considered acceptable to administer its scales and subscales independently. The scale developers caution that an overall composite score across scales cannot be calculated (Sellers et al., 1998). Given the goal of this study to examine protective aspects of racial identity, only one subscale of the racial regard scale was examined, the private racial regard scale. The racial regard scale assesses an individual's affective and evaluative assessment of their race and is heavily rooted in research on collective self-esteem. The private regard subscale consists of six items and measures the extent to which an individual feels positively towards Black Americans, as well as how positively one feels about being Black American. An example item from this subscale states, "I am happy that I am Black". Respondents indicate their level of agreement with each item on a seven-point Likert-type scale, where responses range from 1 (*strongly disagree*) to 7 (*strongly agree*). After reverse coding select items, higher scores on the private regard subscale indicate more positive feelings towards others and oneself as Black Americans.

A validation study (Sellers, Smith, et al., 1998) of the MIBI conducted among 474 Black college students found the private regard subscale to be internally consistent (α= .82). Convergent validity for the MIBI comes from correlations between its subscales and subscales of the Cross Racial Identity Scale, another measure of Black racial identity (Vandiver et al., 2002). Regarding predictive validity, a study by Sellers et al. (1997) demonstrated that the private regard subscale was positively correlated with contact with other Black Americans (*r*=.27). More recent empirical investigations using this subscale have demonstrated a negative relationship between private regard and symptoms of depression and anxiety (Burrow & Ong, 2010; Lee & Ahn, 2013). Internal consistency reliability for the private regard subscale among the current sample was good (Cronbach's α = .83).

Influence of Others on Academic and Career Decisions Scale (IOACDS). To measure academic support and guidance, the Influence of Others on Academic and Career Decisions Scale (IOACDS; Nauta & Kokaly, 2001) was administered. The IOACDS is a 15-item measure assessing the presence and influence of others on academic and career development. The measure consists of two subscales. The eight-item Support/Guidance subscale includes items such as, "There is someone I can count on to be there if I need support when I make academic and career choices." The Inspiration/Modeling subscale consists of seven-items and includes items such as, "There is someone I am trying to be like in my academic or career pursuits." Respondents rate their level of agreement to each measure item on a five-point Likert-type scale where responses range from 1 (*strongly disagree*) to 5 (*strongly agree*). Total scores range from 15 to 75, with higher scores indicating greater perceptions of academic support and guidance.

Validation studies of the IOACDS provide strong psychometric support for the instrument (Nauta & Kokaly, 2001). Internal consistency for the total scale and each subscale

was high (total scale α= .89, Support/Guidance α= .89, and Inspiration/Modeling α= .87). Ten-week test-retest reliability was also high with values ranging from .91 to .94. To establish convergent validity, Nauta and Kokaly (2001) predicted that the Support/Guidance subscale of the IOACDS would positively correlate with the Social Provisions Scale (SPS; Cutrona & Russell, 1987), an index of general social support. Indeed, Support/Guidance subscale scores were significantly related to SPS scores (*r*= .51). These authors also demonstrated that neither subscales of the IOACDS were significantly related to scores from the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960), demonstrating evidence of divergent validity. Internal consistency reliability for the total scale among the current sample was high (Cronbach's α = .92).

Social Provisions Scale-10 (SPS-10). This study also included an assessment of general social support via the Social Provisions Scale-10 (SPS-10; Caron, 2013). The SPS-10 is a shortened version of the original 24-item Social Provisions Scale (e.g., Cutrona & Russell, 1987) and measures one's availability of social support. An example item from the SPS-10 is, "There are people I can depend on to help me if I really need it." Respondents indicate their level of agreement with each measure item on a four-point Likert-type scale where response range from 1 (*strongly disagree*) to 4 (*strongly agree*). Total scores range from 10 to 40, with higher scores indicating greater perceived social support.

A validation study of the SPS-10 was conducted among 2,433 community adults (Caron, 2013). Findings indicated the SPS-10 had high internal consistency (α= .88). Concurrent validity with the original SPS was also strong (*r*=.93). The SPS-10 has been negatively correlated with psychological distress, demonstrating evidence of predictive validity (Caron, 2013). Internal

consistency reliability for this measure among the current sample was good (Cronbach's α = .88).

Coping response. Coping response was measured by one validated scale.

Cognitive Reappraisal. Emotion regulation disposition was measured using one subscale from the 10-item Emotional Regulation Questionnaire (ERQ; Gross & John, 2003). This study excluded the four-item emotion suppression subscale of the ERQ was due to its association with greater psychological distress compared to cognitive reappraisal. The cognitive reappraisal subscale of the ERQ, administered in this study, assesses one's tendency to change how they think about a situation in order to alter their emotional response to an event. An example item from the six-item cognitive reappraisal subscale reads, "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm." Respondents answer each item on a seven-point Likert-type scale where responses range from 1 (*strongly disagree*) to 7 (*strongly agree*). Total scores range from 6 to 42, with higher scores indicating a greater disposition towards use of cognitive reappraisal.

The ERQ has been demonstrated to have strong internal reliability (Cronbach α= .88) and high test-retest reliability across three months (*r*= .69; Gross & Thompson, 2003). Melka, Lancaster, Bryant, & Rodriguez's (2011) confirmatory factor analysis (CFA) of the ERQ conducted among racially diverse undergraduates (N = 1,188) found that an orthogonal relationship existed between the two subscales of the ERQ (*r*=.10), providing evidence to support the independent use of the subscales. Correlations between the cognitive appraisal and suppression latent variables suggested that the constructs are distinct (*r*=.02). Results from this CFA also demonstrated that the ERQ performed similarly across Black and White Americans, and across men and women (Melka et al., 2011).

Researchers have successfully administered the cognitive reappraisal subscale of the ERQ independently of the four-item expressive suppression subscale (Balzarotti, Biassoni, Villani, Prunas, & Velotti, 2016). Cognitive reappraisal has been negatively associated with depressive symptoms and stress among adolescents and adults, demonstrating evidence of predictive validity (Cutuli, 2014; Nadia Garnefski & Kraaij, 2007; S. A. Moore et al., 2008; Pakenham, 2005). Investigations have also found cognitive reappraisal to be associated with closer interpersonal relationships and greater willingness to seek social support and connect with peers, demonstrating further evidence of predictive validity (Cabello, Salguero, Fernández-Berrocal, & Gross, 2013; J. Gross, 2002; J. Gross & John, 2003; J. Gross & Thompson, 2007). Internal consistency reliability for the cognitive reappraisal subscale of the ERQ among the current sample was high (Cronbach's $\alpha = .88$).

Mental health latent variable. Three indices of psychological distress were measured for the mental health latent variable.

***Perceived Stress Scale-10*.** Stress was evaluated via the Perceived Stress Scale-10 (PSS-10; Cohen & Williamson, 1988). The PSS-10 is a widely used measure assessing the degree to which an individual perceives aspects of their life to be uncontrollable, unpredictable, and overwhelming. Respondents indicate how often they have felt a certain way within the past month. For example, one measure item asks, "In the last month, how often have you felt that you were unable to control the important things in your life?" Each question is rated on a five-point Likert-type scale where responses range from 0 (*never*) to 5 (*very often*). Items 4, 5, 7, and 8 are reverse scored before summing all items. Total scores on the PSS-10 range from 0 to 40, where higher scores indicate greater perceived stress.

The PSS-10 has been validated among community adults and college students (S. Cohen, 1988; Roberti, Harrington, & Storch, 2006; J. M. Taylor, 2015). In 2006, Roberti and colleagues conducted a study among 285 undergraduates to advance the psychometrics of the PSS-10. Analyses revealed high internal consistency (Cronbach α= .89). Convergent validity was evaluated by the Pearson product-moment correlation between the PSS-10 and the State-Trait Anxiety Inventory-Trait Version (STAI-T; Spielberger, 1983); a significant relationship was found with the STAI-T (r= .73). Evidence of divergent validity has been demonstrated by the non-significant correlation between the PSS-10 and the Adult Aggression Scale (r= .03). Internal consistency reliability for this measure among the current sample was strong (Cronbach's α = .89).

General Anxiety Disorder-7 scale. Anxiety was assessed using the Generalized Anxiety Disorder-7 (Spitzer, Kroenke, Williams, & Lowe, 2006). The GAD-7 is a brief inventory that assesses symptoms of generalized anxiety disorder (GAD) as listed in the Diagnostic Statistical Manual of Mental Disorders, 4th edition (DSM-IV; American Psychiatric Association, 1994). Respondents rate how often they have been bothered by specific symptoms during the past two weeks. A sample item from the GAD-7 reads, "How often have you been bothered by feeling nervous, anxious, or on edge?" Items are rated on a four-point Likert-type scale where responses range from 0 (*not at all*) to 3 (*nearly every day*). Scores on the GAD-7 range from 0 to 21. Severity scale scores are as follows: 0-4 (minimal), 5-9 (mild), 10-14 (moderate), and 15 to 21 (severe).

The GAD-7 is considered both reliable and valid (Spitzer et al., 2006). The GAD-7 shows high internal consistency (Cronbach α= .92) and good test-retest reliability (interclass correlation= .83) over one week. Convergent validity of the GAD-7 has been demonstrated by its

correlations with other measures of anxiety including the Beck Anxiety Inventory (r= 0.72) and the anxiety subscale of the Symptom Checklist-90 (r= 0.74; Spitzer et al., 2006). The GAD-7 also has been shown to be highly correlated (r= .75) with, but distinct from, the PHQ-8 (a depression measure; Spitzer et al., 2006). Scores from the GAD-7 have been associated with mental health, social functioning, general health perceptions, bodily pain, role functioning, and physical functioning, which demonstrates evidence of its predictive validity (Spitzer et al., 2006). Internal consistency reliability for the GAD-7 among the current study sample was high (Cronbach's α = .91).

Patient Health Questionnaire-9 (PHQ-9). Depression was measured using the nine-item Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 assesses symptoms of depression as listed in the DSM-IV (APA, 1994). Respondents rate how often they have been bothered by specific depressive symptoms during the past two weeks. A sample item from the PHQ-9 asks, "How often have you been bothered by feeling down, depressed, or hopeless?" Item nine of the PHQ-9 screens for the presence of suicide ideation. Items are rated on a four-point Likert-type scale where responses range from 0 (*not at all*) to 3 (*nearly every day*). Scores on the PHQ-9 range from 0 to 27, where higher scores indicate greater depressive symptomatology. Severity scale scores as follows: 0-4 (minimal), 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe), and 20-27 (severe).

The PHQ-9 is considered a valid diagnostic tool for use among clinical and community samples (Kroenke et al., 2001; Spitzer, Kroenke, & Williams, 1999; Spitzer, Williams, Kroenke, Hornyak, & McMurray, 2000). Diagnostic validity for the PHQ-8 was established in two studies (e.g., Spitzer et al., 1999; Spitzer et al., 2000) that administered the instrument among 3,000 patients in eight primary care clinics and 3,000 patients in seven obstetrics-gynecology clinics.

Construct validity of the PHQ-9 was assessed using the Short-Form General Health Survey (SF-20), self-reported sick days and clinic visits, and symptom-related difficulties. Increasing depression severity on the PHQ-9 was associated with decreases on all subscales of the SF-20 and increases in sick days, health care utilization, and symptom-related difficulties. The PHQ-9 has a sensitivity and specificity of 88%, and its internal reliability is high (Cronbach α= .89; Kroenke et al., 2001). Internal consistency reliability for this measure among the current study sample was high (Cronbach's α = .88).

Academic and career outcomes latent variable. The latent variable academic performance and career commitment was assessed using two validated measures.

Anticipated Academic Performance scale. To assess academic performance, this study administered the three-item Anticipated Academic Performance scale (Hardre & Reeve, 2003). This measure asks respondents to rate their academic and career expectancies. Items include: "In terms of academic performance, I expect to do well", "In terms of academic performance, I expect to do better than most of my classmates", and "My expectancies for career success are very, very high." Respondents rate each item using a seven-point Likert-type scale where responses range from 1 *(not at all true*) to 7 (*extremely true*). Total scores range from 3 to 21, with higher scores indicating greater anticipated performance. This measure shows adequate internal reliability (α= .79; Hadre & Reeve, 2003). In the current study, internal consistency reliability for this measure was also adequate (Cronbach's α = .78).

Career Commitment Scale (CCS). The Career Commitment Scale (CCS; Carson & Bedeian, 1994) will be administered to assess students' motivation to work in medicine. This 12-item scale evaluates three dimensions of career commitment: (1) career identity, (2) career planning, and (3) career resilience. The career identity domain of the CCS pertains to how

emotionally close an individual feels to their career. An example item is, "My line of work/career field is an important part of who I am". The career planning domain of the CCS measures one's developmental needs and career goal setting. An example item reads, "I have created a plan for my development in this line of work/career field". The career resilience domain of the CCS assesses one's response to career adversity. An example item from this domain reads, "Given the problems I encounter in this line of work/career field, I sometimes wonder if I get enough out of it". All measure items are rated on a five-point Likert-type scale where responses range from 1 (*strongly disagree*) to 5 (*strongly agree*). Total scores range from 12 to 60, with higher scores indicating greater career identity, planning, and resilience.

The CCS shows good psychometric support (Carson & Bedeian, 1994). In validation studies of the CCS (e.g., Carson & Bedeian, 1994), coefficient alpha reliabilities for the three dimensions ranged from .79 to .85. Evidence was also found for convergent validity, such that the CCS positively correlated to the Occupational Commitment Scale (r= .75; Blau, 1985). Internal- consistency reliability for the total CCS measure among the current study sample was high (Cronbach's α = .82).

CHAPTER IV

RESULTS

This chapter summarizes relevant findings, including descriptive statistics and correlations from the full data set. Results from tests of all hypotheses are discussed.

Data Screening

Data ware screened for missing values and internal consistency reliabilities were computed for each measure. All missing data was left as missing during data analysis procedures, resulting in different sample sizes for each scale. The number of missing cases for all scales was less than five percent of the total sample. At the scale level, all scale scores were computed as the mean of the non-missing items. All scales demonstrated acceptable levels of internal consistency reliability (see Table 4.1). Descriptive statistics for all variables are presented in Table 4.1.

Hypothesis Testing

Hypothesis 1a-1d. Hypotheses 1 through 3 were tested via bivariate correlations (see Table 1). Hypothesis 1 entailed an examination of relationships among ambient race-based stressors, mental health symptoms, and educational outcomes among Black medical students. Hypothesis 1a predicted that general experiences of race-based discrimination would positively relate to symptoms of stress, anxiety, and depression. Study findings demonstrated support for this hypothesis. General experiences of perceived race-based discrimination were significantly and positively related to symptoms of stress ($r = .30$, $p < .001$), anxiety ($r = .31$, $p < .001$), and depression ($r = .32$, $p < .001$). Results suggested a moderate degree of correlation among variables (e.g., Cohen, 1988).

Hypothesis 1b predicted that general experiences of perceived race-based discrimination would negatively relate to academic performance and career commitment. Results revealed partial support for this hypothesis. While there was a significant and negative relationship between perceived race-based discrimination and career commitment (r = -.16, p < .001), the relationship between perceived race-based discrimination and anticipated academic performance was not significant (r = -.04, p = .44).

Results suggested that Hypothesis 1c was fully supported. Perceptions of negative institutional racial climate significantly and positively related to symptoms of stress (r = .20, p <.001), anxiety (r = .20, p <.001), and depression (r = .14, p <.001). All three correlations represented a small degree of magnitude and indicated that perceptions of a negative racial climate are associated with psychological distress. Finally, perceptions of negative institutional racial climate significantly and negatively related to anticipated academic performance (r = -.18, p <.001) and career commitment (r = -.24, p <.001), demonstrating support for Hypothesis 1d. The strength of these relationships also suggested a small degree of correlation. These results suggest that perceptions of a negative institutional racial climate are negatively associated with anticipated academic performance and career commitment.

Hypothesis 2a-2b. Hypothesis 2 examined relationships among racial identity, mental health symptoms, and educational outcomes among Black medical students. Specifically, Hypothesis 2a predicted that private racial regard would negatively relate to symptoms of stress, anxiety, and depression. Study findings demonstrated partial support for this prediction. Private racial regard significantly and negatively related to anxiety (r = -.10, p < .001) but did not significantly relate to stress (r = -.04, p = .63) or depression (r = -.06, p = .20). Regarding educational outcomes, Hypothesis 2b predicted that private racial regard would positively relate

to anticipated academic performance and career commitment. This hypothesis also was partially supported. Results indicated that private racial regard and career commitment were significantly and positively related ($r = .13$, $p < .001$). A significant relationship did not emerge between private racial regard and anticipated academic performance ($r = .07$, $p = .18$). All significant findings related to Hypothesis 2 displayed a small degree of correlation amongst study variables.

Hypothesis 3a-3d. Hypothesis 3 pertained to relationships among perceived supports, mental health symptoms, and educational outcomes. Specifically, Hypothesis 3a predicted a negative relationship between general social support and symptoms of stress, anxiety, and depression. Study findings supported this prediction. General social support was significantly and negatively correlated with symptoms of stress ($r = -.35$, $p < .001$), anxiety ($r = -.30$, $p < .001$), and depression ($r = -.32$, $p < .001$), indicating that more perceived social support was associated with lower levels of mental health symptoms. The degree of correlation observed among these variables was small to moderate. Hypothesis 3b posited a positive relationship between general social support and educational outcomes. Study findings also demonstrated support for this prediction. General social support significantly and positively related to perceptions of both anticipated academic performance ($r = .21$, $p < .001$) and career commitment ($r = .35$, $p < .001$), such that greater perceived social support was associated with more positive perceptions of one's anticipated academic performance and career commitment. These findings demonstrated a small to moderate degree of correlation between observed variables.

Hypothesis 3c predicted that academic and career support from an influential other would relate negatively to symptoms of stress, anxiety, and depression. This hypothesis was fully supported. Results indicated that academic and career support significantly and negatively correlated with symptoms of stress ($r = -.24$, $p < .001$), anxiety ($r = -.18$, $p < .001$), and

depression (r = -.19, p < .001). The degree of correlation amongst these study variables was small. Finally, Hypothesis 3d predicted that academic and career support from an influential other would relate positively to academic performance and career commitment. Data also supported these relationships. Academic and career support significantly and positively related to both anticipated academic performance (r = .24, p < .001) and career commitment (r = .45, p < .001), indicating that perceived academic and career support positively predicted one's anticipated academic performance and career commitment. The degree of correlation observed amongst these study variables was small to moderate, with one exception. Namely, the relationship between academic and career support and career commitment was large in magnitude (e.g., Cohen, 1988).

Table 4.1. Zero-Order Correlations, Means, Standard Deviations, and Reliabilities among 11 Observed Variables

Measure	1	2	3	4	5	6	7	8	9	10	11	*N*	*M*	*SD*	*α*
1. General Perceived Discrimination (GED)	—											414	37.34	12.14	.92
2. Institutional Racial Climate (PPD)	.53**	—										434	17.81	6.77	.91
3. Private Racial Regard	-.03	-.04	—									426	39.24	3.74	.83
4. Academic & Career Support (IOACDS)	-.09	-.18**	.18**	—								430	57.56	10.81	.92
5. General Social Support (SPS-10)	-.21**	-.25**	.25**	.56**	—							432	33.74	4.83	.88
6. Cognitive Reappraisal (ERQ)	-.03	-.18*	.16**	.23**	.34**	—						435	31.35	6.64	.88
7. Stress (PSS-10)	.30**	.20**	-.04	-.24**	-.35**	-.30**	—					430	19.27	6.67	.89
8. Anxiety (GAD-7)	.31**	.20**	-.10*	-.18**	-.30**	-.18**	.71**	—				421	14.33	5.31	.91
9. Depression (PHQ-9)	.32**	.14**	-.06	-.19**	-.32**	-.18**	.60**	.70**	—			418	15.35	5.48	.88
10. Anticipated Academic Performance	-.04	-.18**	.07	.24**	.21**	.20**	-.28**	-.15**	-.20**	—		417	15.49	3.41	.78
11. Career Commitment (CCS)	-.16**	-.24**	.13**	.45**	.35**	.25**	-.20*	-.14**	-.22**	.34**	—	425	43.66	7.19	.82

Note. * $p \leq .05$, two-tailed; ** $p \leq .01$, two-tailed. Perceived Race-based Discrimination= GED (General Ethnic Discrimination scale); Institutional Racial Climate= PPD (Perceived Prejudice and Discrimination scale); Positive Racial Regard = Multidimensional Model of Black Identity subscale; Academic & Career Support= IOACDS (Influence of Others on Academic and Career Decisions scale); General Social Support= SPS-10 (Social Provisions Scale-10); Cognitive Reappraisal= ERQ (Emotion Regulation Questionnaire subscale; Stress= PSS-10 (Perceived Stress Scale-10); Anxiety = GAD-7 (Generalized Anxiety Disorder-7); Depression= PHQ-9 (Patient Health Questionnaire-9); Academic Performance= Anticipated Academic Performance scale; Career Commitment= CCS (Career Commitment Scale).

Hypotheses 4a-4j. Hypotheses 4a-4j concerned hypothesized mediated relationships among all predictor (e.g., ambient discrimination and coping resources) and outcome variables (e.g., mental health symptoms and educational outcomes). These hypotheses were tested following procedures outlined by Baron and Kenny (1986) for mediation analyses. Specifically, Hypotheses 4a-4j were tested using multiple linear regression in order to examine cognitive appraisal as a mediator of ten expected relationships. Mediational paths were tested in accordance with procedures established by Baron and Kenny (1986) where "path a" represents the link between the predictor (IV) to the mediator (M), path "b" represents the link between the mediator and the criterion (DV), and path "c" represents the direct link between the predictor to the criterion variables. Upper and lower values of the 95% confidence interval around each indirect effect were computed for significance. Because the three psychological distress variables (e.g., PSS-10, GAD-7, PHQ-9) were highly and significantly intercorrelated (*rs*= .60-.71, all *ps* < .001), a composite mental health variable was created and used for all mediation analyses. The composite variable was created by summing and averaging Z scores for all three original variables. See Table 4.2- 4.3 for a summary of results from all mediation analyses.

Cognitive reappraisal as a mediator of the relationships between ambient racial discrimination and mental health and educational outcomes. Hypotheses 4a-4d predicted that cognitive reappraisal would mediate the relationship between ambient racial discrimination and mental health, and between ambient racial discrimination and educational outcomes. Specifically, Hypotheses 4a and 4b posited that cognitive reappraisal would mediate the relationship between perceived racial discrimination and mental health (4a), between perceived racial discrimination and anticipated academic performance (4b.1), and between perceived racial discrimination and career commitment (4b.2). Contrary to this prediction, Step 1 of mediation

analyses (e.g., regressing Mediator onto IV) indicated that cognitive reappraisal did not significantly predict perceived racial discrimination (r = -.03, p = .49), a necessary prerequisite for mediation (e.g., Baron and Kenny, 1996). Therefore, Hypotheses 4a and 4b.1-4b.2 were not supported (see Table 4.2). There was no evidence that cognitive reappraisal mediated the relationship between perceived racial discrimination and psychological distress, or between perceived racial discrimination and educational outcomes (e.g., anticipated academic performance and career commitment).

Hypotheses 4c-4d predicted that cognitive reappraisal would mediate the relationship between perceived adverse institutional racial climate and psychological distress (4c), and between perceived adverse institutional racial climate and educational outcomes (e.g., anticipated academic performance [4d.1] and career commitment [4d.2]). Results from this series of mediation analyses suggested that cognitive reappraisal partially mediated all expected relationships (see Table 4.2). These findings suggest that one's coping efforts (e.g., use of cognitive reappraisal strategies) partially explained the reduced, but still positive relationship between perceived institutional racial climate and psychological distress. Likewise, cognitive reappraisal reduced the strength of the negative relationship between perceived adverse institutional racial climate and educational outcomes (e.g., anticipated academic performance and career commitment).

Table 4.2. Summary of Regression Analyses of the Role of Cognitive Reappraisal in Mediating the Relation between Ambient Racial Discrimination and Mental Health and Educational Outcomes

Hypothesis	IV	DV	N	Path a	Path b	Path c′
4a	Perceived Racial Discrimination (GED)	Mental Health Distress	412	-.03 [-0.13, .07]	-	-
4b.1	Perceived Racial Discrimination (GED)	Anticipated Academic Performance	412	-.03 [-.13, .07]	-	-
4b.2	Perceived Racial Discrimination (GED)	Career Commitment (CCS)	412	-.03 [-.13, .07]	-	-
4c	Institutional Racial Climate (PPD)	Mental Health Distress	320	-.11 [-.22, -0.00]	-.20 [-.31, -.10]	.19 [.08, .30]
4d.1	Institutional Racial Climate (PPD)	Anticipated Academic Performance	413	-.12 [-.21, -.02]	.18 [.09, .27]	-.17 [-.26, -.08]
4d.2	Institutional Racial Climate (PPD)	Career Commitment (CCS)	422	-.12 [-.21, -.03]	.22 [.13, .31]	-.22 [-.31, -.13]

Note. Standardized regression coefficients (β) reported. IV= Independent Variable; DV= Dependent Variable; [] = 95% confidence interval; Mediator= Emotion Regulation Questionnaire (ERQ) subscale; GED = General Ethnic Discrimination scale; PPD = Perceived Prejudice and Discrimination scale; Private Regard = Multidimensional Model of Black Identity subscale; Psychological Distress= Composite mental health variable (PSS-10, GAD-7, PHQ-9); Ac Performance= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

Cognitive reappraisal as a mediator of the relationships between coping resources, and mental health and educational outcomes. Hypotheses 4e-4j predicted that cognitive reappraisal would mediate the relationship between coping resources and mental health, and between coping resources and educational. Specifically, Hypotheses 4e and 4f.1-4f.2 posited that cognitive reappraisal would mediate the relationship between private racial regard and psychological distress (e.g., 4e), and between private racial regard and educational outcomes (e.g., anticipated academic performance [4f.1] and career commitment [4f.2]). As demonstrated in Table 4.3, Step 2 of the mediation analyses (e.g., regressing DV onto IV) indicated that private racial regard did not predict psychological distress (Hypothesis 4e; r = -.08, p = .15) or anticipated academic performance (Hypothesis 4f.1; r = .07, p = .18). Given this failure to meet necessary prerequisites for mediation analyses (e.g., Baron and Kenny, 1996), neither Hypothesis 4e nor 4f.1 were supported.

Regarding Hypothesis 4f.2, analyses revealed that cognitive reappraisal fully mediated the relationship between private racial regard and career commitment. Support for Hypothesis 4f.2 suggests that the positive and significant relationship between private racial regard and career commitment can be fully explained through one's coping efforts (e.g., use of cognitive reappraisal). In other words, cognitive reappraisal fully accounted for the positive observed relationship between private racial regard and career commitment.

Hypotheses 4g and 4h.1-4h.2 posited that cognitive reappraisal would mediate the relationship between general social support and mental health distress (4g), and between general social support and educational outcomes (e.g., anticipated academic performance [4h.1] and career commitment [4h.2]). Consistent with these hypotheses, cognitive reappraisal partially mediated all expected relationships. In other words, cognitive reappraisal partially explained the

significant and inverse relationship between general social support and mental health distress, as well as the significant and positive relationships between general social support and anticipated academic performance and career commitment (see Table 4.3).

Lastly, Hypotheses 4i and 4j.1-4j.2 posited that cognitive reappraisal would mediate the relationship between academic and career support and mental health distress (4i), and between academic and career support and educational outcomes (e.g., anticipated academic performance [4j.1] and career commitment [4j.2]). As demonstrated in Table 4.3, data supported all expected hypotheses. Cognitive reappraisal partially explained the inverse relationship between academic and career support and mental health distress, as well as the positive relationship between academic and career support and educational outcomes (e.g., anticipated academic performance and career commitment).

Table 4.3. Summary of Regression Analyses of the Role of Cognitive Reappraisal in Mediating the Relation between Coping Resources and Mental Health and Educational Outcomes

Hypothesis	IV	DV	N	Path a	Path b	Path c'
4e	Private Racial Regard	Mental Health Distress	312	.17 [.06, .28]	-.23 [-.34, -.12]	-.08 [-.15, .07]
4f.1	Private Racial Regard	Anticipated Academic Performance	404	.14 [.04, .23]	.20 [.10, .30]	.07 [-.06, .14]
4f.2	Private Racial Regard	Career Commitment (CCS)	413	.18 [.09, .27]	.23 [.20, .40]	.09 [-.00, .19]
4g	General Social Support (SPS-10)	Mental Health Distress	319	.31 [.21, .41]	-.16 [-.26, -.06]	-.22 [-.33, -.11]
4h.1	General Social Support (SPS-10)	Anticipated Academic Performance	410	.30 [.21, .39]	.16 [.06, .26]	.16 [.07, .26]
4h.2	General Social Support (SPS-10)	Career Commitment (CCS)	419	.34 [.21, .39]	.16 [.07, .25]	.30 [.20, .40]
4i	Academic & Career Support (IOACDS)	Mental Health Distress	315	.23 [.12, .33]	-.19 [-.29, -.08]	-.14 [-.26, -.02]
4j.1	Academic & Career Support (IOACDS)	Anticipated Academic Performance	409	.24 [.15, .33]	.15 [.05, .25]	.20 [.10, .30]
4j.2	Academic & Career Support (IOACDS)	Career Commitment (CCS)	418	.23 [.14, .32]	.17 [.08, .26]	.41 [.32, .50]

Note. Standardized regression coefficients (β) reported. IV= Independent Variable; DV= Dependent Variable; Dependent Variable; [] = 95% confidence interval; Mediator= Emotion Regulation Questionnaire (ERQ) subscale; GED = General Ethnic Discrimination scale; PPD = Perceived Prejudice & Discrimination scale; Private Regard = Multidimensional Model of Black Identity subscale; IOACDS = Influence of Others on Academic & Career Decisions scale; SPS-10= Social Provisions Scale-10; Psychological Distress= Composite mental health variable (PSS-10, GAD-7, PHQ-9); Ac Performance= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

Alternative Tests of the Theoretical Pathways: Hypotheses 5c-5f. While the RDSSC theorizes that one's coping response (e.g., cognitive reappraisal), is precipitated by environmental stimuli, and in turn, influences mental health and educational outcomes, it is important to consider alternative explanations for these relationships (particularly given the cross-sectional design utilized in this study). Specifically, cognitive reappraisal may represent a preexisting thinking style or trait that differentially influences the extent to which environmental stimuli impact individuals' mental health and educational outcomes. Therefore, Hypotheses 5c-5f tested whether the relationships posited in Hypotheses 4a-4j were better explained by moderation than mediation. This series of hypotheses was tested following procedures outlined by Baron and Kenny (1986) for moderation. Specifically, predictor variables (IV) were centered and interaction terms were computed. Using regression, the criterion variable(s) (DV) were regressed onto centered predictors (Step 1) and added to interaction terms (Step 2). Next, upper and lower values of the 95% confidence interval around each indirect effect were computed for significance. As described above for mediation analyses, a composite mental health variable was used in this series of moderation analyses.

Cognitive reappraisal as a moderator of the relationships between predictor variables and mental health and educational outcomes. Hypotheses 5c-5d examined whether cognitive reappraisal moderated the relationships between predictor (e.g., ambient racial discrimination and coping resources) and outcome variables (e.g., mental health distress, anticipated academic performance, and career commitment). As demonstrated in Tables 4.4- 4.5, Hypotheses 5c-5d were not supported. No significant interaction terms emerged within regression analyses, indicating that cognitive reappraisal did not moderate relationships between ambient racial

discrimination and mental health and educational outcomes, or between coping resources and mental health and educational outcomes.

Table 4.4. Summary of Regression Analyses of the Role of Cognitive Reappraisal in Moderating the Relation between Ambient Racial Discrimination and Mental Health and Educational Outcomes

Hypothesis				**Unstandardized Regression Coefficients and 95% Confidence Intervals [Upper Limit, Lower Limit]**		
	IV	**DV**	**N**	**IV**	**Moderator**	**Product Term**
5c.1	Perceived Racial Discrimination (GED)	Mental Health Distress	302	.03 [-.03, .15]	-.03 [-.04, -.01]	-.000 [-.00, -.00]
5c.2	Institutional Racial Climate (PPD)	Mental Health Distress	320	.02 [.01, .04]	-.03 [-.04, -.01]	-.001 [-.00, .00]
5c.3	Perceived Racial Discrimination (GED)	Anticipated Academic Performance	393	-.01 [-.04, .02]	.10 [.05, .15]	-.001 [-.00, .00]
5c.4	Institutional Racial Climate (PPD)	Anticipated Academic Performance	413	-.08 [-.13, -.04]	.09 [.05, .14]	-.001 [-.01, .01]
5c.5	Perceived Racial Discrimination (GED)	Career Commitment (CCS)	403	-.10 [-.15, -.04]	.27 [.17, .38]	-.005 [-01, .00]
5c.6	Institutional Racial Climate (PPD)	Career Commitment (CCS)	422	-.23 [-.33, -.13]	.24 [.14, .34]	-.01 [-.22, .01]

IV= Independent Variable; DV= Dependent Variable; Dependent Variable; Moderator= Emotion Regulation Questionnaire (ERQ) subscale; GED = General Ethnic Discrimination scale; PPD = Perceived Prejudice and Discrimination scale; Psychological Distress= Composite mental health variable (PSS-10, GAD-7, PHQ-9); Ac Performance= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

Table 4.5. Summary of Regression Analyses of the Role of Cognitive Reappraisal in Moderating the Relation between Coping Resources and Mental Health and Educational Outcomes

Hypothesis				**Unstandardized Regression Coefficients and 95% Confidence Intervals [Upper Limit, Lower Limit]**		
	IV	**DV**	**N**	**IV**	**Moderator**	**Product Term**
5d.1	Private Racial Regard	Mental Health Distress	312	-.004 [-.03, .02]	-.03 [-.04, -.01]	.002 [-.00, .01]
5d.2	General Social Support (SPS-10)	Mental Health Distress	319	-.04 [-.06, -.02]	-.02 [-.04, -.01]	.002 [-.00, .00]
5d.3	Academic and Career Support (IOACDS)	Mental Health Distress	315	-.01 [-.02, -.00]	-.03 [-.04, -.01]	.002 [-.00, .00]
5d.4	Private Racial Regard	Anticipated Academic Performance	404	.03 [-.06, .13]	.10 [.05, .15]	-.004 [-.02, .00]
5d.5	General Social Support (SPS-10)	Anticipated Academic Performance	410	.11 [.04, .19]	.08 [.03, .13]	-.003 [-.01, .01]
5d.6	Academic and Career Support (IOACDS)	Anticipated Academic Performance	409	.06 [.03, .10]	.08 [.03, .13]	.001 [-.00, .00]
5d.7	Private Racial Regard	Career Commitment (CCS)	413	.22 [.03, .41]	.26 [.15, .36]	.02 [-.01, .04]
5d.8	General Social Support (SPS-10)	Career Commitment (CCS)	419	.46 [.31, .60]	.17 [.07, .27]	.01 [-.01, .03]
5d.9	Academic and Career Support (IOACDS)	Career Commitment (CCS)	418	.27 [.21, .32]	.18 [.08, .27]	-.002 [-.01, .01]

IV= Independent Variable; DV= Dependent Variable; Moderator= Emotion Regulation Questionnaire (ERQ) subscale; Private Regard = Multidimensional Model of Black Identity (MMBI) subscale; SPS-10= Social Provisions Scale-10; IOACDS = Influence of Others on Academic and Career Decisions scale; Psychological Distress= Composite mental health variable (PSS-10, GAD-7, PHQ-9); Ac Performance= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

Coping resources as a moderator of the relationships between ambient racial discrimination and mental health and educational outcomes. Hypotheses 5e-5f examined whether coping resources (e.g., private racial regard, general social support, and academic and career support) moderated relationships between ambient racial discrimination and mental health and educational outcomes As seen in Table 4.6, none of the interaction terms were significant, indicating that none of the three examined coping resources moderated relationships between ambient racial discrimination and mental health, or between ambient racial discrimination and educational outcomes.

Table 4.6. Summary of Regression Analyses of the Role of Coping Resources in Moderating the Relation between Ambient Racial Discrimination and Mental Health and Educational Outcomes

Hypothesis				**Unstandardized Regression Coefficients and 95% Confidence Intervals [Upper Limit, Lower Limit]**		
	IV	**DV**	**N**	**IV**	**Moderator**	**Interaction**
5e.1	Perceived Racial Discrimination (GED)	Mental Health Distress	295	.02 [.02, .03]	**Private Regard:** -.01 [-.04, .01]	-.001 [-.00, .00]
5e.2	Institutional Racial Climate (PPD)	Mental Health Distress	312	.02 [.01, .04]	**Private Regard:** -.01 [-.04, .01]	-.002 [-.01, .00]
5e.3	Perceived Racial Discrimination (GED)	Mental Health Distress	302	.02 [.02, .03]	**SPS-10:** -.03 [-.05, -.02]	.000 [-.00, .00]
5e.4	Institutional Racial Climate (PPD)	Mental Health Distress	319	.02 [.00, .03]	**SPS-10:** -.04 [-.06, -.02]	-.000 [-.00, .00]
5e.5	Perceived Racial Discrimination (GED)	Mental Health Distress	297	.03 [.02, .03]	**IOACDS:** -.01 [-.02, -.00]	-.001 [-.00, -.00]
5e.6	Institutional Racial Climate (PPD)	Mental Health Distress	315	.02 [.01, .04]	**IOACDS:** -.01 [-.02, -.00]	.000 [-.00, .00]
5f.1	Perceived Racial Discrimination (GED)	Anticipated Academic Performance	385	-.01 [-.04, .02]	**Private Regard**: .06 [-.04, .16]	.000 [-.01, .01]
5f.2	Institutional Racial Climate (PPD)	Anticipated Academic Performance	405	-.29 [-.85, .25]	**Private Regard:** -.04 [-.33, .25]	.000 [-.01, .02]
5f.3	Perceived Racial Discrimination (GED)	Anticipated Academic Performance	392	.01 [-.02, .03]	**SPS-10:** .17 [.09, .24]	.001 [-.00, .01]
5f.4	Institutional Racial Climate (PPD)	Anticipated Academic Performance	411	-.07 [-.12, -.02]	**SPS-10:** .13 [.06, .20]	-.002 [-.01, .01]

5f.5	Perceived Racial Discrimination (GED)	Anticipated Academic Performance	388	-.00 [-.03, .03]	**IOACDS:** .08 [.05, .11]	-.000 [-.00, .00]
5f.6	Institutional Racial Climate (PPD)	Anticipated Academic Performance	408	-.07 [-.12, -.02]	**IOACDS**: .07 [.04, .10]	-.003 [-.01, .00]
5f.7	Perceived Racial Discrimination (GED)	Career Commitment (CCS)	394	-.11 [-.16, -.05]	**Private Regard:** .22 [.03, .41]	.004 [-01, .02]
5f.8	Institutional Racial Climate (PPD)	Career Commitment (CCS)	413	-.26 [-.36, -.16]	**Private Regard:** .21 [.03, .39]	.02 [-.00, .05]
5f.9	Perceived Racial Discrimination (GED)	Career Commitment (CCS)	401	-.05 [-.11, .00]	**SPS-10:** .49 [.34, .63]	-.002 [-.01, .01]
5f.10	Institutional Racial Climate (PPD)	Career Commitment (CCS)	419	-.18 [-.27, -.08]	**SPS-10:** .46 [.32, .59]	.003 [-.02, .02]
5f.11	Perceived Racial Discrimination (GED)	Career Commitment (CCS)	397	-.07[-.12, -.01]	**IOACDS:** .28 [.22, .34]	.002 [-.00, .01]
5f.12	Institutional Racial Climate (PPD)	Career Commitment (CCS)	416	-.18 [-.27, -.09]	**IOACDS:** .27 [.21, .33]	.002 [-.01, .01]

IV= Independent Variable; DV= Dependent Variable; Moderators= Private Regard ([Multidimensional Model of Black Identity] subscale), IOACDS (Influence of Others on Academic and Career Decisions scale), and SPS-10 (Social Provisions Scale-10); GED = General Ethnic Discrimination scale; PPD = Perceived Prejudice and Discrimination scale; Mental Health Distress= Composite variable (PSS-10, GAD-7, PHQ-9); Ac Performance= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

Aspirational Hypothesis: Model Fit. The fit of study data to the model depicted in Figure 4 (see below) was examined via Structural Equation Modeling using MPlus v.7.4 (Muthén & Muthén, 1998- 2015) SEM software. Maximum likelihood estimation was used to fit the data to specified models. Modeling analyses utilized full information maximum likelihood estimation (FIML) to account for missing data on a scale level. FIML assumes that some data will be missing at random and is thought to produce a less biased estimate of missing data compared to more conservative approaches to handling missing data (e.g., Raykov, 2007). The following guidelines were used for interpretation of fit indices: Root Mean Square Error of Approximation (RMSEA < .08 indicates good fit), Comparative Fit Index (CFI > .95 indicates good fit), and Standardized Root Mean Square Residual (SRMR < .09 suggests favorable fit; Kline, 2016). Standardized path coefficients were used for modeling estimates.

Measurement Model Fit of Latent Variables. The measurement model was specified and analyzed with four latent variables. The first latent variable is ambient racial discrimination (ARD), which was comprised of perceived racial discrimination (GED; 18 items) and institutional racial climate (PPD; 7 items). The second latent variable, coping resources (Coping Resources), was comprised of private racial regard (Private Regard; 6 items), general social support (SPS-10; 10 items), and academic and career support (IOACDS; 15 items). Third, mental health (Mental Health Distress) was comprised of stress (PSS-10; 10 items), anxiety (GAD-7; 7 items), and depression (PHQ-9; 9 items). Finally, educational outcomes (Educational Outcomes) was comprised of anticipated academic performance (Ac Perform; 3 items) and career commitment (CCS; 12 items). The measurement model of the four latent variables demonstrated good fit ($\chi 2 = 80.31$, df = 29, CFI = .95, RMSEA = .06, 90% C.I. [.05- .08], SRMR = .04). As seen in Table 4.7, all respective indicators loaded significantly on to their intended latent variable

(all p's < .001), with private racial regard demonstrating the lowest loading onto its respective factor (Ambient Racial Discrimination).

Table 4.7. Standardized Coefficients for Latent Construct Factor Loadings

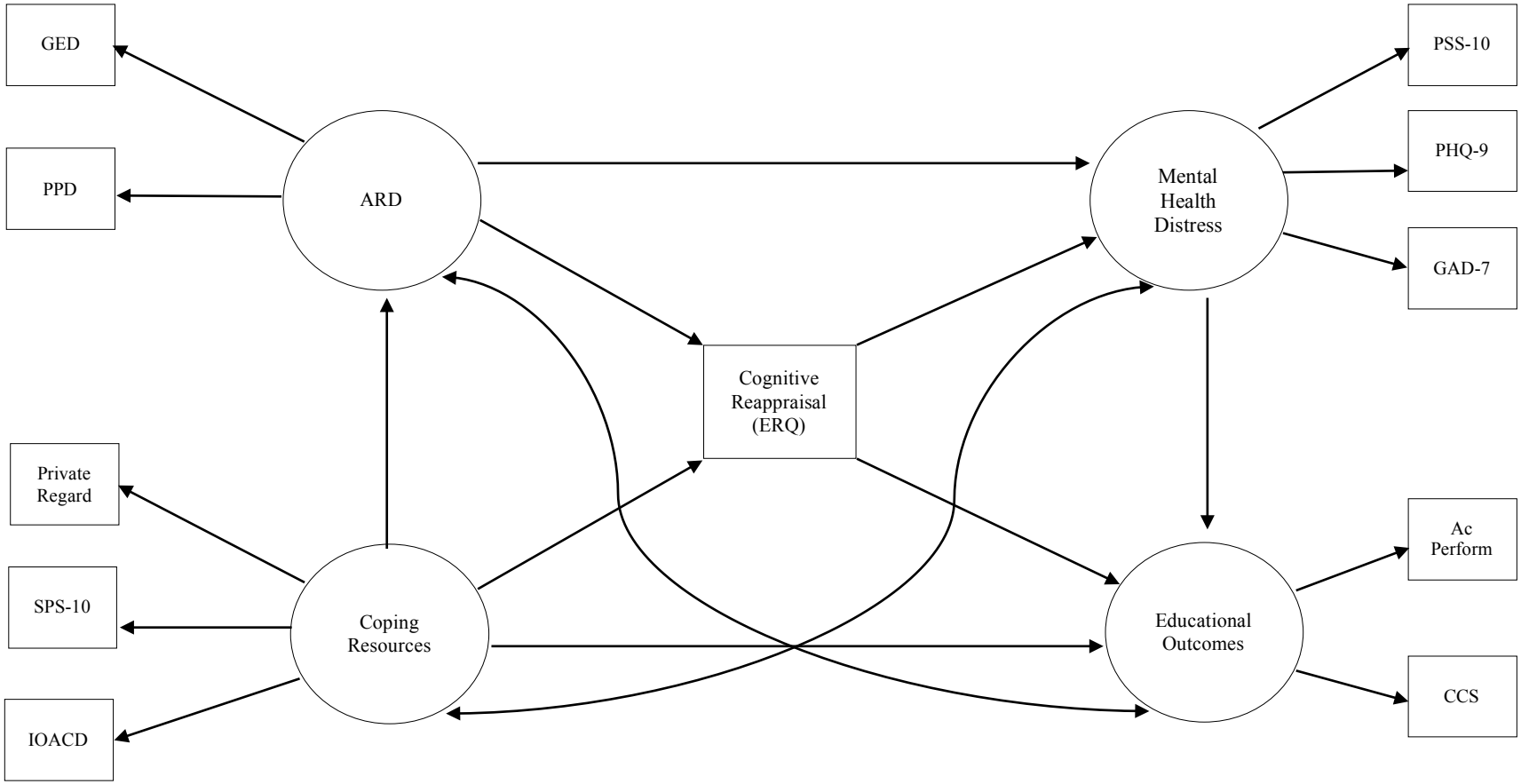
Latent construct	**Indicator variable**	**β**	***SE***
Ambient Racial Discrimination	Perceived racial discrimination	.80	.07
Ambient Racial Discrimination	Adverse institutional racial climate	.66	.06
Coping Resources	Private racial regard	.29	.05
Coping Resources	General social support	.80	.04
Coping Resources	Academic and career support	.70	.04
Mental Health Distress	Stress	.80	.02
Mental Health Distress	Depression	.77	.03
Mental Health Distress	Anxiety	.89	.02
Educational Outcomes	Anticipated Academic Performance	.47	.06
Educational Outcomes	Career Commitment	.73	.07

Structural Model Fit. As seen in Figure 4.1, the structural model demonstrated good fit to the data ($\chi 2 = 119.82$, df = 35, CFI = .94, RMSEA = .07, 90% C.I. [.06- .09], SRMR = .04).

Direct effects. Path coefficients indicated that the pathway between ambient racial discrimination and mental health distress was positive and significant ($\beta = 0.31$, $p < .001$), such that ambient racial discrimination scores positively predicted mental health symptoms. The pathway between ambient racial discrimination and educational outcomes was nonsignificant ($\beta = -.11$, $p = .17$). The pathways between coping resources and ambient racial discrimination ($\beta = -.34$, $p < .001$), mental health distress ($\beta = -.27$, $p < .001$), and educational outcomes ($\beta = .58$, $p < .001$) were significant. While the pathways between cognitive reappraisal and coping resources ($\beta = .42$, $p < .001$) and mental health distress ($\beta = -.13$, $p < .05$) were significant, the pathways between cognitive reappraisal and ambient racial discrimination ($\beta = .06$, $p = .33$) or educational outcomes ($\beta = .13$, $p = .06$) were not. Lastly, the pathway between mental health distress and educational outcomes was nonsignificant ($\beta = -.001$, $p = .99$).

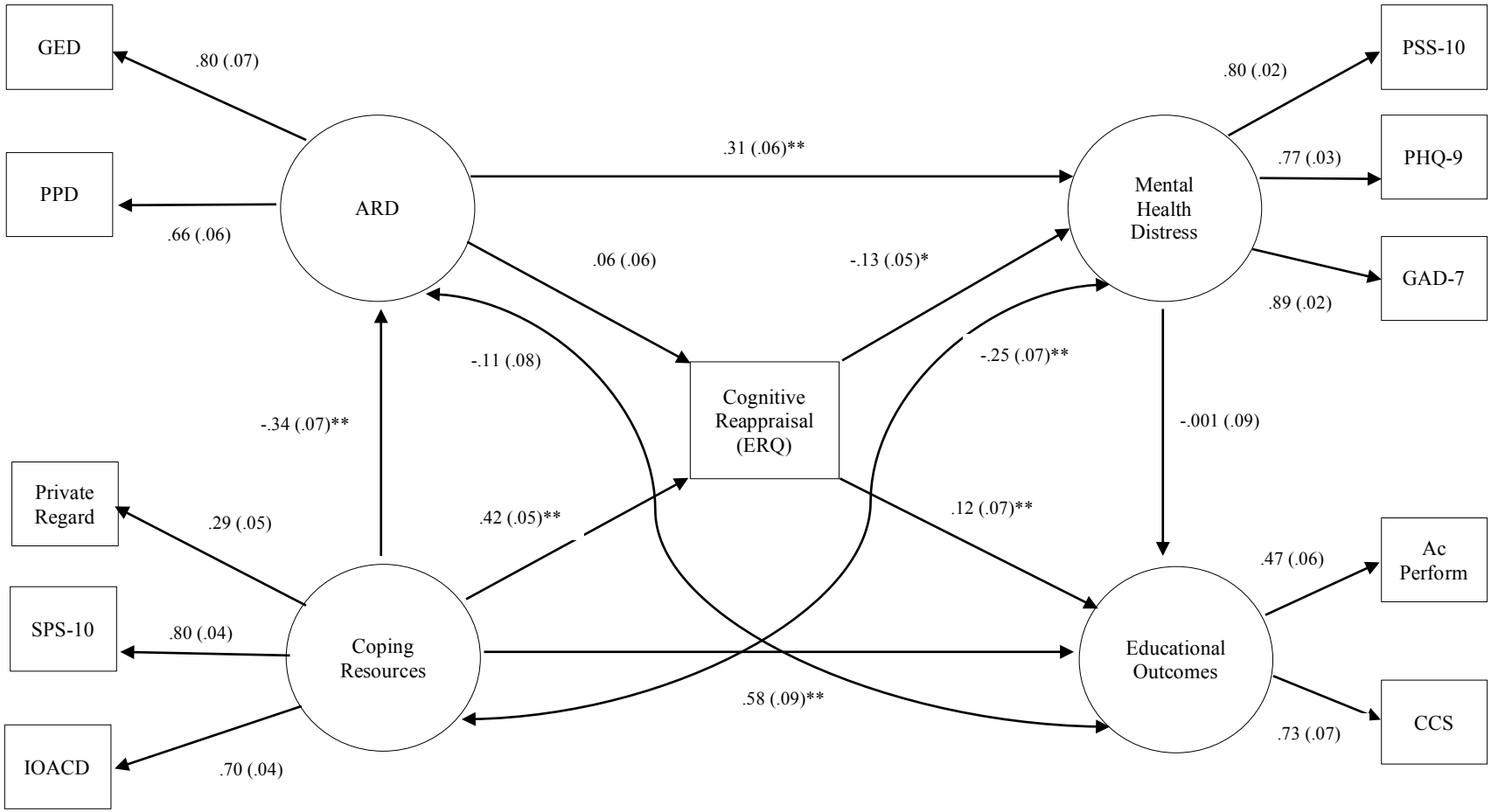
Indirect effects. The indirect effect of ambient racial discrimination on mental health distress through cognitive reappraisal was nonsignificant ($\beta = -.01$, $p = .38$), suggesting that cognitive reappraisal did not mediate the positive relationship between ambient racial discrimination and mental health symptoms. The indirect effect of ambient racial discrimination on educational outcomes through cognitive reappraisal also was nonsignificant ($\beta = .01$, $p = .39$). The indirect effect of coping resources on mental health distress through cognitive reappraisal was significant ($\beta = -.06$, $p = .02$). Conversely, the indirect effect of coping resources on educational outcomes through cognitive reappraisal was nonsignificant ($\beta = .05$, $p = .06$).

Figure 4.1. Specified Structural Model



Note. ARD= Ambient Racial Discrimination; GED= General Ethnic Discrimination; PPD= Perceived Prejudice and Discrimination Scale; Private Regard= Multidimensional Model of Black Identity subscale; SPS-10= Social Provisions Scale-10; IOACD= Influence of Others on Academic and Career Decisions scale; ERQ= Emotion Regulation Questionnaire subscale; PSS-10= Perceived Stress Scale-10; PHQ-9= Patient Health Questionnaire-9; Ac Perform= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

Figure 4.2. Structural Model with Standardized Path Coefficients



Note. *p ≤ .05, two-tailed; **p≤ .01, two-tailed. () = standard error. ARD= Ambient Racial Discrimination; GED= General Ethnic Discrimination; PPD= Perceived Prejudice and Discrimination Scale; Private Regard= Multidimensional Model of Black Identity subscale; SPS-10= Social Provisions Scale-10; IOACD= Influence of Others on Academic and Career Decisions scale; ERQ= Emotion Regulation Questionnaire subscale; PSS-10= Perceived Stress Scale-10; PHQ-9= Patient Health Questionnaire-9; Ac Perform= Anticipated Academic Performance scale; CCS= Career Commitment Scale.

CHAPTER V

DISCUSSION

This study sought to examine specific pathways of a contextual, race-based stress and coping model (e.g., Levy et al., 2016) among a population of Black medical students. Specifically, this investigation examined theorized relationships between ambient racial discrimination (e.g., perceived racial discrimination and perceived institutional racial climate), coping resources (e.g., private racial regard, general social support, academic and career related support), coping responses (e.g., cognitive reappraisal), and mental health (e.g., stress, anxiety, depression) and educational (e.g., anticipated academic performance and career commitment) outcomes. This study was conducted in direct response to ongoing calls for additional research into the social and learning challenges encountered by underrepresented racial minority medical students (e.g., Orom, Semalulu, and Underwood, 2013). Based on the existing body of literature, this study represents the largest cross-sectional study conducted exclusively among a nationwide sample of Black medical students in the United States.

Examination of Hypothesized Relationships

Ambient Racial Discrimination and Mental Health

This sample of Black medical students training in the U.S. reported experiencing two distinct types of race-based stressors (or ambient racial discrimination): everyday perceived racial discrimination and negative institutional racial climate. Consistent with previous research conducted among Black medical students (e.g., Dyrbye et al., 2007; Hardeman et al., 2016) and a priori hypotheses, race-based stressors were associated with increased psychological distress. Specifically, increased incidents of everyday perceived racial discrimination contributed to increased levels of perceived stress and greater endorsement of depression and anxiety

symptoms. Likewise, results suggested that perceptions of a more negative institutional racial climate was associated with higher levels of stress, depression, and anxiety among Black medical students. This finding adds to a growing body of literature demonstrating that institutional racial climate negatively affects underrepresented minority students' psychological well-being (Byrd & McKinney, 2012; Hardeman et al., 2016; Pieterse et al., 2010).

When looking at the relationships among specific race-based stressors and mental health, findings indicated that everyday perceived racial discrimination had a stronger negative relationship with Black medical students' mental health compared to perceived institutional racial climate. Everyday perceived racial discrimination had a medium sized relationship with depression and anxiety symptomology, while perceived institutional racial climate had a small relationship to Black students' mental health symptoms. This finding suggests that experiences of everyday perceived racial discrimination, which occur over prolonged periods of time and across various domains of one's life, increased Black medical students' risk for mental health difficulties more so than the racial climate of their medical training institution. From a theoretical perspective (e.g., RDSSC; Levy et al., 2016), race-based stressors that are appraised negatively, and with greater frequency, elicit more activation of biologically and physiologically driven responses. This frequency, in turn, depletes students' availability of coping resources and exacerbate their cognitive and emotional difficulties. The small association between institutional racial climate and mental health may be explained, in part, by it being a less frequent or uniform occurrence among Black medical students as compared to everyday experiences of racial discrimination across all domains of life.

Taken together, results from this study indicate that race-based stressors negatively influence Black medical students' mental health. Although the association between race-based stressors

and mental health symptoms appeared modest in size, the existence of mental health difficulties among medical trainees is of concern. Average scores on measures of anxiety and depression among this sample of Black medical students reached moderate and moderately severe levels of symptom severity, respectively. This finding adds to a growing body of research demonstrating that U.S. medical students exhibit significant mental health difficulties (Dyrbye, Thomas, & Shanafelt, 2006; Dyrbye et al., 2009; Goebert et al., 2009; Dyrbye at al., 2011; Dyrbye et al., 2018; Rotenstein et al., 2016; Brazeau et al., 2014). Existing research suggests that mental health not only has practical implications for medical students' learning and successful matriculation through medical school, but also negatively affects the delivery of patient care (Hardeman et al., 2015). The psychological threat that race-based stressors impose upon Black medical students' mental health, therefore, may act as a unique predisposing vulnerability that has far-reaching personal and professional consequences.

Ambient Racial Discrimination and Educational Outcomes

This study found partial support for the hypothesized relationships among ambient racial discrimination (a form of race-based stressor) and educational outcomes among Black medical students. Study findings demonstrated that some (but not all) of the examined race-based stressors negatively influenced Black medical students in educational and professional domains. Specifically, negative perceptions of one's institutional racial climate negatively affected students' perceptions of how well they would perform academically in medical school and how committed they felt towards the field of medicine. In contrast, experiences of everyday perceived racial discrimination did not significantly influence students' academic perceptions or career commitment. This finding suggests that Black medical students may experience various forms of

race-based stressors differently and that a negatively perceived institutional racial climate uniquely threatens and undermines their educational and professional well-being.

These results further support a body of literature showing that Black medical students report that their race negatively affects their educational and professional training experiences (e.g., Orom et al., 2013; Bright, Duefield, and Stone, 1998; Bullock & Houston, 1987). Of significance, this investigation extended prior research findings by clarifying the relationship between race-based stressors occurring within the medical training environment and specific educational outcomes. To date, no study has examined how perceptions of one's institutional racial climate relates to Black medical students' beliefs about their own academic performance or their desire to remain in the field of medicine. Understanding Black medical students' subjective experiences, as related to perceived institutional racial climate and career outcomes, illuminates areas of concern that may otherwise be overlooked by more objective indicators of professional well-being. For example, some research suggests that no significant racial differences exist between the academic performance of Black and White medical students (Capers & Way, 2015). This research, however, often has relied upon objective performance markers (e.g., performance on clerkship, structured clinical skills examinations), which may mask meaningful differences in how minority racial status influences Black students' internal experiences within the medical training environment. Findings from this study suggest that it is important to attend to Black medical student's subjective experiences and that additional attention to the negative influence of institutional racial climate on educational well-being is warranted.

While the specific ways in which institutional racial climate undermines Black medical students' perceptions of their academic performance and career commitment remains unclear,

several potential explanations exist. One possibility is that perceptions of racial discrimination or bias within the medical training environment contribute to the development (or maintenance) of negative cognitions among Black students regarding their academic ability and personal fit within the medical profession. Alternatively, Black medical students who experience a negative institutional racial climate may develop a belief or expectation that they will be penalized for their race, irrespective of their actual academic ability and effort. This latter explanation implies that Black medical students' academic perceptions and motivations may be a response to the observable actions and behaviors of others within the medical training environment.

Interestingly, some evidence indicates that Black medical students' concerns about their academic and professional well-being may be well-founded. Recently, Tehrani, Hauer, Fernandez, King, & Lucey (2018) demonstrated that underrepresented racial minority medical students received half as many honors grades and were three times less likely to attain honors society membership as compared to their majority White peers. Such racial discrepancies in grading and membership status, therefore, may offer corroborating evidence that racial biases negatively influence how medical faculty and instructors perceive and evaluate Black medical students' academic performance. Although the negative relationship between institutional racial climate and educational outcomes observed in this study was small in magnitude, emerging research suggests that such associations are not without consequence. For example, Tehrani et al. (2018) highlighted how even small racial differences in educational domains can accumulate over time to produce more significant career-related detriments and disparities. In particular, they introduced the term "amplification cascade" to describe the phenomenon whereby small differences in the assessed clinical performance of underrepresented racial/ethnic medical students contributes to larger downstream discrepancies in grades and awards received, as

compared to their majority White peers (Tehrani et al., 2018, p. 1288). Tehrani and colleagues. (2018) argued that the amplification cascade has consequential implications for underrepresented minority students' level of competitiveness at future stages of medical training and career development, including matching at competitive residency programs or successfully pursuing academic medicine.

Regardless of the underlying mechanism(s) at play, the negative relationships among institutional racial climate and Black medical students' educational outcomes suggests that institutional-level factors can undermine their career development. This is particularly concerning when coupled with the broader literature, which indicates that racial minority medical residents (e.g., Osseo-Asare et al., 2018; Liebschutz et al., 2006) and physicians (e.g., Pololi, Cooper, & Carr, 2010; Nunez-Smith et al., 2007; Peterson et al., 2004) also experience race-based stressors within the medical workplace. Associated consequences of race-based stressors among minority physicians include increased job dissatisfaction and job turnover (Nunez-Smith et al., 2009). Taken together, this study suggests that a negative institutional racial climate undermines Black medical student's educational outcomes. More broadly, such findings suggest that features of the training environment may begin to thwart the cultivation of the Black medical workforce at the earliest stages of training.

Coping Resources as Buffers against Ambient Racial Discrimination

Private Racial Regard. Although literature suggests that positive racial identity offers protective psychological benefits to racial minority children and adolescents in educational environments (Eccles et al., 2006; Wong, Eccles, & Samerhoff, 2003), few studies have examined its utility among professional racial minority students. The present study revealed that private racial regard (an indicator of positive racial identity) related significantly and positively

to Black medical students' perceptions of social and career-related support, use of cognitive reappraisal strategies, and overall career commitment.

These findings confirm previous research indicating that positive racial identity offers some protections to Black individuals in terms of their personal and educational well-being (e.g., Brondolo et al., 2009; Eccles et al., 2006; Wong, Eccles, & Samerhoff, 2003). Consistent with existing theory on the function of racial identity (e.g., Sellers et al., 2003), results suggest that private racial regard may act as a coping resource for Black medical students and provide them with valuable inter- and intrapersonal benefits. Specifically, positive racial identity may bolster a sense of self that helps Black medical students facilitate the development and maintenance of meaningful social connections with others within and outside of the medical training environment. Positive racial regard may also contribute to Black medical students' positive sense of self that may increase one's tendency to engage in cognitive reappraisal strategies.

Consistent with expectations, private racial regard had a small negative relationship with anxiety. In other words, feeling more positively about oneself and one's racial group related to lowered levels of anxiety. Contrary to expectations, however, private racial regard did not significantly relate to Black medical student's reported levels of stress or depression. These findings suggest that this dimension of racial identity may not be a coping resource that reduces Black medical students' vulnerability towards all race-based stressors or psychological sequelae.

The nonsignificant relationships between private racial regard and stress and depression are somewhat consistent with Hardeman et al.'s (2016) investigation of racial identity and mental well-being. These authors demonstrated that higher racial centrality (i.e., the extent to which one considers racial group membership as a part of their overall self-concept) was associated with worse mental health outcomes (e.g., anxiety and depression) among Black medical students. As

postulated by Hardemann et al. (2016), it is plausible that Black medical students' racial identity may create internal conflict and distress when it is at odds with majority White peers and/or broader cultural norms within the field of medicine. To this end, the psychological benefits typically conferred by a positive racial identity may not extend to Black medical students. In combination, these findings suggest that further attention to racial identity dimensions and mental health outcomes among Black medical students is needed in order to disentangle the ways that intrapersonal, interpersonal, and environmental factors (i.e., being Black and in medical school) may interact and contribute to Black medical students' well-being.

Overall, findings suggest that private racial regard (or feeling positively about one's racial identity and racial group) offers some meaningful psychosocial benefits to Black medical students, particularly as related to their perceptions of social and career-related support, career commitment, and anxiety. Importantly, determining the directionality of these relationships was beyond the scope of the current study. At present, it remains unclear whether private racial regard facilitates increased perceptions of support and decreased anxiety, or whether perceived support facilitates one feeling more positively about their racial identity. Future research is needed in order to clarify the causal nature of these relationships.

Perceived Support.

General social support. Among this sample of Black medical students, general social support exhibited a medium sized association with both mental health and educational outcomes, supporting a wealth of research demonstrating the vast psychosocial benefits of social support (Taylor, 2011; Cohen, 1998; Cohen & Willis, 1985; Dean, Alfred, & Lin, 1977). Specifically, social support was negatively related to adverse mental health outcomes (stress, depression, and anxiety) as evidenced by a medium-sized, inverse relationship between general social support

and psychological distress. Regarding educational outcomes, general social support was positively related to anticipated academic performance and career commitment.

These findings are consistent with previous qualitative investigations conducted among underrepresented racial minority medical students. In their series of focus groups, for example, Odom et al. (2007) found that underrepresented minority medical students identified social support as the single most important factor enabling successful matriculation through medical school. Focus group participants, 83 percent of whom self-identified as Black, explained that social support from peers within medicine provided a sense of mutual understanding, while social supports outside of medicine created an outlet for minority students separate from their medical training (Odom et al., 2007). Taken in combination with results from this study, perceived social support appears to represent a critical resiliency factor for Black medical students who often experience feelings of social isolation within the medical training environment.

Academic and career support. Findings from this study provide further evidence that the presence of career role models and mentors serve key functions for racial minority students (Thomas, Willis, & Davis, 2007; Garibaldi, 1991). This study demonstrated that higher perceived support from a career role model or mentor was related to fewer symptoms of psychological distress, more positive perceptions of one's anticipated academic performance, and greater career commitment. Perhaps unsurprisingly, perceived support from a career model or mentor had the strongest relationship with students' level of career commitment, as demonstrated by the medium sized relationship between these variables. As such, this finding highlights the practical significance that a lack of perceived opportunities for supportive physician mentors has for Black medical students.

Results from this study suggest that the presence of a role model or mentor may serve as a vital coping resource that allows Black medical students to persist within a stressful training environment, which is consistent with suggestions from prior scholars (Brown, Davis, & McClendon, 1999; Murry & Mosidi, 1993). Specifically, a career role model or mentor can provide Black students with an increased sense of emotional support, personal and professional belonging, and overall self-efficacy (Garibaldi, 1991; Murry & Mosidi, 1993; Thomas, Willis, & Davis, 2007). By extension, these processes may enable students to appraise stressful events occurring within their surrounding training environments as less personally and professionally threatening, which in turn may facilitate more adaptive coping responses. Taken together, perceived support by way of career mentorship and role modeling appears to represent an essential coping resource that may buffer against psychological distress and subsequently promote positive educational outcomes among Black medical students.

Summary of Mediation Analyses: The Role of Cognitive Reappraisal

This study examined whether cognitive reappraisal (a specific coping response strategy) mediated relationships between race-based stressors and mental health (stress, depression, and anxiety). Inconsistent findings emerged. Specifically, cognitive reappraisal mediated the relationship between institutional racial climate and mental health, but did not mediate the relationship between perceived racial discrimination and mental health. These results suggest that Black medical students' use of cognitive reappraisal strategies partially explains the positive relationship between institutional racial climate and mental health symptoms. Given that cognitive reappraisal is generally considered an adaptive coping response that attenuates mental health problems (Gross & Thompson, 2007), the positive directionality of this relationship is unexpected. Contrary to stress and coping theory, this finding indicates that employing cognitive

reappraisal strategies in response to negative race-related events within the training environment may exacerbate mental health problems (e.g., stress, anxiety, depression) among Black medical students. One possible explanation for this relationship may be that intentional efforts to reframe negative race-related events in order to feel less negatively (or more positively) may subvert fuller emotional processing. In turn, suppressed or unresolved emotions may undermine Black student's psychological well-being. Further examination into cognitive reappraisal, as related to race-based stressors and mental health is warranted.

This study also examined whether cognitive reappraisal mediated relationships between race-based stressors and educational outcomes among Black medical students. These results also were inconsistent with expectations. While cognitive reappraisal partially explained the inverse relationships between institutional racial climate and educational outcomes (anticipated academic performance and career commitment), it did not mediate relationships between general perceived racial discrimination and educational outcomes. It is plausible that employing cognitive reappraisal strategies allows Black medical students to view negative race-related incidents occurring within the training environment as less personally threatening, or as a motivating factor that promotes more positive career-related beliefs and intentions. This notion is supported by some prior scholarship (e.g., Carter, 2008), which describes Black academic achievement as an active form of resistance to racism and racial discrimination. Additional research is needed to further ascertain the nature of these relationships.

Finally, this study examined the mediating role of cognitive reappraisal between coping resources and mental health, and between coping resources and educational outcomes. Results generally indicated that the inverse relationship between coping resources and mental health was partially explained by cognitive reappraisal. Similarly, cognitive reappraisal partially explained

the majority of relationships between coping resources and educational outcomes. Together, these findings appear to suggest that coping resources provide psychological and educational benefits to Black medical students because they, in part, may cause individuals to make sense of, and respond to, stimuli within their surrounding environment differently. Specifically, coping resources seem to facilitate a coping response that buffers against mental health difficulties and promote more positive educational outcomes.

Summary of the Moderating Effects of Cognitive Reappraisal & Coping Resources

To examine the plausibility of alternate explanatory processes within the RDSSC model, this study conducted a series of moderation (rather than mediation) analyses among study variables. Results from this study indicated that cognitive reappraisal did not play a moderating role between ambient racial discrimination and mental health, or between ambient racial discrimination and educational outcomes. Similarly, cognitive reappraisal did not moderate relationships between coping resources and mental health or educational outcomes. Likewise, coping resources did not moderate the relationships between ambient racial discrimination and mental health, or between ambient racial discrimination and educational outcomes. The lack of moderating effects between these variables supports existing pathways posited within the RDSSC, which proposed mediation as the focal explanatory process (Levy et al., 2016). In combination with the theorized pathways of the RDSSC model, these results indicate that the relationships between environmental stimuli and personal and professional well-being are, in part, explained by students' appraisals of environmental stimuli. It is, however, important to note that future research that tests these pathways using longitudinal rather than cross-sectional data is needed.

Structural Model Summary

This study utilized structural equation modeling to examine the overall fit of study data to the stress and coping pathways theorized within the RDSSC model (e.g., Levy et., 2016). Examination of the proposed structural model indicated that ambient racial discrimination directly and positively related to mental health symptoms. Contrary to hypotheses, however, ambient racial discrimination did not directly relate to educational outcomes or cognitive reappraisal. Next, coping resources directly and negatively related to ambient racial discrimination and mental health, and positively related to cognitive reappraisal and educational outcomes. Regarding indirect pathways, this study found that cognitive reappraisal did not mediate the relationship between ambient racial discrimination and mental health. In addition, cognitive reappraisal mediated the relationship between coping resources and mental health, but did not mediate the relationship between coping resources and educational outcomes.

Overall, this preliminary examination of the RDSSC model demonstrated empirical support for some, but not all, of the hypothesized pathways within a racial minority medical student sample. Specifically, this investigation demonstrated support for several of the direct pathways posited within the RDSSC model. Consistent with previous research among racial minority students (e.g., Prelow, Mosher, & Bowman, 2006), race-based stressors (e.g., ambient racial discrimination) exacerbated mental health problems among this sample of Black medical students. Additionally, coping resources such as social- and career-related support attenuated Black medical students' mental health problems and promoted positive educational outcomes. These relationships echoed those established within the broader literature base (e.g., David, 1991; DeFour & Hirsch, 2002).

Contrary to the RDSSC model (Levy et al., 2016), race-based stressors did not directly relate to Black medical students' educational outcomes. Given findings from correlational analyses in this study, the nonsignificant relationship between race-based stressors and educational outcomes is perhaps unsurprising. As noted previously at the bivariate level, perceived racial discrimination was not significantly associated with the educational outcomes variables (e.g., anticipated academic performance and career commitment). Further, while institutional racial climate negatively related to both educational outcome variables (e.g., anticipated academic performance and career commitment) at the bivariate level, these relationships were small in magnitude. Therefore, when estimating all paths simultaneously within the SEM model, it makes sense that the direct relationship between these latent variables became nonsignificant.

Regarding indirect pathways linking race-based stressors and coping resources to mental health and educational outcomes through cognitive reappraisal, this study found limited support for the RDSSC model. Specifically, data suggested that cognitive reappraisal only acted as a mediator of the relationship between coping resources and mental health. All other hypothesized indirect pathways were nonsignificant. Although the nonsignificant indirect pathways were contrary to study hypotheses, these findings are consistent with the primary mediation analyses conducted in this study. For example, cognitive reappraisal did not mediate the relationship between general perceived discrimination and mental health or educational outcomes. Moreover, although there was support for cognitive reappraisal as a partial mediator of the relationship between coping resources and educational outcomes, results indicated that cognitive reappraisal only explained a small proportion of the variance.

Importantly, it is possible that nonsignificant pathways within the structural model may have been influenced, in part, by some ill-fitting indicator variables within some latent variables. Specifically, within the coping resources latent variable, private racial regard had a small factor loading as compared with other indicator variables (i.e., general social support, academic and career support). Likewise, within the educational outcomes latent variable, anticipated academic performance had a lower factor loading as compared to career commitment. Therefore, further modifications to the structural model, including removal of some indicator variables, may improve overall model fit and/or the significance of proposed pathways.

In summary, the current study advances the applicability of a context driven race-based stress and coping model (e.g., RDSSC; Levy et al. 2016) among a racial minority professional student group. By systematically examining the impact of race-based stressors (e.g., ambient racial discrimination) while also accounting for specific and empirically supported coping resources, a more nuanced understanding of risk and resilience factors, and their impact on personal and professional well-being, emerged. This investigation demonstrated that race-based stressors, in the form of perceived racial discrimination and institutional racial climate, directly undermined Black medical students' mental health, but not their educational outcomes. Additionally, this study confirmed that coping resources such as positive racial identity, general social support, and academic and career support are directly associated with decreased mental health problems and improved educational outcomes. While some evidence supported the mediating role of cognitive reappraisal on the relationship between coping resources and mental health, there was no evidence to support its role as a mediator of the relationship between race-based stressors and mental health, or the relationship between coping resources and educational outcomes.

Study Limitations

Caution is warranted when generalizing these findings to the larger Black medical population given limitations to this study. First, this study utilized a cross-sectional design. While cross-sectional studies can be useful for estimating the prevalence of specified behaviors (i.e., cognitive reappraisal) and health indicators (e.g., psychological distress) within a particular population, this design limits predictive validity (Heppner, Wampold, Owen, Thompson, & Wang, 2016). In this study, risk and resilience factors and associated outcomes were measured at the same time point. Assessing these variables simultaneously leaves unclear any temporal relationships that may exist. Thus, patterns emerging within cross-sectional research only reflect a snapshot of data from one time point and do not provide evidence of true causal relationships.

Second, this study relied on self-report measures of race-based stressors, coping resources, coping responses, and mental health and educational outcomes. Given the inherent subjectivity of self-report measures, it is possible that respondents either under- or over- reported personal experiences in these domains. The use of objective indicators of risk and resilience factors, as well as mental health and educational outcomes, would strengthen study findings. For example, future research could evaluate objective indicators of psychological well-being such as number of sick days and hospitalizations, or cortisol levels. Similarly, to evaluate academic well-being, researchers could measure medical students' GPA or clinical evaluations. Given some evidence suggesting that Black Americans are more likely to exhibit distress through somatization (Huertin-Roberts, Snowden, & Miller, 1997), future research is needed that assesses assess this form of distress among Black medical students. To evaluate somatization, future studies could include validated tools used for measuring bodily complaints.

Third, while a particular strength of this study includes increased insight into a specific group of medical students in the United States, this investigation does not allow for comparisons to other racial/ethnic student groups. Without a comparison or reference group, it is difficult to determine how unique study findings are to Black medical students as compared to other racial/ethnic minority students, or racial majority students. Further application of the RDSSC model among other specific student populations will increase its concurrent validity.

Fourth, the majority of Black medical students participating in this study identified as women, straight/heterosexual, and in their first year of medical training. Although some sample characteristics (e.g., predominately female and straight/heterosexual) are consistent with national trends within the Black medical student population (AAMC, 2015), it is possible that the demographic makeup of this study sample influenced study outcomes. For example, research indicates that identity markers such as gender (Lacey et al., 2015), sexual orientation (Przedworski et al., 2015), and social class (Beagan, 2005) may differentially influence individuals' experiences of perceived discrimination and coping. Such minority statuses also may contribute to additional barriers to establishing meaningful support networks, particularly in medicine. Thus, conclusions drawn from this study may not generalize to the broader Black medical student community and further examination of within-group differences among Black medical students is warranted. Exploration of cultural intersectionality and the possible additive effect of multiple identity statuses may result in a more nuanced understanding of race-based stress and coping processes among the Black medical students. Future research also is needed in order to understand the race-based stress and coping experiences of Black medical students based upon other facets of identity including gender identity, social class, first generation college student status, and year in medical school.

Fifth, while this study successfully sampled Black medical students across all five major geographic regions of the United States, disproportionate recruitment efforts across some regions of the country may have impacted findings. Specifically, medical institutions known to have the greatest prevalence of Black medical students, including HBCUs, were targeted during study recruitment. Among student participants (n = 367; 84%) electing to report the name of their medical institution, 82 (22.3%) reported attending an HBCU (e.g., Meharry Medical College, Morehouse School of Medicine, and Howard University College of Medicine), with the majority (n = 62; 75.6%) of those attending an HBCU indicating that they attend Meharry Medical College. In addition, the majority of institutions were located in the Northeast, Southeast, and Midwest, with fewer successfully recruited institutions in the Southwest and West. Geographic location, as well as institutional characteristics, may contribute to cultural variations and norms that influence Black medical students' experiences of race-based stress and coping. For example, the racial composition of one's training institution (including, for example, its peers, supervisors, and faculty) may influence the salience of one's racial identity within the training environment and has implications for individual's ability to access coping resources such as social support systems. That is, a Black medical student attending an HBCU might attend to their race as a less or more salient feature of their self-concept as compared to a Black medical student attending a PWI given that they may feel higher levels of racial belongingness on their campus. In addition, Black medical students attending an HBCU may have more opportunities to establish support systems with similar others compared to a Black medical student attending a PWI, where their race makes them more visually distinct from their peers. Also, the regional racial context within which an institution is situated has important implications for students' experiences within the training environment (e.g., historical and current race-relations on campus and within the broader

community). Future research that examines some of these within-group differences based upon identity, regional, and institutional factors is needed.

Additionally, a medical institution's commitment to diversity and inclusion, or lack thereof, also may differentially influence Black students' perceptions of race-based stressors such as institutional racial climate, mental health, and anticipated career outcomes. For instance, students attending institutions that have demonstrated tangible efforts towards diversification and inclusivity may experience fewer incidents of racial discrimination within their training programs or may view a negative race-related incident as an exception rather than a common occurrence. Conversely, students may feel more negatively impacted by racial discrimination within a medical institution where such incidents are considered normative or appropriate. In such environments, negative effects of racial discrimination may compound over time. Given such cultural variations across medical institutions, and these potential impacts on Black medical students' training experiences, future studies should consider examining student's perceptions of institution-level characteristics (e.g., availability of peer and faculty supports, perceptions of diversity and inclusion). Future studies that employ a more systematic recruitment approach to ensure a larger representativeness of Black medical student experiences is needed in order to better understand the implications of institutional-level factors on the relationships observed in this study.

Study Implications

Implications for Medical Education and Training

For individuals in medical education and those invested in medical student recruitment and retention, much can be gleaned from the current study. Of significance, perceived race-based stressors, including institutional racial climate, can impact Black medical students in terms of

their mental health and career development. Sustained efforts to create racially supportive and inclusive medical training environments remain an essential step towards diversifying the healthcare workforce, and by extension, reducing health disparities among racial minorities. To this end, results suggests that ensuring Black medical students receive social support, including career-related role modeling and mentorship may be one of the most potent mechanisms to promote resiliency and well-being among this vulnerable population.

Intentional integration of theories and models of mentorship and career related support specific to racial/ethnic minorities may be of particular relevance to the medical training community. For example, researchers (e.g., Byars-Winston, Estrada, Howard, Davis, & Zalapa, 2010) have used social cognitive career theory (Lent, Brown, & Hackett, 1994) to identify and test effective mentoring practices that promote academic and career outcomes among racial/ethnic minorities in the sciences, engineering, and medicine. Leveraging SCCT (Lent, Brown, & Hackett, 1994), such interventions (e.g., Byars-Winston et al., 2010) attempt to account for mentees' cultural identities on their career development (including experiences of perceived racial discrimination). These interventions seek to train and equip mentors with evidence-based strategies to help minority students and trainees persist. In a mentor training workshop by Ghandi and Johnson (2016), for example, facilitators specifically taught mentors of early career scientists from underrepresented backgrounds skills relevant to career development, including: effective communication, mentor-mentee expectation alignment, assessing mentee understanding, fostering independence, addressing diversity, and promoting professional development. Culturally-informed mentorship may promote increases in academic and research related self-efficacy, thereby promoting greater career persistence (Ghandi & Johnson, 2016). This burgeoning area of intervention and evaluation speaks not only to the importance of

providing racial minority students with supportive mentorship, but also to educating and training minority and majority race faculty and supervisors on effective mentoring methods and skillsets.

Implications for Clinical Training

Findings from this investigation indicate that Black medical students represent an important clinical population regarding mental health and career development needs. Unique experiences of race-based stress, in addition to the everyday rigors of medical training, may place this population at increased risk for adverse mental health and educational outcomes. The convergence of these vulnerability factors suggests that mental health providers direct attention to this student population. To this end, clinicians may benefit from increased training in the psychological and educational impacts of race-based stress among racial minority student groups. Understanding the physiological and psychological ramifications of race-based stressors and the contextual factors that may differentially influence the extent to which these stressors impact individuals' well-being will lead to a more informed provision of mental health services and interventions.

Importantly, while some aspects of providing therapeutic intervention among Black medical students may resemble approaches utilized among any clinical population (e.g., rapport building, goal setting), this population warrants additional considerations. For example, clinicians are encouraged to assess Black medical students' perceptions of their medical school training environment (e.g., institutional racial climate, social support and mentorship). An intentional assessment of these areas will help clinicians to develop a clearer conceptual understanding of students' distress, as well as inform the development of a more individualized treatment plan. While some Black medical students may attribute stressful aspects of their medical training to their racial minority status, others may attribute stressful experiences to

broader social and cultural norms within the field of medicine. For many Black medical students, perceptions of stress may include race and non-race related factors. By rigorously evaluating students' perceived medical school experiences and accounting for the potential role of their racial minority status, clinicians will be better equipped to flexibly attend to the most salient aspects of individuals' distress.

Regarding Black medical students' perceptions of their experiences within and outside of medical training, clinicians are encouraged to teach and promote specific adaptive coping responses such as cognitive reappraisal. This study demonstrated that cognitive reappraisal attenuated symptoms of stress, depression, and anxiety, and promoted anticipated academic performance and career commitment among Black medical students. The use of cognitive behavioral theory (Beck, 2011) and time-limited dynamic psychotherapy (Levenson, 2003), which intentionally aim to help clients modify cognitive thought processes to facilitate more flexible and adaptive understandings of stressful life events and experiences, may represent promising directions to guide interventions with this clinical population. Notwithstanding the importance of eradicating the occurrence of race-based stressors within medical training environments, equipping Black medical students with the tools to externalize and reframe negative race-related experiences could offer one promising mechanism by which to contribute to students' personal and professional resilience.

Additionally, given the heightened concerns around privacy, confidentiality, and stigmatization among many medical students experiencing mental health difficulties (Chew-Graham, Rogers, & Yassin, 2003; Givens & Tija, 2002; Schwenk, Davis, & Wimsatt, 2010), clinicians are encouraged to consider alternative models of mental health service provision among this population. For example, support-, skills-, and psychoeducation-based intervention

groups may be particularly advantageous for Black medical students. Such delivery formats might allow greater numbers of students to access focused services, while further normalizing the significance of mental health and mental health treatment. Group-based interventions also may foster an increased sense of belonging, connection, and support among Black medical students. These, in turn, may help promote improved personal and professional well-being. For example, some medical schools have begun implementing brief, skills-based interventions such as mindfulness-based trainings to medical students (e.g., Dyrbye et al., 2017; Rosenweig, Reibel, Greeson, Brainard, & Hojat, 2009) to address ongoing concerns around mental well-being among medical trainees. Some studies demonstrate improvements in mental health outcomes such as stress (Warnecke, Quinn, Ogden, Towle, & Nelson, 2011) and depression (Shapiro, Schwartz, & Bonner, 1998), but not burnout (Barbosa et al., 2013; Dyrbye et al., 2017) among samples of mostly White medical students. Further research is needed in order to explore the potential that such group interventions may similarly benefit Black medical students.

While alternative strategies for mental health delivery among Black medical students are warranted, clinical intervention alone will likely prove insufficient in our efforts to create a more racially inclusive medical workforce. Therefore, clinicians invested in social justice and workforce diversification are encouraged to continue to pursue opportunities for multilevel intervention and advocacy. Opportunities at the institutional, state, and national levels include: (1) participating in training selection committees to reduce racial biases and assumptions that may lend to discriminating in admissions and selection processes, (2) developing and implementing racial bias awareness and reduction trainings within medical institutions, (3) engaging in policy development or task force initiatives that increase the representativeness of racial minorities in medical training environments, and (4) engaging in research and scholarship

that advances our understandings of the role of race in the professional development and performance of underrepresented racial minorities.

Implications for Future Research

Model Advancement and Refinement. Continued research concerning race-based stress and associated coping processes among Black medical students is warranted. Given the accumulative impact of stress on health and well-being, future research that employs a longitudinal approach is needed to more adequately discern the developmental effects of race-based stressors on Black medical students. Future studies utilizing a longitudinal study design, for example, might consider tracking Black medical trainees' well-being beginning at the outset of medical school training through medical residency. Current evidence demonstrates that Black physicians report negative race-based experiences (Nunez-Smith et al., 2007; Nunez-Smith et al., 2009; Peterson, Friedman, Ash, Franco, & Carr, 2004; Pololi, Cooper, & Carr, 2010) and that these experiences contribute to greater job turnover intentions (Nunez-Smith et al., 2009). By evaluating perceptions and impacts of race-based stressors among Black medical trainees and physicians across early years of their career development, researchers may develop more informed developmental models that help elucidate differing mental health and career-related trajectories among this group.

From a developmental perspective, researchers also might consider closer examination of predisposing, early childhood environmental factors with regard to individuals' susceptibility to race-based stress. The RDSSC model (e.g., Levy et al., 2016) proposes that factors such as exposure to neighborhood and community violence, incidents of personal and familial trauma or abuse, perceptions of personal welfare and social connectedness, and availability of social and financial resources may influence vulnerability to environmental stressors. Accounting for Black

medical students' formative experiences within their homes and surrounding communities may then increase our insight into the ways in which stress and coping processes vary across socioeconomic and ecological domains. Such information may, in turn, better inform efforts to identity and intervene upon underrepresented racial minority students most vulnerable to adverse mental health, educational, and occupational outcomes.

Future investigations also should consider other identity-related within-group differences among Black medical students (e.g., gender, gender identity, gender expression, sexual orientation). Research indicates that Black women (Lacey et al., 2015) and Black persons identifying as LGBTQ (Follins, Walker, & Lewis, 2014; Hughes, Matthews, Razzano, & Aranda, 2003) report experiencing more psychological distress compared to non-LGBTQ Black men. If such identities contribute to quantifiable differences in perceptions of, and responses to, race-based stressors among Black medical students, it will be important to disentangle areas of divergence in the stress and coping process across subgroups. Expanded exploration into cultural identity offers promising new understandings of the salience of intersectionality on students' experiences of discrimination, coping, and well-being.

Another area worthy of continued exploration includes mediating factors explaining relationships between race-based stress and mental health and educational outcomes. To advance stress and coping theory, and further refine the RDSSC model (e.g., Levy et al., 2016), future research should test other possible mediating mechanisms that may better explain relationships between perceived stress, coping response, and health and behavioral outcomes. Given the underlying biological and physiological processes associated with stress and stress responses within the RDSSC, it may be particularly useful to examine biological factors such as HPA Axis activity (Levy et al., 2016).

Researchers also could explore HPA Axis related factors such as sleep hours or sleep quality, both of which are included as components of the broader RDSSC model (e.g., Levy et al., 2016). Recent studies by Fuller-Rowel (2016), for example, found that Black Americans who reported more perceived discrimination also experienced poorer sleep quality and more difficulty sleeping. In a study conducted among medical students, Pagnin and de Queriroz (2015) found that burnout and sleep difficulties, combined, explained 21 percent of the variance in students' psychological well-being. Considering how sleep has direct implications for mental and physical health, as well as performance, examination of sleep among Black medical students might offer key insights into the ways in which race-based stressors erode well-being.

Program Evaluation and Intervention Development. Next, outcome research is needed to assess the effectiveness of existing interventions and strategies intended to address the ongoing underrepresentation of Black students in medicine. A number of institutions across the nation have undertaken varied efforts to improve institutional racial climate as a means to not only cultivate a more racially inclusive medical workforce, but also to reduce health disparities among racial minority patient groups. While laudable, little is currently known about the translatable impact of such interventions on measurable improvements in Black medical student recruitment and retention. For example, New York University recently announced their decision to waive tuition for all accepted medical students across all four years of training (Fox, 2018). This policy could lead to increases in the number of Black applicants and enrollees by eliminating a significant financial barrier that may otherwise disproportionately prohibit Black students from pursuing the field of medicine. It will be vital to critically monitor and evaluate the effectiveness of this policy over time to determine its utility in dismantling racial inequities among medical providers and patients alike.

Lastly, the need for increases in the number of available Black physicians and faculty capable of assuming mentorship roles for Black trainees and early career physicians persists. Moving forward, researchers and academicians must develop novel, theory-driven strategies to facilitate greater linkages between Black physicians, Black medical students, and Black youth engaging in early career exploration. Accomplishing this goal might include, but is not limited to: (1) establishing mentorship matching programs that pair trained physicians with medical students and trained medical students with pre-medical undergraduates; (2) increasing Black medical students' involvement in scientific research and consideration of faculty positions; and (3) developing partnerships between medical institutions and surrounding community health clinics to facilitate opportunities for Black youth to shadow and volunteer. Fostering early connections through direct role modeling and mentorship will not only expand Black students' notions of themselves as capable medical professionals, but will also strengthen career pipelines that will ultimately result in a more visible Black physician workforce.

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Appendix A

GENERAL ETHNIC DISCRIMINATION (GED) SCALE

We are interested in your experiences with racism. As you answer the questions below, please think about the PAST YEAR. For each question, please circle the number that best captures the things that have happened to you.

1. How often have you been treated unfairly by teachers and professors because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
2. How often have been treated unfairly by your employers, bosses, and supervisors because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
3. How often have you been treated unfairly by your co-workers, fellow students and colleagues because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
4. How often have you been treated unfairly by people in service jobs (store clerks, waiters, bartenders, bank tellers and others) because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
5. How often have you been treated unfairly by strangers because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
6. How often have you been treated unfairly by people in helping jobs (doctors, nurses, psychiatrists, case workers, dentists, school counselors, therapists, social workers and others) because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6

7. How often have you been treated unfairly by neighbors because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
8. How often have you been treated unfairly by institutions (schools, universities, law firms, the police, the courts, the Department of Social Services, the Unemployment Office and others) because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
9. How often have you been treated unfairly by people that you thought were your friends because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
10. How often have you been accused of doing something wrong (such as stealing, cheating, not doing your work, or breaking the law) because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
11. How often have people misunderstood your intentions and motives because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
12. How often did you want to tell someone off for being racist towards you but didn't say anything?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
13. How often have you been really angry about something racist that was done to you?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
14. How often have you been forced to take drastic steps (filing a grievance, quitting a job, etc.) to deal with some racist thing that happened to you?						

	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
15. How often have you been called a racist name?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
16. How often have you gotten into an argument or a fight about something racist that was done to you or done to another member of your racial group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
17. How often have you been made fun of, picked on, pushed, shoved, hit, or threatened with harm because of your race/ethnic group?						
	Never	Once in a while	Sometimes	A lot	Most of the time	Almost all the time
How often in the past year?	1	2	3	4	5	6
18. How different would your life be now if you HAD NOT been treated in a racist and unfair way?						
	The same as it is now	A little different	Different in a few ways	Different in a lot of ways	Different in most ways	Totally different
How often in the past year?	1	2	3	4	5	6

Appendix B

Perceptions of Prejudice and Discrimination (PPD) scale

For the following questions, please consider your experience during MEDICAL SCHOOL training only. Please rate your level of agreement with each of the following statements.

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. I have observed discriminatory words, behaviors, or gestures directed at minority students at this institution.	1	2	3	4	5
2. I feel there is a general atmosphere of prejudice among students.	1	2	3	4	5
3. I have encountered racism while attending this institution.	1	2	3	4	5
4. I have heard negative words about people of my own race or ethnicity while attending classes.	1	2	3	4	5
5. I feel there is a general atmosphere of prejudice among faculty at this institution.	1	2	3	4	5
6. I feel there is a general atmosphere of prejudice among academic staff at this institution.	1	2	3	4	5
7. I have been singled out in class and treated differently than others.	1	2	3	4	5

Appendix C

Private Regard subscale of Multidimensional Inventory for Black Identity (MIBI)

Please rate your level of agreement to each of the following statements.

	Strongly Disagree			**Neutral**			**Strongly Agree**
1. I feel good about Black people.	1	2	3	4	5	6	7
2. I am happy that I am Black.	1	2	3	4	5	6	7
3. I feel that Blacks have made major accomplishments and advancements.	1	2	3	4	5	6	7
4. I often regret that I am Black.	1	2	3	4	5	6	7
5. I am proud to be Black.	1	2	3	4	5	6	7
6. I feel that the Black community has made valuable contributions to this society.	1	2	3	4	5	6	7

Appendix D

The Social Provisions Scale-10 (SPS-10)

Please rate how much each statement describes your situation by using the following responses. For example, if you feel a statement is VERY TRUE you would say Strongly Agree. If you feel a statement CLEARLY does not describe your relationships, you would answer Strongly Disagree.

	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
1. There are people I can depend on to help me if I really need it.	1	2	3	4
2. I feel that I do not have close personal relationships with other people.	1	2	3	4
3. There is no one I can turn to for guidance in times of stress.	1	2	3	4
4. There are people who enjoy the same social activities I do.	1	2	3	4
5. I do not think other people respect my skills and abilities.	1	2	3	4
6. If something went wrong, no one would come to my assistance.	1	2	3	4
7. I have close relationships that provide me with a sense of emotional security and well-being.	1	2	3	4
8. I have relationships where my competence and skills are recognized.	1	2	3	4
9. There is no one who shares my interests and concerns.	1	2	3	4
10. There is a trustworthy person I could turn to for advice if I were having problems	1	2	3	4

Appendix E

The Influence of Others on Academic and Career Decisions Scale (IOACDS)

Please rate the degree to which you agree with each of the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. There is someone I can count on to be there if I need support when I make academic and career choices.	1	2	3	4	5
2. There is someone who helps me weigh the pros and cons of academic and career choices I make.	1	2	3	4	5
3. There is someone who helps me consider my academic and career options.	1	2	3	4	5
4. There is no one who shows me how to get where I am going within my education or career.	1	2	3	4	5
5. There is someone who supports me in the academic and career choices I make.	1	2	3	4	5
6. There is someone who stands by me when I make important academic and career decisions.	1	2	3	4	5
7. There is no one who supports me when I make academic and career decisions.	1	2	3	4	5
8. There is someone who tells or shows me general strategies for a successful life.	1	2	3	4	5
9. There is someone I am trying to be like in my academic or career pursuits.	1	2	3	4	5
10. There is no one particularly inspirational to me in the academic or career path I am pursuing.	1	2	3	4	5
11. In the academic or career path I am pursuing, there is someone I admire.	1	2	3	4	5

12. There is no one I am trying to be like in my academic and career pursuits.	1	2	3	4	5
13. I have a mentor in my academic or career field.	1	2	3	4	5
14. I know of someone who has a career I would like to pursue.	1	2	3	4	5
15. In the academic or career path I am pursuing, there is no one who inspires me.	1	2	3	4	5

Appendix F

Cognitive Reappraisal subscale of Emotion Regulation Questionnaire (ERQ)

The following ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. For each item, please answer using the following scale:

Strongly Disagree			**Neutral**			**Strongly Agree**
1	2	3	4	5	6	7

1. When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*.	
2. When I want to feel less *negative* emotion (such as sadness or anger, *I change what I'm thinking about*.	
3. When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.	
4. When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation.	
5. I control my emotions by *changing the way I think* about the situation I'm in.	
6. When I want to feel less *negative*, I *change the way I'm thinking* about the situation.	

Appendix G

The Perceived Stress Scale-10 (PSS-10)

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate with a check how often you felt or thought a certain way.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Appendix H

Generalized Anxiety Disorder-7 (GAD-7) scale

In the last 2 weeks, how often have you been bothered by the following problems?

	Not at all	**Several days**	**More than half the days**	**Nearly every day**
1. Feeling nervous anxiety or on edge.	0	1	2	3
2. Not being able to stop or control worrying.	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing.	0	1	2	3
5. Being so restless that it is hard to sit still.	0	1	2	3
6. Becoming easily annoyed or irritable.	0	1	2	3
7. Feeling afraid as if something awful might happen.	0	1	2	3

Appendix I

Personal Health Questionnaire-9 (PHQ-9)

In the last 2 weeks, how often have you been bothered by the following problems?

	Not at all	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.	0	1	2	3
4. Feeling tired or having little energy.	0	1	2	3
5. Poor appetite or overeating.	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down.	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television.	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way.	0	1	2	3

Appendix J

Anticipated Academic Performance scale

Please rate the degree to which you each of the following statements is true of you.

	Not at all true						**Extremely True**
1. In terms of academic performance, I expect to do well.	1	2	3	4	5	6	7
2. In terms of academic performance, I expect to do better than most of my classmates.	1	2	3	4	5	6	7
3. My expectancies for career success are very, very high.	1	2	3	4	5	6	7

Appendix K

Career Commitment Scale (CCS)

Please rate the degree to which you agree with each of the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. My line of work/career field is an important part of who I am.	1	2	3	4	5
2. This line of work/career field has a great deal of personal meaning to me.	1	2	3	4	5
3. I do not feel "emotionally attached" to this line of work/career field.	1	2	3	4	5
4. I strongly identity with my chosen line of work/career field.	1	2	3	4	5
5. I do not have a strategy for achieving my goals in this line of work/career field.	1	2	3	4	5
6. I have created a plan for my development in this line of work/career field.	1	2	3	4	5
7. I do not identify specific goals for my development in this line of work/career field.	1	2	3	4	5
8. I do not often think about my personal development in this line of work/career field.	1	2	3	4	5
9. The costs associated with my line of my work/career field sometimes seem too great.	1	2	3	4	5
10. Given the problems I encounter in this line of work/career field, I sometimes wonder if I get enough out of it.	1	2	3	4	5
11. Given the problems in this line of work/career field, I sometimes wonder if the personal burden is worth it.	1	2	3	4	5
12. The discomforts associated with my line of work/career field sometimes seem too great.	1	2	3	4	5

Appendix L

Demographic Form

Gender ____M ____F _____Trans _____

Age ____ years

Which of the following best describes your race?

____Black/African American
____African descent
____Multiracial, including Black/African American, or African descent
____I do not identity as any of the above
____Other--Please specify: _____

How do you identify your ethnicity?
____Non-Hispanic/Latino(a)
____Hispanic/Latino(a)

Partner status
____ Single
____ Married
____ Divorced
____ Separated
____ Not married, but living with partner

How do you identify your sexual orientation?
____Lesbian Woman
____Gay Man
____Bisexual Woman
____Bisexual Man
____Queer
____Questioning
____Straight
____Other (please specify): _____

What is the combined annual income of the person(s) who raised you in your home?
0-$19,999
$20,000-$39,999
$40,000-$49,999
$60,000-$79,999
$80,000-$99,999
$100,000-$119,999
$120,000-$139,999
$140,000-$159,999
$150,000-$179,999
$180,000-$199,999
$200,000 and above

If you are no longer living in the family in which you were raised, what is your current annual income?
0-$19,999
$20,000-$39,999
$40,000-$49,999
$60,000-$79,999
$80,000-$99,999
$100,000-$119,999
$120,000-$139,999
$140,000-$159,999
$150,000-$179,999
$180,000-$199,999
$200,000 and above

In thinking about your past and present experiences, which label best describes your perceived social class?

____Lower Class
____Working Class
____Lower-Middle Class
____Middle-Class
____Upper-Middle Class
____Upper Class

Please provide information regarding our primary caregivers

Primary Caregiver #1: Specify	Primary Caregiver #2: Specify
What is this person's highest level of completed education	What is this person's highest level of completed education?
____No formal schooling ____Some grade school ____8th grade ____High school or GED ____Some college ____2 year college ____College ____Graduate or professional school	____No formal schooling ____Some grade school ____8th grade ____High school or GED ____Some college ____2 year college ____College ____Graduate or professional school

Please provide the name of your medical institution (Note: data will be used to aggregate type of institution and no information specific to your institution will be reported):

_____

What is your current year of medical school training?

____First year
____Second year
____Third year
____Fourth year
____Fifth year
____Sixth year
____Seventh year (or more)

Are you a full time or part time student?

____Full time
____Part time

Appendix M

Education and Social/Behavioral Science IRB

Submission ID Number:	CP001 for IRB Study 2017-0693
Title:	A theory-based investigation of stress and coping processes among black medical students
Principal Investigator:	Mindi Thompson
Point-of-contact:	Tyson Pankey
IRB Staff Reviewer:	Laura Conger
Date of Determination:	8/18/2017

The IRB has reviewed the study indicated above. Please review the determination indicated below and any additional guidance provided by the IRB. If you have questions about this determination, please contact the staff reviewer listed above. For additional information about this application, please log into your ARROW account at arrow.wisc.edu.

Determination

☐ Further IRB review is not required because, in accordance with federal regulations, your project:

- ☐ does NOT constitute research as defined under 45 CFR 46.102(d)
- ☐ does NOT involve human subjects as defined under 45 CFR 46.102(f)
- ☐ involves ONLY protocol development activities (PDA) that do not involve human subjects research pursuant to 45 CFR 46.102(d) and 46 CFR 46.102(f)

Additional information:

☒ Your study continues to qualify for exemption under category:

- ☐ 45 CFR 46.101(b)(1): Research in educational settings
- ☒ 45 CFR 46.101(b)(2): Research involving the use of educational tests, surveys, interviews
- ☐ 45 CFR 46.101(b)(3): Research involving the use of educational tests, surveys, interviews with public officials or required be federal statute
- ☐ 45 CFR 46.101(b)(4): Research involving existing data or specimens
- ☐ 45 CFR 46.101(b)(5): Demonstration projects
- ☐ 45 CFR 46.101(b)(6): Taste and food quality evaluation

Although your study is exempt from federal regulations, UW-Madison Human Research Protection Program policy requires that all human subjects research be conducted in accordance with the highest ethical standards/Belmont Report.

Additional information: