AN EXAMINATION OF THE IMPACT GRIT, ADAPTIVE AND MALADAPTIVE COPING, AND SOCIODEMOGRAPHICS HAVE ON THE EXPERIENCES OF STEREOTYPE THREAT IN MEDICAL STUDENTS

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DISSERTATION

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An Examination of the Impact Grit, Adaptive and Maladaptive Coping, and Sociodemographics Have on the Experiences of Stereotype Threat in Medical Students

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-"For I know the plans I have for you," declares the LORD, "plans to prosper you and not to harm you, plans to give you hope and a future." ~ Jeremiah 29:11

Abstract

As students from underrepresented racial and ethnic backgrounds (Black/African American, Latinx/Hispanic, and American Indian/Alaska Native/Hawaiian Native) in the United States continue to be minorities in the medical education environment and the medical field, the presence of stereotype threat may be a reality to many and a potential internal barrier to success (Bullock et al., 2020). Stereotype threat suggests that stigmatized group members may underperform academically or on tests of ability due to concerns about confirming a negative societal stereotype (Aronson, 1995; Spencer et al., 1999; Steele, 1997). As part of a minoritized group, students from underrepresented backgrounds may feel threatened by majority populations (non-Hispanic White and Asian/Asian American) in medicine and internalize the notion that they cannot perform as well academically (Cheng et al., 2021; Orom et al., 2013). This study explores the impact of grit, adaptive and maladaptive coping skills, and sociodemographics on the experience of stereotype threat in medical students. Stereotype threat can jeopardize academic performance in underrepresented minority populations within healthcare educational systems (Bullock et al., 2016). Low academic performance potentially affects retention and continues inadequate representation of minorities in medicine (Ackerman-Barger et al., 2016). In this quantitative study, a survey was utilized to collect data from students at a medical education institution in the U.S. Northwest. The analysis showcased significant relationships between stereotype threat and grit and stereotype threat and some sociodemographic variables.

Keywords: stereotype threat, stereotype threat vulnerably, grit, adaptive coping, maladaptive coping, diverse healthcare workforce, medical students, medical education

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Chapter 1: Introduction

Statement of the Problem

As students from diverse racial and ethnic groups continue to be a minority in the medical education environment, the presence of stereotype threat may be a reality for many and possibly an internal barrier to success (Bullock et al., 2020). Stereotype threat occurs when people fear that they will live up to negative stereotypes and perpetuate these stereotypes by engaging in self-defeating behaviors (Steele & Aronson, 1995). Stereotype threat (ST) has affected the retention of minority medical students who are already dismally and disproportionately underrepresented in the fields of science, technology, math, and engineering (STEM), particularly in medicine (Carr et al., 2015; Meador, 2018).

Steele (1997) and Aronson (1995) influenced the foundational research studies in various areas of higher education on the effect of ST. ST requires both a vulnerable student (one who is aware of stereotypes of their group) and a threatening learning environment (Spencer et al., 1999). Many underrepresented minorities (URM) individuals may have experienced blatant, passive, insidious, and/or institutional racism at some point in their life regardless of profession or background (Odom et al., 2007; Zambrana et al., 2017). Because of the existing prejudices surrounding the medical field, many URMs may feel threatened and do not think they can perform as well as the majority group (Orom et al., 2013). However, students may possess protective factors against ST that they have developed throughout their lives.

Research by Owens and Massey (2011) noted that ST potentially jeopardized academic performance in underrepresented minority populations within healthcare education systems as ST added an extra layer of stress and strain to learners. Regardless of their racial and ethnic background, many students in higher education might be subject to challenges in the academic

setting, such as academic overload and financial burdens (Ackerman-Barger et al., 2016). Orom et al. (2013) determined that ST is a consistently present phenomenon for URM medical students, concluding one reason might be due to non-supportive learning environments and racial discrimination/harassment, resulting in lower academic performance. The study also indicated that students were more likely to feel their race may have negatively affected their medical school experience overall (Orom et al., 2013).

As stated previously, the presence of ST is a "disruptive psychological state" in which underrepresented minorities (URM) students may feel vulnerable for confirming a negative stereotype, particularly in healthcare learning environments (Ackerman-Barger et al., 2016, p. 1232). These stereotypes are associated with social identities such as race, gender, ethnicity, social class, sexual orientation, etc. Ackerman-Barger et al. (2015) found that hypervigilance, impaired working memory, reduced self-regulation, and repressed intellectual performance are all prevalent in URM students in the clinical setting who have been affected by ST. The additional impact of ST not only has an affect academic performance but potential future employment opportunities such as residency, medical school drop-out rates, and long-term effects related to avoidance behaviors and disengagement from academic pursuits (Ackerman-Barger et al., 2015). Instead of spending energy on learning and performing their best academically, students worry, experience anxiety, and doubt themselves, possibly causing a student to disengage with their professional goals or even disassociate themselves with the professional identity of a healthcare provider (Ackerman-Barger et al., 2016). Essentially, the presence of ST perpetuates a marginalization of URM students and contributes to decreased retention (Museus et al., 2011). This study will primarily explore whether there is a relationship

between medical students' psychological pre-existing protective factors (grit, adaptive and maladaptive coping) and students' vulnerability to ST.

Background and Justification

ST effect on academic achievement and retention of URM students. Psychological and educational research has shown that manipulation of ST can affect academic performance, particularly among disadvantaged minority groups (Osboure, 2001). Steele's (1992, 1997) ST theory attempted to explain the underperformance of select minority students in academic domains. Steele (1997) noted that the situational self-identity of negative group stereotypes in testing situations increases the anxiety of students' experiences and that related variances of anxiety levels partially explain academic underperformance. Steele (1997) found that the higher one's perception of ST, the higher the risk for struggling academically.

ST may affect medical students in a demanding, high-stakes learning environment (Bullock et al., 2020). ST influences academic achievement principally by inducing worry, creating barriers for oneself that would sabotage or undermine academic performance, or distancing from educational spaces where a person feels like they do not belong (Steele, 1997; Steel & Aronson, 1995). These types of internal thoughts and ideas may decrease academic and clinical performance for medical students. For example, stereotypes related to healthcare might include: "People of color are not as smart as…;" "Students of color don't belong in health professions;" or "People have lower expectations for people of color" (Ackerman-Barger et al., 2016, p.1241). Claude and Steel (1995) founded that even passive reminders that someone belongs to one group or another, such as a group stereotyped as inferior in academics, can negatively impact their academic performance. In addition to the potential presence of ST, URM students have been targets of discrimination, mistreatment, racism, and prejudice as a result of

their membership of a corresponding ethnic group in healthcare settings, as well as other education and workforce settings in the United States (Inzlicht et al., 2012).

Within medical school and residency, highly academic and rigorous environments, being a URM can be isolating (Albert, 2018). With so few peers and even fewer academic medical faculty they can ethnically identify with, URM learners can potentially lack a sense of belonging within the physical space and the healthcare field overall (Yeager et al., 2016). ST can further perpetuate stereotypes of individuals in these anxiety-filled, high-stakes settings (Schamander & Hall, 2014). These existing stereotypes potentially contribute to ST of URMs in healthcare, likely because they continue to be minority populations in the clinical setting (Ackerman-Barger et al., 2016).

URM students have struggled with issues such as ST and imposter syndrome (doubting your capabilities and feeling like a fraud), leaving them feeling unsure of whether they belong in medicine, deserve to be there, and can succeed (Pauneska et al., 2015). These feelings can cause students to outwardly disconnect or withdraw from their identity in the medical profession and perhaps eventually disengage (Aronson, 2002; Mahmoud et al., 2012). ST is a factor that has contributed to the attrition of URM STEM students, including medical students, and has ultimately contributed to low numbers of URM professionals in the fields (Museus et al., 2011; Thomas & Erdei, 2018). ST has often deterred URM students from pursuing STEM fields, such as medicine, because of self-doubt in their ability to sustain in STEM fields due to its effect on performance (Meador, 2018).

ST effect on diversity in medicine. Considering the generally low URM numbers of entering the profession of medicine, a loss of even a single minority medical student as a potential future physician may be devastating to the communities these individuals will

eventually serve (Rabinowitz et al., 2000). The potential for URMs in medical school to be adversely affected by ST stems from the overarching theme of being a minority in that space; not enough URMs are in medical school to meet the healthcare workforce need (Talamantes et al., 2019). According to the Association of Medical Colleges (AAMC) (2018), 52,550 people applied to medical school in the 2015 cycle, and there was an acceptance rate of 39% overall (20,630). Acceptance rates differ among select racial and ethnic subgroups, with one of the most dispersing populations being African American/Black applicants, making up only 7% of the entire applicant pool and having the lowest acceptance rate of 34%. Of the 20,630 applicants accepted into a U.S. medical school, only 13.7% of matriculants were URM students. With this percentage equating to roughly 2,828 students across 141 medical schools, there is an average of only 20 URM students across institutions (AAMC, 2018). This is one reason why addressing ST is crucial in retaining the current minority students in medical school and the medical profession.

Heiser (2017) reports that physicians from minority backgrounds are disproportionately underrepresented compared to the patient population in the United States, which is 30% URM, statistically correlating with patient satisfaction, a lack of advocacy for minority patients, and less access to healthcare for minority patient populations. It has also been found that underrepresented minorities with a direct or shared identity with underserved populations are more likely to serve those same populations as healthcare providers (Fenton et al., 2016). Marrast et al. (2014) also noted that non-white physicians disproportionately cared for 53.5% of minority and 70.4% of non-English speaking patients and concluded that increasing racial and ethnic diversity of the doctors may reduce health disparities within these populations because of the shared identity between them (patient and provider). When patients can connect with their provider in an immediate way (such as racial identity), studies show there is more trust, respect,

communication, self-advocacy, intention to adhere to medical advice, and patient satisfaction with the provider (Alsan et al., 2020; Cooper & Stoney, 2020). Therefore, diversifying the healthcare workforce to reflect the racial demographics of patient populations could be the key to addressing healthcare disparities for underserved communities, particularly individuals who are part of a racial minority group (Fenton et al., 2016; Marrast et al., 2014).

Deficiencies in the Evidence

ST can dampen a learner's academic performance and undermine their identity over time (Orom et al., 2013; Steele, 1997). Most of the research around ST presence, causalities, and intervention has mostly occurred within undergraduate higher education, but not much beyond that has been done for graduate and professional education. Recently Bullock et al. (2020) explored the presence of ST related to racial/ethnic identity among medical students during their clinical clerkship training. This explanatory research is one of the very few investigations specifically on medical education and ST. Relevant to ST and coping, Bullock et al. (2020) noted that although the discovery of ST distracts from clinical learning, it also highlights strength, perseverance, and coping skills. The mixed-methods study outlined a 3-stage process specific to the medical student ST experience consisting of: (1) a trigger, such as standing out, past experiences, microaggressions, and intersectionality; (2) an internal dialogue with self, assess power dynamics, impact on grade or assessment, and emotional impact; and (3) individuals' response, avoidance, prevention, deferral, or confrontation (Bullock et al., 2020). This research study aimed to specify further the significance of internal protective attributes for medical students to potentially mitigate ST-related dynamics within the model.

Audience

The goal of this research study was to encourage medical school leadership to explore the learning climate that exists at their institution and determine if and how ST affects the academic performance of its learners. If leaders in medical education have a better understanding of learners' experiences more likely to have perceived ST vulnerability, they can explore solutions to create a more inclusive learning environment. An immediate solution to resolve all factors contributing to ST is unlikely because many of these factors contributing to the ST vulnerability are intangible. However, by identifying if protective factors that potentially decrease ST, the development of future interventions may help increase these protective factors among incoming medical students could help reduce instances of ST while we work towards creating a workforce in which URM students are no longer the minority population. This can theoretically contribute to the overall physician pathway to diversify medicine and provide better patient care.

Definition of Terms

Definitions of terms are used for the purpose of clarity and simplicity throughout this study.

Adaptive Coping. Adaptive coping, a positive and productive response to ST, would be characterized by a sympathetic reaction in which improved performance, especially on tasks that benefit from effort and are perseverance-based, would be expected (Mendes & Jamison, 2012).

Graduate Medical Education (GME). GME, more commonly known as "residency," is formal medical education, usually taking place in a hospital or hospital-sponsored site, pursued after receipt of the M.D. or D.O. degree in the United States. This education includes internship, residency, subspecialty, and fellowship programs and leads to state licensure and board certification. (Association of American Medical Colleges, 2020)

Health Disparities. Outcomes in healthcare that potentially stem from social structures and processes through which the level and distribution of health are determined beyond the biological or genetic limits of individuals. (Burris, 2003)

Healthcare Access. One's ability to enter the healthcare system and obtain care, a factor that contributes to health outcomes. (Litaker et al., 2005)

Maladaptive Coping. An internal factor that usually can display outward disconnection or withdrawal when facing stress or negative impaction. Rather than engaging and attempting success, maladaptive coping typically results in a further setback in performs due to disengagement (Mendes & Jamison, 2012).

Medical College Admissions Test (MCAT). The Medical College Admission Test® (MCAT®), developed and administered by the AAMC, is a standardized, multiple-choice examination created to help medical school admissions offices assess your problem solving, critical thinking, and knowledge of biological, behavioral, and social science concepts and principles prerequisite to the study of medicine. (AAMC, 1995-2020)

Science, technology, engineering, and medicine (STEM). STEM is an acronym for the fields of science, technology, engineering, and math. Discussion of STEM-related programs has become a priority to increase college students to pursing degrees in these fields (Morton and Paul, 2019).

Sociodemographic. Sociodemographic is of, relating to, or involving a combination of social and demographic factors (Merriam-Webster, n.d.). Social factors are the effects of people and groups influencing one another through culture, social class, reference groups, and family (Lamb, L., n.d.). Demographic factors are used to define the characteristics of a person or a population. Commonly used demographic factors include variables such as race, age, gender,

income, marital status, and educational level, and others (Hayes, 2021). The sociodemographic factors for this study were racial/ethnic identity, gender, family income, parent education, and the academic performance metrics of GPA and MCAT score.

Stereotype Threat (ST). Stereotype threat refers to the personal perception of confirming negative stereotypes about an individual's racial, ethnic, gender, or cultural group. An example of this comes from researchers Steele and Aronson (1995). They performed experiments that showed that black college students performed worse on standardized tests than their white peers when they were reminded, before taking the tests, that their racial group tends to do poorly on such exams. When their race was not emphasized, however, black students performed similarly to their white peers. (Sparks, 2015).

Undergraduate Medical Education (UME). Also, know more commonly as medical school. The first two years of UME are primarily spent in a classroom setting where students study basic sciences. During the third and fourth, students spend much of their time learning clinical skills in patient care delivery settings. (Association of American Medical Colleges, 2020)

Underrepresented in Medicine (UIM). After 2003, an enhanced definition of the same concept emerged: Underrepresented in Medicine (UIM). Underrepresented in Medicine refers to racial and ethnic populations underrepresented in the medical profession relative to their numbers in the general population. (Association of American Medical Colleges, 2018).

Underrepresented Minority (URM). URM in medicine referred to Blacks, Mexican Americans, Native Americans (American Indians, Alaska Natives, and Native Hawaiians), and mainland Puerto Ricans before 2003 (Association of American Medical Colleges, 2018).

Chapter 2: Literature Review

Introduction

This literature review serves as the foundation for establishing the importance of this study. To address the outlined research questions, it is first critical to summarize current research that explains the impact of ST perception among medical students within medical education. Next, the literature review's focus will examine the internal protective measures (grit, adaptive coping, and maladaptive coping) and explain how they relate to reducing the perception of ST. Finally, select sociodemographic factors contributing to ST and internal protective measures in medical students are outlined.

The Impact of Stereotype Threat in Educational Settings

At all levels of education, ST has potentially affected the achievement gap in performance between racial/ethnic groups (Baker et al., 2019; Schmader et al., 2008). ST has had a negative impact on students and has led to devalued social identities on performance, engagement, sense of belonging, and self-control (Baker et al., 2019; Inzlicht & Schmader, 2011). Schmader (2010) noted that individuals who experience ST typically work the hardest to succeed. The derailment of focus transitioned into hypersensitivity, feeling inadequate or feeling inferior contribute significantly to decreased academic performance. With the most prevalent effect on the working memory, physiological evidence such as this confirmed that when the most vulnerable individuals are exposed to ST, their performance skills are affected negatively due to these cognitive processes (Schmader, 2010; Schmader et al., 2008).

Schmader (2010) has noted that students who have experienced ST have a sense of uncertainty about their abilities in the field that they are interested in, and because they are determined to excel in that particular field, they expend extra energy trying to avoid confirming

these stereotypes. When completing academic tasks related to their area of interest, the heightened awareness of not wanting to confirm ST takes over the part of the brain needed to do well with challenging cognitive tasks. This results in the poorest or decreased performance trying to be avoided (Schmader, 2010). A further consequence of this occurrence is increased anxiety levels of affected individuals who do not want to be linked to the negative stereotypes; again, resulting in more hindrance of their performance and related brain functioning (Baker et al., 2019).

Individuals most vulnerable to ST are those who most devote themselves to doing well in their field and invest the most energy in trying not to confirm negative stereotypes. They are the ones that are more likely to experience poor performance and feelings of inferiority compared to stereotypically superior groups (Schmader, 2010). This finding is supported by Schrader's (2010) studies in which the URM students who had been identified as those with the most dedicated to succeeding in a specific domain had higher error-related negativity (ERN) amplitudes when informed their intelligence was being evaluated. ERN is associated with initiating activation of the frontal, cingulate cortex, a region of the brain involved in detecting when behavior conflicts with objectives (Schmader, 2010). Physiological evidence such as this confirmed that when the most vulnerable individuals are exposed to ST, their performance skills are compromised due to these cognitive processes.

Aronson and Inzlicht (2004) conducted a study to examine the impact of ST in the undergraduate education setting, examining whether ST impacted African American students' academic confidence. The study results showed that African American students who have experiences of ST underestimate their academic ability; however, they also doubt their knowledge and competence due to societal categorized association identity (Aronson & Inzlicht,

2004). Cheng and Demyn conducted another study (2007) focused on a group of ethnically diverse teachers and their beliefs regarding Asian, Black, and White students. One hundred eighty-eight teachers collectively from over one hundred sixty schools in Southern California were asked to list traits that best described each of these student groups. The results suggested a generally positive Asian stereotype that corresponds with the "model minority" image. This model suggests that Asian Americans are intellectually and academically strong than other racial groups (Nguyen et al., 2019). The results for Black and White students contained both strongly negative and strongly positive associations, respectively (Chang & Demyan, 2007). These findings suggested that a teacher's beliefs about a certain race or group of students still held stereotypical beliefs about their students. Whether the belief is positive or negative, it is still a categorical prejudgment that confirmed the justification for a student's perception of their risk for being stereotyped.

Factors that Contribute to High Stereotype Threat Vulnerability in Medical Education

Group identity. Gomez and Wright (2014) conducted a study with orthopedic residents exploring ST and how negative stereotypes associated with group identity can interfere with academic achievement. The purpose of this study was to determine if a single orientation session could reduce ST for orthopedic residents. The study looked at orthopedic residents who received two sessions of group orientation focused on their possible responses to poor performance in teaching rounds versus the operating room to reduce ST (Gomez & Wright, 2014). Results indicated that women and URM residents experience low self-esteem following perceived poor performance, mainly while doing clinical rounds (in-patient visits) with their supervising physician. Gomez and Wright (2014) concluded in their final discussion that future research would need to consider longer-term intervention as possible ways to reduce perceived poor

performance at clinical rounds and in the operating room. The study noted that, in a challenging clinical orthopedic surgery program, ST potentially jeopardized students' performance and affected their aspirations (Gomez and Wright, 2014). The longstanding under-representation of women and minorities in orthopedic residency programs sets the stage for potential ST vulnerability. In their final discussions, Gomez and Wright (2014) noted that simple interventions, such as sharing negative learning experiences, can reduce ST. The purpose of the study was to evaluate a simple orientation to reduce ST in an orthopedic surgery residency program by enhanced positive attitudes toward learning. Although this study focused on the response itself, rather than the source and solution for ST amongst graduate medical residents, it gives us a concrete indication that ST was present in the clinical setting, and intervention to reduce ST could be a substantial future effort of ST great need.

Medical education learning environment. Bullock et al. (2020) provided an extensive background of ST within medical education, noting that an equitable learning environment contributed to success, but students from racial/ethnic underrepresented groups likely faced additional pressures than the norm for medical students universally. African American, Latinx, Native, and other non-majority racial/ethnic groups faced additional challenges that disproportionately and negatively affected their performance, including supervisor biases, possibly inadequate prior academic training, and ST (Beagan, 2005; Brosnan et al., 2016; Bullock et al., 2019; Steger-Jager et al., 2012; Teherani et al., 2018). The presence of ST is induced by the individual's perception but also context-dependent; therefore, it is imperative to understand the aspects of the medical education learning environment that trigger ST in medical students.

Bullock et al. (2016) conducted a study, prompted by missing research available on ST experiences specifically by race/ethnicity, surveying over 600 fourth-year medical students from various institutions. The results indicated that underrepresented minority students had higher racial/ethnic ST rates than non-minority students (55.7% versus 10.9%). Medical students with higher ST were awarded fewer honors grades. To further explore a possible relationship between these grade disparities, racial/ethnic identity, and ST, Bullock et al. (2020) conducted an additional study to determine the prevalence of ST stratified by medical student race/ethnicity and explore student experiences of ST during clinical rotations. The results for this study concluded that 28% (of which were 82% Black, 45% Asian, 43% Latinx, and 4% White students) of 184 respondents across two medical schools had a high vulnerability to ST. Eighteen medical students who had a high vulnerability to ST completed an interview in which interviewees across institutions consistently described ST as being influenced both by the internal and external environment, rather than a "static fear of stereotype."

From the work of Bullock et al. (2020), the Clerkship Student Stereotype Threat Model was developed, which explains ST into three stages: (1) Triggering: participants described how standing out because of their race/ethnicity, previous experiences, or microaggressions caused them to experience the workplace through a colored lens of race/ethnicity, triggering ST. (2) Internal dialogue: students spent substantial energy processing these triggering events. Their internal dialogue about navigating racially/ethnically charged events and power dynamics in the environment interfered with clinical learning. (3) Response: students described how they responded and coped with withstanding threats during their clerkships. While responses to these experiences varied, a consistent theme reported was that students rarely confronted triggers directly. They reported that when patients and providers sometimes served as support or

advocates, it helped decrease students' ST. Returning to the notion of URM representation, it is necessary to increase URM at all levels of the medical pathway, train authority positions in the learning environment to respond to microaggressions and avoid being a source, and train all institution community members as allies (Bullock et al., 2020).

Lack of URM faculty representation for URM medical students. Along with implicit prejudices and ST, minorities also face experiences of marginalization, internalized bias, microaggressions, and racism (Ackerman-Barger et al., 2016). Ackerman-Barger et al. (2015) emphasize the lack of minority representation in the field and contend that most physician faculty who teach medical students do not identify as a URM and do not understand how to support the underrepresented students accepted into their programs. Lack of URM representation in faculty is one explanation of why racial stereotypes can trigger emotion, but more information is needed to understand the impact on learning and performance. Orem et al. (2013) found that URM students, in general, "have experienced less supportive and less positive learning environments and have been more likely to perceive that their race negatively affected their medical school experience" (p. 1769).

Faculty have impacted the mitigation of ST and academic achievement of medical students, highlighting factors such as shared identity and a culturally compassionate learning climate (Ackerman-Barger et al., 2015). Faculty members have influenced the learning experience for all students, but for minority students, an educator who affirms their individuality and values may have been the difference between success and failure (Webber et al., 2013). Previous research indicated that when there are increased student-faculty interactions, mentoring, access to resources, and positive self-efficacy with students and faculty being able to identify with one another, there are both positive outcomes for faculty members and students (Collins et

al., 2017; Daniels et al., 2016; Dyer-Barr, 2010; Espinosa, 2011; Fleming et al., 2013; Webber et al., 2013). The pathway to increase and retain URM medical students also continues to contribute to diversifying graduate residency programs and attending physicians or academic medicine faculty--yet another reason why mitigation of ST for URM retention is so vital to the future of medicine (Rodriguez et al., 2014).

Impact of Internal Factors Affecting Stereotype Threat

Factors that potentially increase ST presence. Pennington et al. (2016) summarized individuals' internal risk factors (initially introduced by Aronson (2002)) that contributed to ST vulnerability and related underperformance include: domain identification, group identification, stigma consciousness, acceptance of stereotype, and beliefs about intelligence. Domain identification refers to underperformance relating to ST that is more prevalent to those that care most about being a high achiever; therefore, the more one cares about achievement, the more susceptible one is to ST. Group identification was summarized as the more people feel an attachment to group identity (such as ethnicity or gender), the more at risk for having perceived ST. Stigma consciousness is awareness of the stereotypes associated with an individual's associated group. With the acceptance of stereotypes, an individual feels some part of the stereotype is true. Lastly, beliefs of intelligence are an individuals' conclusion on whether intelligence can be expanded with hard work, as opposed to the notion that a person is either smart or not smart. Although there has been no proven research on the sure prevention of ST, individuals may use coping mechanisms to shield themselves from "stereotype-dense environments of most integrated schools" (Aronson, 2002, p. 289). People can unconsciously cope with threats to self without awareness that it is working, rationalizing, minimizing, and attempting to neutralize threats to self (Aronson, 2002; Gilbert et al., 1998; Steele, 2010). This

also applies to coping defenses with ST, where the result can be positive or harmful in the interim and long-term (Aronson, 2002; Inzlicht & Kang, 2010; Steele & Aronson, 1995).

Grit

Grit is a concept that has been highly popularized within education by New York teacher Angela Duckworth (Duckworth et al., 2007). Duckworth et al. (2007) defined grit as "perseverance and passion for long-term goals" and state that grit "entails working strenuously toward challenges, maintaining effort and interest over the years despite failure, adversity, and plateaus in progress" (p.1087). Duckworth's (2007) research interest focused on learning from a motivational and psychological view instead of a metric-driven measurement, typically dictated by standardized testing. Duckworth stated, "Grit is not just having resilience in the face of failure, but also having deep commitments that you remain loyal to over many years" (Hochanadel & Finamore, 2015, p. 47). Duckworth conducted various studies to determine what grit is and how it affects perseverance and resilience.

Shih and Maroongroge (2017) discussed the implications of grit in assessing medical school or residency candidates by applying parallel insights from a research study in graduate medical education (Salles et al., 2014). They noted limitations to what metrics can predict in terms of success in medical school and that grit could reduce burnout rates and increase well-being for learners in the healthcare profession. Placing a high value on academic metrics is a common practice in medical education. A study by Roberstson-Kraf and Duckworth (2017) confirmed the same concept related to retention. Their study looked at "novice" teachers—those who scored higher on a measure of grit outperformed their peers and were less likely to leave the classroom midyear. These results highlighted grit as not only a tactic of survival but a direct indicator of retention. Grit has been found to predict retention more strongly than other related

predictive factors such as intelligence, personality, job tenure, and certain sociodemographic variables, including years of educational background and academic goal motivation (Eskreis-Winkler et al., 2014). Swanson (2004) reported that nationally, 25% of students drop out of school before earning their high school diplomas, and dropout among students from disadvantaged minority backgrounds was twice that.

Morton and Paul (2019) provided insight on how grit can help mitigate ST in minorities and women in the science, technology, engineering, and medicine (STEM) fields. Due to existing prejudice towards these identity groups within the field, they simply run out of willpower at higher rates. When circumstances in these environments constantly create the need to "over-effort" performance for those affected by ST, it can become counterproductive. Morton and Paul (2019) went on further to note how the presence of grit can mitigate the need to “over-effort” because an individual has more confidence that they belong. They can successfully work through difficulties and setbacks as they occur. As the research of Angela Duckworth revealed, fostering a stronger sense of control and grit, a growth mindset may also help to lessen student anxieties rooted in ST (Hochanadel and Finamore, 2015).

Adaptive Coping

Adaptive coping is an internal mechanism an individual may use to deal with stressful situations that focus on seeking available support and finding solutions that can be used to problem-solve (Mahmoud et al., 2012). Alter et al. (2010) looked at the concept of inner insecurities of an individual being perceived or reframed as a "threat" vs. a "challenge" related to academic performance, ST, and adaptive coping. To test the concept, researchers provided participants with one of two surveys. In examining the URM participants and those from a lower socioeconomic status (SES), they found the threat questionnaire participants were stress-induced

and performed worse. Those who took the challenge questionnaire engaged in a more motivational attitude and an adaptive stress-coping mechanism, resulting in a better performance.

In a comprehensive review of psychological mediators in ST research, Pennington et al. (2016) illustrated that individuals susceptible to ST might "underpin the effects of ST on performance" with mediating variables (p. 3). In line with the rigor of the medical education environment, the review (Pennington et al.,2016) supported that ST effects tend to surface in situations of great difficulty and demands. Reactions to these demands are contingent on the individual's internal coping mechanisms, adaptive being one factor (Pennington et al.,2016).

In the medical field, a stressful environment by nature, ST can create an additional need for psychological navigation for minorities. Mendes and Jamison (2012) noted that an adaptive stress response is associated with “approach-oriented motivation and challenge assessments” (p.55). An adaptive coping response to ST would be characterized by a sympathetic reaction in which improved performance, especially on tasks that benefit from effort and resiliency, would be expected. Therefore, if ST occurs, this might result in a shift to higher perceived demands for the individual, and a psychological threat state consistent with ST would occur (Mendes & Jamison, 2012).

Adaptive coping can potentially mitigate ST. The burden and stress of ST can be conditional or situational, meaning it is induced by features of the situation that can be changed and minimized by equipping learners’ adaptive ways of coping with it (Aronson, 2002; Steele, 2010). Inzlicht and Kang (2010) noted that ST could be categorized as a stressor, and therefore people can utilize coping. Adaptive coping, over time, can lead to the development of resiliency or grit as learned cognitive behavior, conditioning responses to difficulty in a fruitful way (Pennington et al., 2016).

Maladaptive Coping

Maladaptive coping is an internal factor that can usually outwardly display disconnection or withdrawal when facing stress or negative impact. Rather than engaging and attempting success, maladaptive coping typically results in a further setback in performance due to disengagement (Aronson, 2020). Mahmoud et al. (2012) noted that although individuals can improve their adaptive coping strategies across their life span, young adults more often utilize maladaptive coping strategies. Maladaptive coping can create other negative behavior patterns such as aggression, poor dietary decisions, bad decision making, and poor self-care, sometimes resulting in confirming stereotypes (Inzlicht & Kang, 2010). ST can take a toll on self-control to mitigate these patterns as it is a form of stress that has a build-up of negative experiences over time. Some common examples of maladaptive coping mechanisms included self-distraction, denial, rumination, avoidance, suppression, anger, development of an eating disorder, venting negative emotion, substance use, behavioral disengagement, and self-blame (Aronson, 2002; Mahmoud et al., 2012; Moritz et al., 2016).

Aronson (2002) summarized self-defeating defenses of coping when performance and belonging are threatened, noting that these maladaptive methods can have lasting harmful effects. The utilization of self-handicapping attempts to minimize the implications of low performance by claiming that an external factor affected them. For example, "I didn't get any sleep last night" or by actually creating a performance issue to blame (for example, getting intoxicated before an exam) (Aronson, 2020, p. 290). Another maladaptive coping defense in relation to ST is an avoidance of challenge, in which an individual will arrange things intentionally, so there is a lesser amount of risk to confirm the/a stereotype by selecting a "safer" option instead of a challenge. The method of self-suppression occurs when an individual

suppresses their true self by adjusting certain aspects of themselves to fit an image of those who seem to belong to avoid alignment or confirmation of a stereotype. Lastly, individuals can disidentify themselves from the threatened domain by devaluing it and eventually losing an internal connection. When ST arises in situations, maladaptive coping strategies can result in lower satisfaction levels, higher levels of negative thinking, and additional barriers to academic achievement (Aronson, 2002; Mahmoud et al., 2012).

Sociodemographics and Stereotype Threat

Sociodemographic variables are broad characteristics of people. Sociodemographic is of, relating to, or involving a combination of social and demographic factors (GESIS - Leibniz Institute for the Social Sciences, n.d.). Social factors are characteristics of people and groups influencing one another through things such as culture, social class, reference groups, and family (Lamb, L., n.d.). Demographic factors are used to define the characteristics of a person, for example, race, age, gender, income, marital status, educational level, and others (Hayes, 2021).

Racial and Ethnic Identity

According to Steele and Aronson (1995), ST differentially affected students who are racial/ethnic minorities. For example, as Black, Latinx, and Asian college students are adjusting to higher education institutions in which they are categorized as a minority population, research showed they universally face racial stereotyping and microaggressions (Baker et al., 2019). Some challenges Black and Latinx students have faced that increase their ST vulnerability is being less academically prepared than their peers, not fitting into the college environment, or feeling like they do not belong in specific majors/programs (Baker et al., 2019; Steele, 2010). Asian students have also been shown to experience negative stereotypes related to racial/ethnic identity, emphasizing being always seen as a foreigner or a model/inferior minority (Baker et al.,

2019; Museus & Park, 2015). An adverse racial climate that involves discrimination and stereotypes based on race/ethnicity can be damaging to an individual's integration into an academic environment create additional stress, a phenomenon Steele (1997) linked directly to ST impaired academic performance.

ST has been shown to contribute to low performance among URM individuals because of pressures created by negative stereotypes about their racial group (Bullock et al., 2020; Pennington et al., 2016; Steele & Aronson, 1995). In medical school, URM learners face additional pressure more disproportionately than majority groups that contribute to the presence of ST due to other societal negative race associated phenomena such as supervisor bias and possibly inadequate academic foundations (Bullock et al., 2020). In general, academic achievement and race have been strongly connected to ST vulnerability (Pennington et al., 2016). URM students bear an additional cognitive and emotional burden that comes to fruition in the form of "performance-disruption, apprehension, and anxiety about confirming inferiority that stems from racial stereotypes" (Aronson et al., 2002, p. 114). Similarly, URM students in medical education who face stereotypes relating to intelligence and academic ability can be at a more significant disadvantage for achieving academic success and remaining in medical school (Began, 2005).

Students who identify as Black, Hispanic/Latinx, Native American, and other non-White/Asian racial/ethnic groups have been significantly underrepresented among undergraduate students as a whole and even more so in STEM majors that include pre-medical students (Cromley et al., 2013). In examining the URM STEM majors drop-out rate, "one possible explanation that has been offered for these patterns is racial ST – the idea that URMs worry so much about disconfirming a negative stereotype about their race in STEM courses or majors that

this affects their grades in STEM courses and/or willingness to remain in a STEM major" (Cromley et al., 203, p. 249). As mentioned previously, when a student identifies with a racial group sparsely represented, the racial climate makes it challenging for a student to integrate fully into the academic environment and the system structures that exist, such as asking for a race indication on an exam can induce immediate ST and undermine the performance of URM students (Aronson et al., 2002; Baker et al., 2019; Steele, 1997).

Gender

Steele and Aronson (1995) examined gender differences in math achievement and test performance, concluding that women significantly disidentified themselves with math, producing low confidence and self-esteem within the math domain. This psychological factor of ST may influence women's participation in related math academic activities and professions (Spencer et al., 1999). Pennington and Heim (2016) conducted a multi-part study, one of which focused on creating a critical mass that eliminates the effects of ST on women's math performance. This study looked at whether being a part of a heightened "in-group" would reduce the effects of ST on women's academic performance in math. The study investigated whether single-sex (separating male and female students taking the test) environments and ST influenced participants to believe that their academic ability was a "fixed mindset" rather than an attribute that could be developed, referred to as growth mindset in the study. One hundred sixty-four participants were assigned randomly to a "self-as-target or group-as-target ST condition or a control condition" (Pennington & Heim, 2016, p. 359). The results showed that participants solved fewer mathematical problems under self-as-target and group-as-target ST when tested alone. However, the performance deficits were eliminated when they were tested in groups separated by gender (Pennington & Heim, 2016). The study (Pennington & Heim, 2016)

concluded that a critical mass positively contributed to women's academic performance. Therefore, an environment in which peers have shared identity resulted in learners feeling less vulnerable to ST and performing academically at an optimal level (Pennington et al., 2016; Pennington & Heim, 2016).

Sunny et al. (2016) also conducted a study on ST and gender differences, focused on a freshman chemistry course, which was considered a gatekeeper course for aspiring medical school students. It is a standard medical school prerequisite. The study examined the impact of ST on gender differences in chemistry achievement, self-efficacy, and test anxiety using a 4-group, quasi-experimental design. One hundred fifty-three participants were selected who were entry-level/first-year college chemistry students. The students were randomly assigned to 1 of 4 ST conditions. Results concluded that there were no gender differences related to ST condition, but overall, males had higher self-efficacy and lower test anxiety than the women (Sunny et al., 2016). Some significant considerations related to gender were the narratives uncovered by open-ended questions: asking students about their intent to major, beliefs regarding barriers to their achievement, and gender differences in perceived available opportunities and mental capacity to achieve in chemistry. Therefore, although women had an equivalent ability, the physiological effects due to ST likely caused them to disidentify themselves with achievement in chemistry. As mentioned previously, a belief such as this can have adverse short-term and long-term effects on performance in the domain (Aronson, 2002). Most ST research related to gender focuses on adverse effects on female learners. Therefore, a future area to explore would be adverse effects on male, non-binary, or transgender learners.

Family Income and Parent Education

Two proven interrelated factors contributing to ST vulnerability and negatively affect diversity in medicine are family income/socio-economic status (SES) and an individual's parent education (Aronson, 2002; Grbic et al., 2010; Spencer et al.,1998). SES does not just include financial income (also educational attainment and perceptions of social class status), but income has the most significant impact on SES (Aikens & Barbarin, 2008). ST vulnerability increases for those with the intersectionality of marginalized race/ethnicity with gender, sexual orientation, and class identities (Bullock et al., 2020). In a mixed-methods study by Bullock et al. (2020), a medical student recounted being triggered by what would be considered a seemly innocent conversation about the weekend, which turned into feelings of being out of place: "Attendings talk about skiing, golfing, all these things … I just can't relate to it, because I didn't grow up doing any of that."

There is a disproportionate skew in the populace of medical education students coming from middle and upper-income families (Grbic, Garrison & Jolly, 2010; Talamantes et al., 2019). Some low-income families may not have found the field of medicine as a potential career choice due to the high cost and length of training and education (Grbic, Garrison & Jolly, 2010). Also, the likelihood of obtaining a large education debt for medical school is extremely high, and many members from disadvantaged backgrounds may have felt discouraged. Those who identify with these situations but do make it to medical school harbor these differences internally, contributing to their ST vulnerability (Grbic, Garrison & Jolly, 2010).

In the U.S., there are significant disparities between the parental educational profiles of various racial and ethnic groups, which statically affect the educational outcomes of their children (Talamantes et al., 2019). The levels of education of parents of African American/Black

and Latinx medical students are significantly lower than those of Asians and Whites (Grbic et al., 2010). This data suggests that some URM students attending medical schools likely come from families of higher-income backgrounds. Additionally, parents of medical students are likely to have higher levels of education, including graduate education, than are the parents of non-medical students. Therefore, this is another possible divide and insecurity that can contribute to ST in URM students in the medical education environment.

McKay et al. (2003) examined whether a set of sociodemographic variables and ST could explain African American and White differences in cognitive ability test performance. In the study, demographics like income, parental education, etc., were compared to their level of ST, measured by the Posttest Attitude Survey (PAS). The study results showed a positive correlation between racial disparities contributing to ST among African American and White differences in cognitive ability test performance. "Individuals from high-income households earn higher IQ scores than their low-income counterparts (McKay et al., 2003, p.3). This finding corresponds with the exploration in this study of sociodemographic factors that can impact ST.

Academic Metrics

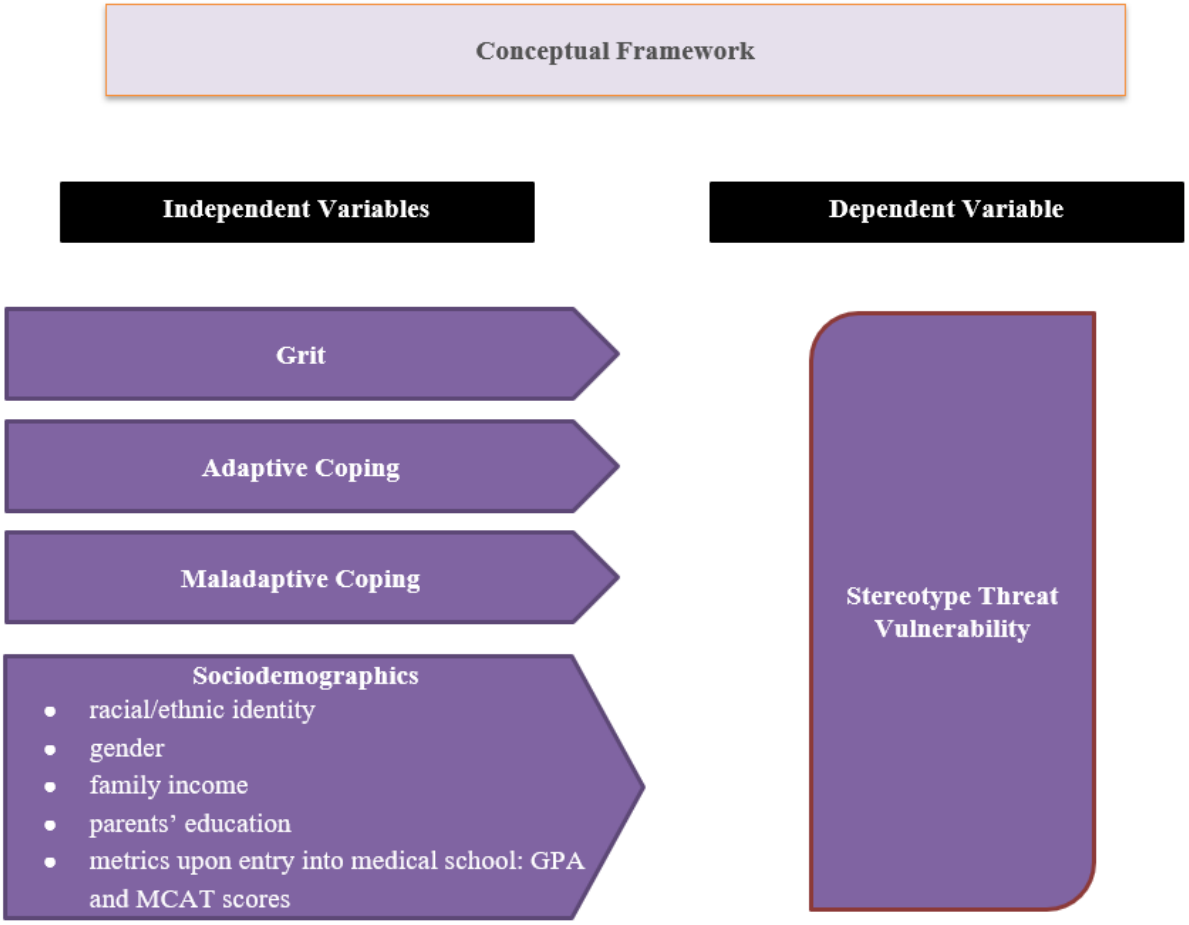
Burgess et al. (2010) noted that one of the barriers to increasing the number of URM physicians in the U.S. is the Medical College Admissions Test (MCAT) because they tend to score lower than non-URMs. Even more disparaging, the MCAT is a predictor of performance on their Step One national board exam (United States Medical Licensing Exam (USMLE)), therefore based on ST theory (Steele, 1997), many URMs are vulnerable to ST as soon as they enter medical school. According to the American Medical Association (2016), URM medical students are three to five times as likely to need an extra year to finish medical school and fail national board exams on their first sitting. This factor contributes an 88% retention rate for

underrepresented minorities compared to 97% for all students. Aronson et al. (2002) came to a similar conclusion related to ST and GPA. In essence, the higher the metric achievement, the greater the identity with academics and lower vulnerability for ST (and vice versa with lower metrics, lower identity, and higher ST). The phenomenon of ST is a barrier to realizing equal educational achievement because it debilitates the belief that knowledge and academic skills can be enhanced and realized (Pennington et al., 2016).

Conceptual Framework

The conceptual framework in this research study will examine if internal protective mechanisms influence the level of vulnerability to ST. Pennington et al. (2016) provide an overview of ST, in which they state ST can affect "anyone who is a member of a group to which a negative stereotype threat applies" (p.2). Depending on the implied notion of the ST per the affected group, the damage can vary in relevance to achievement and prosperous opportunities. As a situational phenomenon, over three hundred experiments have been conducted on the effects of ST and many different populations (Inzlicht et al., 2012; Pennington et al. (2016)). In this study, the dependent variable is ST vulnerability. The independent variables are grit, adaptive and maladaptive coping, and the sociodemographics of medical students in the sample. The research study used a quantitative methodology. A summary of the conceptual model for the current research study is illustrated in Figure 1below.

Figure 1: Conceptual Framework



Based on the conceptual framework, the following main research objectives were developed: 1) identify coping and vulnerability factors in URM medical students as it relates to the experience of ST and examine if protective factors affect experiences with ST in medical students; and 2) evaluate whether different protective factors are present in racial/ethnic minority medical student populations. These topics directly relate to the proposed research questions related to the impact of protective factors on the experiences of ST. The ability to thrive in an environment where one is a minority may require additional internal tools to achieve success, indicating that further development of self-perception is essential for retention and academic achievement (Aronson, 2002; University College London, 2008).

Research Questions

This study seeks to explore if grit, adaptive coping, maladaptive coping, and sociodemographics (racial/ethnic identity, gender, family income, parent education, GPA, and MCAT) have relationships with ST vulnerability. The following research questions were directed towards the investigation of this topic.

Research Questions

1. Do the internal protective measures of grit, adaptive coping, and maladaptive coping affect ST in medical students?
2. Do the internal protective measures of grit, adaptive coping, and maladaptive coping affect ST more than the others in medical students?
3. Do sociodemographics (racial/ethnic identity, gender, family income, parent education, GPA, and MCAT) have a significant relationship to internal protective measures of grit, adaptive coping, and maladaptive coping?
4. Do sociodemographics (racial/ethnic identity, gender, family income, parent education, GPA, and MCAT) have a significant relationship with the stereotype threat?

Hypotheses

Based on previous ST related research, the following hypotheses for research question 1 were proposed:

- Hypothesis 1: H_a: Participants with high levels of grit will have a low level of ST vulnerability. H_0: There is no relationship between grit and ST vulnerability.
- Hypothesis 2: H_a: Participants with high levels of adaptive coping will have a low level of ST vulnerability. H_0: There is no relationship between adaptive coping and ST vulnerability.

- Hypothesis 3: H_a: Participants with low levels of maladaptive coping will have a low level of ST vulnerability. H_0: There is no relationship between maladaptive coping and ST vulnerability.

Based on previous ST related research, the following hypotheses for research question 2 were proposed:

- Hypothesis 4: H_a: The internal protective measure of grit will affect ST more than adaptive coping and maladaptive coping. H_0: Grit will not have a more significant relationship with ST than adaptive coping and maladaptive coping.
- Hypothesis 5: H_a: The internal protective measure of adaptive coping will not affect ST more than maladaptive coping and grit. H_0: Adaptive coping will not have a significant relationship with ST.
- Hypothesis 6: H_a: The internal protective measure of maladaptive coping will not affect ST more than adaptive coping and grit. H_0: Maladaptive coping will not have a significant relationship with ST.

Based on previous ST related research, the following hypotheses for research question 3 were proposed:

- Hypothesis 7: H_a: Racial/ethnic identity will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. H_0: Racial/ethnic identity will not have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping.
- Hypothesis 8: H_a: Gender will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. H_0: Gender will not

have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping.

- Hypothesis 9: H_a: Family income will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. H_0: Family income will not have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping.
- Hypothesis 10: H_a: Parent education will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. H_0: Parent education will not have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping.
- Hypothesis 11: H_a: GPA will have a significant relationship to the internal protective measures of grit, adaptive coping, and maladaptive coping. H_0: GPA will not have a significant relationship to the internal protective measures of grit, adaptive coping, and maladaptive coping.
- Hypothesis 12: H_a: MCAT score will have a significant relationship to the internal protective measures of grit, adaptive coping, and maladaptive coping. H_0: MCAT score will not have a significant relationship to the internal protective measures of grit, adaptive coping, and maladaptive coping.

Based on previous ST related research, the following hypotheses for research question 4 were proposed:

- Hypothesis 13: H_a: Racial/ethnic identity will have a significant mean difference to ST. H_0: Racial/ethnic identity will not have a significant mean difference to ST

- Hypothesis 14: H_a: Gender will have a significant mean difference to ST. H_0: Gender will not have a significant mean difference to ST
- Hypothesis 15: H_a: Family income will have a significant mean difference to ST. H_0: Family income will not have a significant mean difference to ST.
- Hypothesis 16: H_a: Parent education will have a significant mean difference to ST. H_0: Parent education will not have a significant mean difference to ST.
- Hypothesis 17: H_a: GPA will have a significant relationship to ST. H_0: GPA will not have a significant relationship to ST.
- Hypothesis 18: H_a: MCAT will have a significant relationship to ST. H_0: MCAT will not have a significant relationship to ST.

Chapter 3: Methodology

Participants

A quantitative research study was conducted to examine the impact of grit, adaptive and maladaptive coping, and sociodemographics on ST in medical students. A power analysis was conducted to determine the appropriate sample size for the reliability of the analysis. Four hundred and sixty-four medical students at a northwest school of medicine were invited to take an online, self-administered, self-paced survey. Only participants enrolled at the sponsoring research institution were eligible to complete the survey from August 26, 2019 to November 15, 2019 and April 19, 2021 to May 15, 2021. This study was focused on medical students within a singular northwest United States school of medicine only, and the probability method of convenience sampling was utilized.

Instruments

In this quantitative investigation, medical students were invited to take a 4-part online questionnaire consisting of sixty-one items total, including consent, the Grit Scale, the Brief COPE Inventory, the Stereotype Vulnerability Scale, and prompts related to participants' sociodemographics focused on addressing the research questions in this study. An informed consent statement outlining the description, purpose, risks for the participants was provided to each potential subject. For survey administration, the medical school's student leadership members were recruited as volunteers to send the inquiry for participation out on the student-only listserve; volunteers were not required or coerced to participate in the study themselves. The involvement of student leaders was intentional, so prospective participants would not feel they could be penalized or retaliated against from the school if they did not wish to complete the

survey or completed it in a way that may portray the school in an unfavorable light. Also, due to the researcher's positionality, this distribution method provided an extra level of confidentiality and privacy for the target population.

Grit Scale

To measure grit, Duckworth et al. (2007) created a 12-item scale focused on two traits, grit and self-control. The Grit Scale, used for the current research study, measured the consistency of interest and the perseverance of effort by utilizing a Likert-type scale with responses ranking from 1= "very much like me" to 5= “not much like me at all.” The scale was designed and validated by a series of six research studies (Duckworth et al., 2007). In each of the studies, grit consistently showcased self-regulation, self-discipline, goal orientation, and other constructs related to the notion that grit can be taught and tends to evolve (Peterson & Seligman, 2004). Studies 1 and 2 found that gritter individuals who achieve higher education levels were older and made few career changes. In Study 3, undergraduate students who had high grit levels earned higher GPAs, despite entering college with lower SAT scores, than their peers with the same GPA. In Studies 4 and 5, grit was a better predictor of retention at a military summer program. In Study 6, gritter competitors in a national spelling bee did better than their peers of the same age. Collectively, the research of Duckworth et al. (2007) signifies grit as the general quality of high achievers, consisting of a strong interest in that field, the desire to reach a high level of achievement, and the willingness to put in the effort.

Grit can predict achievement in challenging spheres, such as medical education, beyond measures of talent or skills (Duckworth & Quinn, 2009). In a study by Strayhorn (2013), the Grit Scale was utilized to examine if grit was a factor in the academic success of black males at predominantly white institutions. The results indicated that high grit was moderately predictive

of black males' academic achievement (determined by GPA) and an indication that the more grit a student had, the higher their incoming high school GPA and SAT scores were. Additionally, it was noted that high grit results were consistent with the notion that consistency of effort toward long-term goals and the passion to pursues those goals over time matters most to achieving academically (Duckworth & Quinn, 2009; Strayhorn, 2013).

Brief COPE Inventory

The Brief COPE (Coping Orientation to Problems Experienced) Inventory (Carver, 1997) used for the current research study is a multidimensional coping inventory to assess the different ways in which people respond to stress. It is an abbreviated version of the initial COPE inventory (Carver et al., 1989) with a total of fourteen subscales composed of two items each, totaling 28 questions. Carver (1997) classified the personal strategies as emotion-focused (acceptance, emotional, social support, humor, positive reframing, and religion), productive strategies as problem-focused (active coping, instrumental support, and planning), and negative strategies as dysfunctional (behavioral disengagement, denial, self-distraction, self-blaming, and substance use), and then further sorted the strategies into adaptive coping or maladaptive coping (Garcia et al., 2018). The Brief COPE was created to reduce the length and redundancy from the original COPE and was validated based on a study with Hurricane Andrew survivors (Carver, 1997). The psychometric factors of the Brief COPE were conducted by explanatory analysis by Carver (1997). The Brief COPE Inventory is one of the most validated and used measurement tools to determine coping strategies (Garcia et al., 2018).

Stereotype Threat Vulnerability Scale

ST vulnerability is the examination of how the unique experiences of learners contribute to the susceptibility of experiences of ST. (Smith & Cokley, 2016). The Stereotype Vulnerability

Scale (SVS) is a one-dimensional scale developed from Spencer's (1993) dissertation research. This measurement tool is an 8-item scale with a 7-point Likert-type response format ranging from strongly disagree to strongly agree. The goal of the Stereotype Vulnerability Scale is to measure the degree to which learners report feeling threatened by a negative ST regarding their academic success (Barnard et al., 2008). The SVS has gone on to be validated by many other research efforts. Spencer et al. (1998) initially tested for the validity of the SVS in a study examining college freshman and sophomores, utilizing gender as the grouping variable to establish configural and metric factorial invariance. This study tested the original measure, as developed by Spencer (1993), and the domain-specific revised version. Using Cronbach's alpha analysis reliability, the results indicated that the original measure had adequate internal consistency ($\alpha = .67$), and the domain-specific revealed a high internal consistency ($\alpha = .82$). Using a domain-specific version of SVS, Sparks (2015) found an overall internal consistency of $\alpha = 82$. The scores obtained from the domain-specific version of SVS in the sample were Domain 1 ($\alpha = 0.86$) and Domain 2 ($\alpha = 0.68$). Spencer et al. (1998) also concluded an internal consistency of $\alpha = 82$ on their domain-specific topic mathematics.

Sociodemographic Variables

Sociodemographic variables included in the survey questionnaire and used for analysis were racial/ethnic identity (nominal), gender (nominal), family income (ordinal), parents' education background (ordinal), and metrics upon entry into medical school, including GPA and MCAT scores (interval). The selection of these variables was determined by the research content available and relevance to ST based on a review of previous studies (Pennington, 2016).

Procedures

After Institutional Review Board (IRB) approval was obtained from both the sponsoring institution and the degree-awarding institution, for which this study is a partial fulfillment of a doctoral degree requirement, student leader volunteers sent out the survey invitation to all medical students enrolled at the institution. The invitation included the purpose and format of the study and a link to the survey questionnaire. Data was collected through the Qualtrics web-based program over the period from August 2019 to November 2019. Data collection was de-identified. Within the survey, participants were first required to review the research descriptions and disclosures. Participants had to review and complete the informed consent before participation. The sociodemographic-related information was the first section of the research questionnaire. Next, participants completed the Grit Scale, the Brief COPE Inventory, and finally, the Stereotype Threat Vulnerability scale. The complete survey questionnaire has sixty-one questions in total (see Appendix B). As a part of the email invitation, the researcher notified potential subjects that if they participated in the study by completing the survey, they would have the opportunity to win a $100 Amazon gift card as part of a randomized raffle. After participants completed the survey, they were asked to send proof of completion to a third-party volunteer not involved with the research study and had no conflicts of interest. After the survey closed, the volunteer randomly selected a winner for the raffle. The researcher was not involved with this process and had no knowledge of the winner to further protect all participants' privacy. Upon completion of the initial analysis, capturing responses through November 2019, it was determined that additional samples would be necessary to expand the validity and generalizability of the study based on the power analysis that was conducted to determine

reliability for analysis. Therefore, the survey tool was re-opened April 19, 2021 to May 15, 2021 utilizing the same process for data collection.

Limitations

There are several limitations to this study that should be considered. First, it is essential to recognize that the sample size is small, which may have affected the ability to test significance within some of the comparative variables. Based on the title and/or the survey description, some potential participants may have opted out because they felt they could not identify with the topic or content. Another element related to sample size to consider is that this study partially occurred during the COVID-19 pandemic, potentially contributing to low response rates due to the situation's added stress, responsibility, and adaptation to new learning modalities.

Secondly, due to the researcher's association with the sample population, there was an awareness that medical students within the institution are asked to complete many surveys related to every course they are enrolled in, the learning environment, various research efforts, etc., throughout their four years in medical school. There is often not much motivation as students only want to participate in surveys that will add value. Too often, they have expressed their frustration with taking the time to complete surveys, and little change or follow-up comes out of their responses; therefore, this factor may have deterred them from participating in the current study. In a hopeful attempt to mitigate this perspective, the researcher felt it was imperative to be open and honest regarding the intent of the survey, the possible direct outcomes or implications that could arise based on other related evidence-based research, and be upfront about who has access to the results/responses after completion of the study. Additionally, transparency regarding the researchers' positionality in relation to potential subjects was

outlined, and it was explicitly mentioned that this research is voluntary and results in no penalty for non-participation.

Thirdly, within many variable measurements, there is a tremendous potential for social desirability in which respondents may want to present a positive image of themselves and so may lie or bend the truth (McLeod, 2014). The research description encouraged participants to be open and honest about their experience, so the results could genuinely influence potential change.

Lastly, another limitation was the self-reporting of the sociodemographic information. As a de-identified, anonymous survey tool, there is no way to verify any information participants were asked to recall from their time of application to medical schools, such as academic metrics, family income, etc. Additionally, if participants left this field blank, the researcher did not have a complete data set, as metrics were critical variables in the data analysis. Incomplete data sets were discarded and not used in the analysis.

Data Analysis

To answer the research questions in the current quantitative study, a series of statistical analyses were performed in SPSS statistics software. To obtain the Grit score, the survey items in the Grit Scale were reviewed, and the twelve data points were added up and divided by twelve, resulting in the mean as the final score. This variable was named Grit score with a maximum score of 5 (extremely gritty) and a minimum score of 1 (not at all gritty) (Duckworth & Quinn, 2009). The Brief COPE scale consists of fourteen categories from twenty-eight questions. Based on the evidence that these items tend to be either generally adaptive or problematic, the scale was sorted into adaptive coping or maladaptive coping subscales (Carver, 1997; Moore et al., 2011). The adaptive subscale includes active coping, planning, positive

reframing, acceptance, humor, religion, emotional support, and instrumental support (Carver, 1997; Moore et al., 2011). The maladaptive coping subscale includes self-distraction, denial, venting, substance abuse, behavioral disengagement, and self-blame (Moore et al., 2011). For the Stereotype Vulnerability Scale (SVS), the eight items with Likert-type responses (7=strongly agree, 1=strongly disagree) were reviewed. To measure the perception of ST among medical students, a modified SVS was administered. The SVS scale was contextualized into two domains. Domain 1 included items 1,4,6, and 8, which were related to negative personal experiences. Domain 2 contains items 2, 3, 5, and 7, which focused on racial group characteristics (Carver, 1997; Smith & Cokely, 2016). Each domain had a respective total score as the final result.

To address research questions one and two, a Pearson's bivariate correlation was conducted to examine whether there is an association between each individual internal protective measures (grit, adaptive coping, and maladaptive coping) and the ST vulnerability among medical students (Domain 1 and Domain 2) and which protective measure had the strongest association. To address research question three, a one-way ANOVA was computed to evaluate the difference of groups within the categorical sociodemographics of race/ethnicity, gender, family income, and parents' education level to internal protective measures. A Pearson's bivariate correlation was used to determine the association of the numeric/continuous sociodemographics variables of GPA and MCAT to internal protective measures. For research question four, an ANOVA test was conducted to examine if there is a difference in groups within the categorical sociodemographics variables of race/ethnicity, gender, family income, and parents' education level to ST vulnerability. A Pearson's bivariate correlation was used to

determine the association of the numeric/continuous sociodemographics variables of GPA and MCAT to ST vulnerability.

Chapter 4: Results

Demographic Characteristics of the Survey Respondents

The demographic summary of the Northwest School of Medicine students who participated in the ST study is as follows. A total of one hundred two medical students were included in this study analysis. Participants identified racially/ethnically as 25.7% Caucasian, 39.2% Asian, and 33.3% URM. Categories for URM students included: African American, Hispanic/Latinx, Native American/Alaska Native, and Native Hawaiian/Pacific Islander). Participants who identified as female were 69.9%, 25.5% identified as male, and 2.9% identified as non-binary or transgender. Approximately half of the participants had a family income of less than $75,000 (56%). Related to academic metrics, 34.3% of applicants had an undergraduate GPA of 3.0 to 3.5, 65.7% of participants had a GPA of 3.5 or higher, 5.8% had an MCAT score below 500, 46% scored between 500 and 510, and 47% scored 511 through the highest possible score of 528. The average GPA for students admitted to an MD program in the US in 2020 was 3.73, and the average MCAT was 511 (AAMC, 2021); therefore, the majority of participants were consistent with national metric averages (Table 1).

Table 1: Summary Statistics of Northwest School of Medicine Survey Respondents

Variables (n=102)	Frequency	Percentages
Race/Ethnicity		
White	28	25.7%
Asian	40	39.2%
URM	34	33.3%
Gender		
Female	71	69.6%
Male	28	27.5%
Non-Binary or Transgender	3	2.9%
Expected Graduation Year		
2019	2	2%
2020	21	20.6%
2021	21	20.6%
2022	18	17.6%

Variables (n=102)	Frequency	Percentages
2023	28	27.5%
2024	12	11.8%
Family Income		
Less than $25,000	14	13.7%
$25,000-$49,999	25	24.5%
$50,000-$74,999	18	17.6%
$75,000 or more	45	44.1%
Parent 1 Education Level		
College Degree	47	47%
No College Degree	55	53.9%
Parent 2 Education Level		
College Degree	52	51%
No College Degree	49	48%
No Second Parent/Unknown/NA	1	1%
At Least 1 Parent w/College Degree	58	56.9%
No Parent w/College Degree	44	43.1%
Undergraduate GPA		
3-3.5	35	34.3%
3.6-4.0	67	65.7%
Average GPA	3.62	
MCAT Exam Score		
Below 500	6	5.8%
500-510	47	46%
511-528	48	47%
Average MCAT	510	

Findings Related to Study Research Questions

Research Question 1 and 2

Research Questions 1. Do the internal protective measures of grit, adaptive coping, and maladaptive coping affect ST in medical students?

Research Questions 2. Do the internal protective measures of grit, adaptive coping, and maladaptive coping affect ST more than the others in medical students?

A Pearson's bivariate correlation was conducted to examine if there is any association between ST and each internal protective measure: grit, adaptive coping, and maladaptive coping and which internal protect measure most affected ST. SVS Domain 1 included items 1, 4, 6, and

8 related to negative personal experiences. SVS Domain 2 includes items 2, 3, 5, and 7, focusing on racial group characteristics. Domain 1 yielded a correlation of 0.15 with grit, 0.1 with adaptive coping, and 0.06 with maladaptive coping, which indicates an overall positive relationship between the internal protective measures and ST vulnerability (Table 2). Domain 2 yielded a correlation of -0.27 with grit, -0.08 with adaptive coping, and -0.07 with maladaptive coping, reflecting a negative relationship with grit, adaptive coping, and maladaptive coping (Table 2). The overall analysis for Domain 1 (negative personal experiences) did not result in any significant correlations between ST and each of the internal protective measures. The overall analysis for Domain 2 (racial group characteristics) did show a significant correlation of <0.05 (Table 2) between ST and the internal protect measure of grit. Essentially, a grit level goes up, ST vulnerability goes down.

Furthermore, a Pearson's bivariate correlation (two-tailed) was conducted to examine if there are any significant associations between internal protective measures and each SVS survey item. As shown in Table 2, grit had significant correlations (<.05) positively associated with survey item #1 (professors expect me to do poorly in class because of my race), while negatively associating with survey items #2 (my academic success may have been easier for people of my race) and # 3 (I doubt that others would think I have less academic success because of my race). Most of the SVS survey items were not significantly associated with internal protective measures, reflecting that the overall correlational study showed a weak relationship/effect between the internal protective measures and ST in medical school.

Table 2: Pearson's Correlation: Internal Protective Measures and Stereotype Vulnerability (SVS)

SVS Survey Items	Grit		Adaptive Coping		Maladaptive Coping	
	Correlation Coefficient (r)	p-value	Correlation Coefficient (r)	p-value	Correlation Coefficient (r)	p-value
Q1	*.21**	.04	.12	.25	.14	.17
Q2	*-0.34**	<.001	.07	.52	-.08	.44
Q3	*-.23**	.02	-.13	.21	-.07	.49
Q4	.11	.28	.05	.64	.02	.83
Q5	-.18	.07	-.06	.54	-.06	.56
Q6	.15	.13	.14	.15	.00	1
Q7	-.42	.68	-.14	.18	-.01	.93
Q8	.07	.49	.04	.69	.07	.48
Domain 1	.15	.12	.1	.31	.06	.53
Domain 2	*-.27**	.007	-.08	.44	-.07	.47

**p*=<0.05 ***p*=<.001

Based on the analysis for research question one, the results concluded:

- Hypothesis 1: Participants with high levels of grit will have a low level of ST vulnerability. The null hypothesis is rejected as there was a <0.05 significant, negative correlation between grit and ST Domain 2.
- Hypothesis 2: Participants with high levels of adaptive coping will have a low level of ST vulnerability. There was no significant correlation; therefore, the null hypothesis is accepted for Domain 1 and Domain 2.
- Hypothesis 3: Participants with low levels of maladaptive coping will have a low level of ST vulnerability. There was no significant correlation; therefore, the null hypothesis is accepted for Domain 1 and Domain 2.

Based on the analysis for research question two, the results concluded

- Hypothesis 4: The internal protective measure of grit will affect ST more than adaptive coping and maladaptive coping. The null hypothesis is rejected as grit showed the closest correlation in both Domain 1 and Domain 2 compared to adaptive coping and maladaptive coping.
- Hypothesis 5: The internal protective measure of adaptive coping will not affect ST more than maladaptive coping and grit. The null hypothesis is rejected as grit showed the closest correlation in both Domain 1 and Domain 2 compared to adaptive coping and maladaptive coping.
- Hypothesis 6: The internal protective measure of maladaptive coping will not affect ST more than adaptive coping and grit. The null hypothesis is rejected as grit showed the closest correlation in both Domain 1 and Domain 2 compared to adaptive coping and maladaptive coping.

Research Question 3

Do sociodemographics (racial/ethnic identity, gender, family income, parent education, GPA, and MCAT) have a significant relationship to internal protective measures of grit, adaptive coping, and maladaptive coping?

An ANOVA analysis was computed to evaluate the mean difference between the categorical sociodemographics of race/ethnicity, gender, family income, and parent education to each internal protective measure (grit, adaptive coping, and maladaptive coping). Table 3 below shows no significant differences among medical student categorical groups (race/ethnicity, gender, family income, and parent education) and the internal protective measures of grit, adaptive coping, and maladaptive coping. Therefore, we would accept all null hypotheses for research question three related to categorical variables:

- Hypothesis 7: Racial/ethnic identity will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. The null hypothesis is accepted.
- Hypothesis 8: Gender will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. The null hypothesis is accepted.
- Hypothesis 9: Family income will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. The null hypothesis is accepted.
- Hypothesis 10: Parent education will have a significant mean difference to the internal protective measures of grit, adaptive coping, and maladaptive coping. The null hypothesis is accepted.

Table 3: ANOVA Results of Internal Protective Measures and Sociodemographics (Categorical)

Variables	Grit			Adaptive Coping			Maladaptive Coping		
	M (SD)	F	p-value	M (SD)	F	p-value	M (SD)	F	p-value
Race/Ethnicity									
White	3.72 (.59)			43.85 (6.73)			28.82 (5.32)		
Asian	3.87 (.44)	1.16	.32	44.95 (6.71)	1.24	.30	27.72 (7.25)	.39	.68
URM	3.90 (.45)			46.62 (7.39)			27.41 (6.64)		
Gender									
Female	3.87 (.48)			45.77 (7.09)			27.93 (6.63)		
Male	3.81 (.51)	.91	.41	45.25 (6.67)	.96	.39	27.93 (6.59)	.004	1
Non-Binary/Transgender	3.50 (.52)			45.22 (6.97)			27.50 (.71)		
Family Income									

Variables	Grit			Adaptive Coping			Maladaptive Coping		
	M (SD)	F	p-value	M (SD)	F	p-value	M (SD)	F	p-value
Less than $25,000	3.62 (.46)	2.57	.20	45.77 (8.56)	.04	.99	28.93 (6.26)	.28	.84
$25,000-$49,999	3.96 (.39)			44.92 (5.96)			28.52 (6.14)		
$50,000-$74,999	3.89 (.36)			45.28 (8.40)			27.22 (6.87)		
$75,000-more	3.82 (.57)			45.20 (6.60)			27.45 (6.75)		
Parental Education									
No College	3.89 (.48)	.82	.37	45.33 (7)	.18	.89	28.61 (6.95)	.88	.35
At Least 1 Parent College	3.80 (.49)			45.14 (7.00)			27.39 (6.52)		

*p=<0.05

A Pearson's bivariate correlation was used to determine if there was any relationship of the numeric/continuous sociodemographics variables of GPA and MCAT to internal protective measures (grit, adaptive coping, and maladaptive coping). Table 4 below shows no significant relationship between medical student continuous variables (MCAT and GPA) and the internal protective measures of grit, adaptive coping, and maladaptive coping. Therefore, we would accept all null hypotheses for research question three related to continuous variables:

- Hypothesis 11: GPA will have a significant relationship to the internal protective measures of grit, adaptive coping, and maladaptive coping. The null hypothesis is accepted.
- Hypothesis 12: MCAT score will have a significant relationship to the internal protective measures of grit, adaptive coping, and maladaptive coping. The null hypothesis is accepted.

Table 4: Correlation of Stereotype Threat and Sociodemographics (Numeric)

Variables	Grit			Adaptive Coping			Maladaptive Coping		
	M (SD)	r	p-value	M (SD)	r	p-value	M (SD)	r	p-value
GPA	3.62 (.28)	0.45	.65	3.62 (.28)	-.006	.95	3.62 (.28)	-.11	.27
MCAT	510.87 (6.48)	-.14	.17	510.87 (6.48)	.06	.56	510.87 (6.48)	.06	.58

*p=<0.05.

Research Questions 4

Do sociodemographics (racial/ethnic identity, gender, family income, parent education, GPA, and MCAT) have a significant relationship with the stereotype threat?

An ANOVA analysis was computed to evaluate the mean difference between the categorical sociodemographics of race/ethnicity, gender, family income, and parent education compared to ST vulnerability. The results shown in Table 5 concluded that participants differed significantly between White, Asian, and URM racial/ethnic groups with ST (Domain 1, p=<.0001; Domain 2, p=<.0001). There were also significant differences (Domain 2, p=<.05) related to family income and parent education level (Domain 1, p=<.0001; Domain 2, p=<.0001) (Table 5). Based on the analysis for research question four in relation to the categorical variables, the results concluded:

- Hypothesis 13: Racial/ethnic identity will have a significant mean difference to ST. The null hypothesis is rejected for both Domain 1 and Domain 2.
- Hypothesis 14: Gender will have a significant mean difference to ST. The null hypothesis is accepted. The null hypothesis is accepted for both Domain 1 and Domain 2.
- Hypothesis 15: Family income will have a significant mean difference to ST. The null hypothesis is accepted for Domain 1 and rejected for Domain 2.

- Hypothesis 16: Parent education will have a significant mean difference to ST. The null hypothesis is rejected for both Domain 1 and Domain 2.

Table 5: ANOVA Results of Stereotype Threat and Sociodemographics (Categorical)

Variables	Domain 1			Domain 2		
	M (SD)	F	p-value	M (SD)	F	p-value
Race/Ethnicity						
White	10.07 (5.26)	*11.73***	<.001	18.18 (5.94)	*8.65* **	<.001
Asian	14.7 (6.09)			13.4 (5.79)		
URM	17 (5.47)			12.71 (4.96)		
Gender						
Female	14.18 (6.19)	.536	.59	14.31 (5.88)	1.02	.36
Male	14.61 (6.60)			14.39 (6.34)		
Non-Binary/Transgender	10.67 (4.04)			19.33 (5.98)		
Family Income						
Less than $25,000	15.14 (6.14)	2.26	.09	13.36 (5.9)	*3.04**	.03
$25,000-$49,999	16.4 (6.22)			12.48 (5.4)		
$50,000-$74,999	14.44 (5.75)			13.33 (5.52)		
$75,000-more	12.58 (6.21)			16.4 (6.08)		
Parental Education						
No College	16.98 (6.01)	*17.94***	<.001	11.5 (4.71)	*23.54***	<.001
At Least 1 Parent College	12.09 (5.59)			16.74 (5.87)		

*p=<0.05. **p=<.001.

A Pearson's bivariate correlation was used to determine if there was any relationship of the numeric/continuous sociodemographics variables of GPA and MCAT to ST. Table 6 below

shows there were significant relationships among medical student GPA and MCAT scores with ST. There was a strong and negative correlation between Domain 1 for academic performance and ST vulnerability, meaning that greater ST vulnerability is associated with low academic performance (GPA, r= -0.35, p= <.0.001; MCAT, r= -0.59, p=<.0.001). Additionally, Domain 2 ST vulnerability was also significantly associated with the academic performance (GPA, r=0.21, p=<0.05; MCAT, r= 0.57, p=<.0.001). Therefore, all null hypotheses for research question four related to continuous variables are rejected:

- Hypothesis 17: GPA will have a significant relationship to ST. The null hypothesis is rejected.
- Hypothesis 18: MCAT will have a significant relationship to ST. The null hypothesis is rejected.

Table 6: Correlation of Stereotype Threat and Sociodemographics (Numeric)

Variables	Domain 1			Domain 2		
	M (SD)	r	p-value	M (SD)	r	p-value
GPA	3.62 (.28)	-.*35***	<.001	3.62 (.28)	.21*	.04
MCAT	510.87 (6.48)	-.*59***	<.001	510.87 (6.48)	.57**	<.001

**p=<0.05 **p=<.001*

Chapter 5: Discussion

A diverse healthcare workforce is essential to improving health outcomes for our increasingly diverse U.S. population, and much improvement is needed to ensure that health professional schools can admit, support, and graduate URM healthcare providers (Marrast et al., 2014). Where URMs continue to lack critical mass, ST experiences will also persist (Pennington & Heim, 2016). The sponsoring institution's current student population is 39.6% URM (which includes American Indian/Alaska Native, Black/African American, Hispanic/Latinx, Native Hawaiian/Other Pacific Islander, and multiple race/ethnicity inclusive of at least one URM category) and 61% female according to data maintained by the AAMC (2020). This study explored the relationship between ST vulnerability and the internal protective mechanisms of grit, adaptive and maladaptive coping. Additionally, the relationship between ST vulnerability and internal protective mechanisms was also examined with the sociodemographics of racial/ethnic identity, family income, parents' education level, and academic metrics (GPA and MCAT) of current students in a medical education setting. It was anticipated that underrepresented minority students in a highly competitive setting, such as medical school, would be affected by ST as they are expected to be highly identified with the stereotypes associated with it for URM medical students (Bullock et al., 2020).

Discussion of Findings

This study explored the relationship between ST vulnerability and internal factors that may influence the level of susceptibility in medical students. Based on the data analysis, overall, there appeared to be minimal effects between the internal protective measures (grit, adaptive coping, and maladaptive coping) and perceptions of ST vulnerability among medical students. However, there was a significant relationship between grit and Domain 2 of the SVS that focuses

on racial group characteristics. Even where the correlation between ST and grit was not statistically significant, the results consistently showed grit had the closest relationship compared to adaptive coping and maladaptive coping. There was a minimal association in group differences between sociodemographics and internal protective measures (Table 3); none were statistically significant. This could be due to the small sample size and partly to the ambiguity of some survey items. Most sociodemographics were strongly associated with ST vulnerability, except gender (Table 5), which was surprising based on previous research outcomes. In relation to the focus of this study, there was a clear difference in ST among URM students compared to Asian and White students (Table 6). A significant decrease in students' academic scores (MCAT and GPA) on the experience of high stereotype threats was detected and statistically significant (Table 6). Therefore, the generalized hypothesis that internal protective measures within grit, adaptive coping, and maladaptive coping will show less perceived ST experiences in medical students was rejected. Also rejected is the notion that grit, adaptive coping, and maladaptive coping are significantly correlated with the sociodemographics in this study. Lastly, there are significant correlations between ST vulnerability and the sociodemographics of race/ethnicity, family income, parent education, and academic metrics (GPA and MCAT).

Limitations

There are several limitations in this study that should be considered. A primary limitation of the research is that the data collected was self-reported by participants. Understanding the concepts and terminology used may be interpreted differently based on participants' previous knowledge of the topics and the ability to recall information related to the direct questions accurately. Secondly, Spencer (1993) notes that ST is most often unconscious, so it is difficult to determine its commonness since its awareness is based mainly on the perception of contributing

factors. Third, this study was conducted at one medical school, and the results do not represent the experience of all medical students who may or may not experience ST. This study did not explore factors related to the learning climate, current academic performance, and the relationship to institutional diversity. These elements could have a significant influence on the results, but also, these factors might affect results differently from institution to institution. Fourth, some participants may not have felt compelled to participate if they did not identify with the key topics. There were also 26 respondents out of the total 102 with incomplete data that could not be used in this study. Lastly, it is essential to note that this study partially took place during a global pandemic where burnout and added stress may have been barriers to obtaining respondents. These factors may have further decreased the sample size, which ended up consisting of 22% of the total pool of potential participants.

Recommendations for Future Research/Conclusion

Continuation of Steele's (1995, 1997, 2010) work specifically in medical education is an area that needs more focus. There are some overlapping recommendations to mitigate ST from the limited research available on ST and medical education. First, there is a critical need to increase URM representation at all levels of the medicine pathway (STEM/pre-medical college undergraduate, medical school, graduate medical residency, and academic medicine) (Bullock et al., 2020). Second, educators must be equipped to respond to microaggressions, prejudice, biases, discrimination, racism, etc., and avoid being perpetrators of them (Ackerman-Barger et al., 2016; Bullock et al., 2020). Lastly, institutional leaders must support and be active participants in creating an inclusive learning environment (Ackerman-Barger et al., 2016; Bullock et al., 2020; Figueroa, 2014; Montgomery, 2020). Ongoing faculty development related to issues of cultural humility is a practical, low-cost strategy to achieve the goal of a diverse

health professions workforce (Ackerman-Barger et al., 2015). These interventions can engage students and foster learning, skills, and positive behaviors they need to succeed in college and possibly add to the URM faculty pool by paying it forward (Denecke et al., 2011).

Additional studies may be of interest to examine medical schools that have achieved majority racial/ethnic diversity to explore if this affects ST vulnerability for its medical student population. There are currently four historically black medical schools in the US. Of the four schools, 3 admit about 100 students per year, 70% are of African descent, and 1 admits 24 students per year yield 50% of African descent (Montgomery, 2020). Therefore, these four schools alone account for much of the overall 13.7% URM US medical students (AAMC, 2018). Attiah (2014) authored an article addressing many of these same issues related to ST, noting that increase diversity serves as an intervention of ST, but there are also many other benefits that help all medical students to thrive in a medical school setting. He explained that diversity should not be sought after to meet quotas or "check boxes off," but create an optimal learning environment to contribute to the education of peers where different perspectives turn into innovative solutions due to collaborative effort. Diversity allows peers to be exposed to different learning styles, life experiences, and problem-solving methodologies (Bullock et al., 2019). Ultimately, this makes our future doctors well-rounded and ready to serve a broader patient population (Talamantes et al., 2019). Physicians carry great responsibility beyond patient care and are viewed as scholars who are responsible and trustworthy, part of that responsibility is cultural competency (Burgess et al., 2010).

If ST endangers the academic performance of URM students in the healthcare provider pathway, it will affect future workforce diversity and, ultimately, the health of underserved communities (Ackerman-Barger et al., 2016). There are efforts towards closing the gap on

healthcare access among racial and ethnic minorities; however, the uninsured, poor, and non-English speakers continue to remain without adequate healthcare. A contributor to this deficiency is physicians' shortage in communities where disadvantaged patients live (Marrast et al., 2014). In a medical education program, having medical students and faculty members from a variety of socioeconomic backgrounds, racial and ethnic groups, and other life experiences can: 1) enhance the quality and content of interactions and discussions for all students throughout the preclinical and clinical curricula and 2) result in the preparation of a physician workforce that is more culturally aware and competent and better prepared to improve access to healthcare and address current and future health care disparities (Talamantes et al., 2019; Whitla et al., 2003). A previous study by Bartman (1995) indicated non-white physicians care for a large proportion of the underserved; therefore, increasing racial diversity in the medical field can address those that are disproportionality cared for and underserved (Marrast et al., 2014).

Another focus for the future research area in ST might be making students aware of ST and the physiological effects on self and academic performance. Schmader (2010) also provided a similar future recommendation, noting that it would be impactful to help change students' frame of mind regarding their abilities by educating them on their theories of ST. "By teaching students about the theory, we might effectively inoculate them against its effects" (Schmader, 2010, p.18). Informing students about ST concepts might reduce its negative consequences on those who feel they have setbacks towards future medical careers. Further research may lead to concrete and effective ways in which awareness of ST can be raised, so students of all genders and racial/ethnic backgrounds perceive themselves to be on an equal foundation when embarking upon their education in the field of medicine.

Being a physician can be a great responsibility. Physicians are respected, seen as scholars, and seen as trustworthy. Broadening the image of a physician more diversely extends the reach of their influence. Having well-rounded, grounded, and socially balanced voices are becoming more and more critical as we face challenges with healthcare as a nation (Rosenstein et al., 2021)

References

Ackerman-Barger, K., Valderama-Wallace, C., Latimore, D., & Drake, C. (2016). Stereotype threat susceptibility among minority health professions students. *Journal of Best Practices in Health Professions Diversity: Education, Research & Policy*, *9*(2), 1232–1246.

Ackerman-Barger, K., Bakerjian, D., & Latimore, D. (2015). How health professions educators can mitigate underrepresented students' experiences of marginalization: Stereotype threat, internalized bias, and microaggressions. *Journal of Best Practices in Health Professions Diversity: Education, Research & Policy*, *8*(2), 1060–1070. Retrieved from http://search.ebscohost.com.lb-proxy9.touro.edu/login.aspx?direct=true&db=bth&AN=122521995&site=ehost-live

Aikens, N. L., & Barbarin, O. (2008). Socioeconomic Differences in Reading Trajectories: The Contribution of Family, Neighborhood, and School Contexts. *Journal of Educational Psychology*, *100*(2), 235–251. https://doi.org/10.1037/0022-0663.100.2.235

Albert, M. A. (2018). #me_who anatomy of scholastic, leadership, and social isolation of underrepresented minority women in academic medicine. *Circulation*, *138*(5), 451–454.

Alsan, M., Stantcheva, S., Yang. D., Cutler, D. (2020). Disparities in Coronavirus 2019 Reported Incidence, Knowledge, and Behavior Among US Adults. *JAMA Network Open*, *3*(6): e2012403. doi:10.1001/jamanetworkopen.2020.12403

A.A.M.C. (2016). *Underrepresented in Medicine Definition*. AAMC. https://www.aamc.org/what-we-do/equity-diversity-inclusion/underrepresented-in-medicine

Association of American Medical Colleges. (2020, October). *MCAT and GPAs for Applicants and Matriculants to U.S. Medical Schools by Primary Undergraduate Major, 2020-2021* (Table A-17). AAMC. https://www.aamc.org/media/6061/download

American Association of Medical Colleges. (2018). *Facts & Figures Report*. AAMC. http://www.aamcdiversityfactsandfigures.org/

Alter, A. L., Aronson, J., Darley, J. M., Rodriguez, C., & Ruble, D. N. (2010). Rising to the threat: Reducing stereotype threat by reframing the threat as a challenge. *Journal of Experimental Social Psychology, 46*(1), 166–171. https://doi.org/10.1016/j.jesp.2009.09.014

Aronson, J. (2002). Stereotype threat: Contending and coping with unnerving expectations. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education.* (pp. 279–301). San Diego, CA: Academic Press. https://doi.org/10.1016/B978-012064455-1/50017-8

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the Effects of Stereotype Threat on African American College Students by Shaping Theories of Intelligence. *Journal of experimental Social Psychology*, 38(2), 113. https://doi.org/10.1006/jesp.2001.1491

Attiah, M. A. (2014). The new diversity in medical education. *The New England Journal of Medicine, 371*(16), 1474-1476. doi:10.1056/NEJMp1408460

Baker, D. J., Skinner, B. T., & Redding, C. H. (2019). Affirmative Intervention to Reduce Stereotype Threat Bias: Experimental Evidence from a Community College. *Journal of Higher Education*, *91*(5), 722–754. https://doi.org/10.1080/00221546.2019.1650582

Barnard, L., & Burley, H., & Olivarez, A., & Crooks, S. (2008). Measuring vulnerability to stereotype threat. Electronic *Journal of Research in Educational Psychology*, *6* (14), 51-63.

Beagan, B. (2005). Everyday classism in medical school: Experiencing marginality and resistance. Med Educ. 2005; 39:777–784

Brosnan, C., Southgate, E., Outram, S., Lempp, H., Wright, S., Saxby, T., Harris, G., Bennett, A., & Kelly, B. (2016). Experiences of medical students who are first in family to attend university. *Medical Education, 50*(8), 842–851. https://doi.org/10.1111/medu.12995

Bullock, J. L., Lai, C. J., Lockspeiser, T., O'Sullivan, P. S., Aronowitz, P., Dellmore, D., Fung, C. C., Knight, C., & Hauer, K. E. (2019). In Pursuit of Honors: A Multi-Institutional Study of Students' Perceptions of Clerkship Evaluation and Grading. *Academic medicine: journal of the Association of American Medical Colleges, 94*(11S), S48–S56. https://doi.org/10.1097/ACM.0000000000002905

Bullock, J. L., Lockspeiser, T., Del Pino-Jones, A., Richards, R., Teherani, A., & Hauer, K. E. (2020). They Don't See a Lot of People My Color: A Mixed Methods Study of Racial/Ethnic Stereotype Threat Among Medical Students on Core Clerkships. *Academic medicine: Journal of the Association of American Medical Colleges*, *95* (11S), S58-S66. https://doi.org/10.1097/ACM.0000000000003628

Burgess, D. J., Warren, J., Phelan, S., Dovidio, J., & Van Ryn, M. (2010). Stereotype threat and health disparities: what medical educators and future physicians need to know. *JGIM: Journal of General Internal Medicine*, *25*, 169–177. https://doi.org/10.1007/s11606-009-1221-4

Carr, P. L., Gunn, C. M., Kaplan, S. A., Raj, A., & Freund, K. M. (2015). Inadequate progress for women in academic medicine: findings from the National Faculty Study. *Journal of Women's Health*, 24(3), 190–199.

Carver, C. S. (1997). You want to Measure Coping but Your Protocol's Too Long: Consider the Brief COPE. *International Journal of Behavioral Medicine*, *4*(1), 92. https://doi.org/10.1207/s15327558ijbm0401_6

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, *56*, 267–283.

Chang, D. F., & Demyan, A. L. (2007). Teachers' stereotypes of Asian, Black, and White students. *School Psychology Quarterly*, *22*(2), 91-114. Retrieved from http://dx.doi.org/10.1037/1045-3830.22.2.91

Collins, L. W., Sweigart, C. A., Landrum, T. J., & Cook, B. G. (2017). Navigating common challenges and pitfalls in the first years of special education: Solutions for success. *TEACHING Exceptional Children, 49*(4), 213-222.

Cooper, L. A., Stoney, C. M. (2020). Messages to Increase COVID-19 Knowledge in Communities of Color: What Matters Most? *Annals of Internal Medicine, 174 (4): 554-555.* https://www.acpjournals.org/doi/full/10.7326/M20-8057

Cromley, J. G., Perez, T., Wills, T. W., Tanaka, J. C., Horvat, E. M., & Agbenyega, E. T. (2013). Changes in race and sex stereotype threat among diverse STEM students: Relation to grades and retention in the majors. *Contemporary Educational Psychology*, *38*(3), 247–258. https://doi.org/10.1016/j.cedpsych.2013.04.003

Daniels, H., Grineski, S. E., Collins, T. W., Morales, D. X., Morera, O., & Echegoyen, L. (2016). Factors influencing student gains from undergraduate research experiences at a Hispanic-serving institution. *CBE—Life Sciences Education*, *15*(3), 1–12.

Denecke, D. D., Kent, J. D., & Wiener, W. (2011*). Preparing future faculty to assess student learning.* Washington, DC: Council of Graduate Schools

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087-1101. doi:10.1037/0022-3514.92.6.1087

Duckworth, A.L, & Quinn, P.D. (2009). Development and validation of the Short Grit Scale Grit-S). *Journal of Personality Assessment*, *91*, 166-174.

Dyer-Barr, R. (2010). The role and prevalence of faculty mentoring among African American and Latino undergraduates in different institutional contexts: a mixed-methods study. Illinois Dissertations and Theses from the College of Education. https://doi.org/10.1080/10463280802547171

Eskreis-Winkler, L., Duckworth, A. L., Shulman, E. P., Beal, S. (2014). The grit effect: predicting retention in the military, the workplace, school and marriage. *Frontiers*. https://www.frontiersin.org/articles/10.3389/fpsyg.2014.00036/full.

Figueroa, O. (2014). The significance of recruiting underrepresented minorities in medicine: an examination of the need for effective approaches used in admissions by higher education institutions. *Medical education online*, *19*, 24891. doi:10.3402/meo.v19.24891

García, F. E., Barraza-Peña, C. G., Wlodarczyk, A., Alvear-Carrasco, M., & Reyes-Reyes, A. (2018). Psychometric properties of the Brief-COPE for the evaluation of coping strategies

in the Chilean population. *Psicologia: Reflexão e Critica, 31*(1), 1. https://doi.org/10.1186/s41155-018-0102-3

Gilbert, D. T., Wilson, T. D., Pinel, E. C., Blumberg, S. J., & Wheatley, T. P. (1998). Immune Neglect: A Source of Durability Bias in Affective Forecasting. *Journal of Personality & Social Psychology*, 75(3), 617–638. https://doi.org/10.1037/0022-3514.75.3.617

GESIS - Leibniz Institute for the Social Sciences. Socio-Demographic Variables. (n.d.). https://www.gesis.org/en/gesis-survey-guidelines/instruments/survey-instruments/socio-demographic-variables#:~:text=Socio%2Ddemographic%20variables%20include%2C%20for,household%2C%20employment%2C%20and%20income.&text=They%20include%2C%20for%20example%2C%20socio,information%20on%20education%20and%20income.

Grbic, D., Garrison, G., & Jolly, P. (2010). Analysis in brief: Diversity of U.S. medical students by parental education. Volume 9, Number 10. Washington, DC: Association of American Medical Colleges. Retrieved from https://www.aamc.org/download/142770/data/aibvol9_no10.pdf

Gomez, E., & Wright, J. G. (2014). A simple strategy to reduce stereotype threat for orthopedic residents. Canadian Journal of Surgery. *Journal Canadien De Chirurgie*, *57*(2), E19-E24.

Hayes, A. (2021, February 28). Demographics definition. Retrieved March 04, 2021, from https://www.investopedia.com/terms/d/demographics.asp#:~:text=Demographic%20analysis%20is%20the%20study,and%20death%20rates%20and%20more.

Heiser, S. (2017, March 14). New Research Reaffirms Physician Shortage. Retrieved January 4, 2019, from https://news.aamc.org/press-releases/article/workforce_projections_03142017/

Hochanadel, A., & Finamore, D. (2015). Fixed And Growth Mindset In Education And How Grit Helps Students Persist In The Face Of Adversity. *Journal of International Education Research (JIER), 11*(1), 47-50. https://doi.org/10.19030/jier.v11i1.9099

Inzlicht, M., & Kang, S. K. (2010). Stereotype Threat Spillover: How Coping With Threats to Social Identity Affects Aggression, Eating, Decision Making, and Attention. *Journal of Personality & Social Psychology, 99*(3), 467–481. https://doi.org/10.1037/a0018951

Inzlicht, M., & Schmader, T. (2012). Stereotype Threat: Theory, Process, and Application: Oxford University Press. Retrieved 9 Jun. 2020, from https://oxford.universitypressscholarship.com/view/10.1093/acprof:oso/9780199732449.001.0001/acprof-9780199732449.

Johnson, H. J., Barnard-Brak, L., Saxon, T. F., & Johnson, M. K. (2012). An Experimental Study of the Effects of Stereotype Threat and Stereotype Lift on Men and Women's Performance in Mathematics. *Journal Of Experimental Education, 80*(2), 137-149.

Lain, E. (2016). Experiences of Academically Dismissed Black and Latino Law Students: Stereotype Threat, Fight or Flight Coping Mechanisms, Isolation and Feelings of Systemic Betrayal. *Journal of Law & Education*, *45*(3), 279–326. Retrieved from http://search.ebscohost.com.lb-proxy9.touro.edu/login.aspx?direct=true&db=eft&AN=116912817&site=ehost-live

Lamb, L. (n.d.). Introduction to marketing. Retrieved March 04, 2021, from https://courses.lumenlearning.com/suny-hccc-marketing/chapter/reading-social-factors/#:~:text=Social%20factors%20represent%20another%20important,%2C%20reference%20groups%2C%20and%20family.

Litaker, D., Koroukian, S., & Love, T. (2005). Context and Healthcare Access: Looking beyond the Individual. *Medical Care, 43*(6), 531-540. Retrieved September 21, 2020, from http://www.jstor.org/stable/3768170

Marrast, L. M., Zallman, L., Woolhandler, S., Bor, D. H., & McCormick, D. (2014). Minority physicians' role in the care of underserved patients: diversifying the physician workforce may be key in addressing health disparities. *JAMA Internal Medicine*, 174(2), 289–291. https://doi.org/10.1001/jamainternmed.2013.12756

Mahmoud, J. S. R., Staten, R. "Topsy," Hall, L. A., & Lennie, T. A. (2012). The Relationship among Young Adult College Students' Depression, Anxiety, Stress, Demographics, Life Satisfaction, and Coping Styles. *Issues in Mental Health Nursing*, *33*(3), 149–156. https://doi.org/10.3109/01612840.2011.632708

Meador, A. (2018), Examining Recruitment and Retention Factors for Minority STEM Majors Through a Stereotype Threat Lens. *School Science and Mathematics*, *118*: 61-69. https://doi.org/10.1111/ssm.12260

McGee, E. O. (2016). Devalued black and Latino racial identities: A by-product of STEM college culture. *American Educational Research Journal*, *53*(6), 1626–1662. doi:10.3102/0002831216676572

McKay, P. F., Doverspike, D., Bowen-Hilton, D., & McKay, Q. D. (2003). The Effects of Demographic Variables and Stereotype Threat on Black/White Differences in Cognitive Ability Test Performance. *Journal of Business & Psychology*, *18*(1), 1–14. https://doi.org/10.1023/A:1025062703113

McLeod, S. (2014) Questionnaires. Simply Psychology. Retrieved from http://www.simplypsychology.org/questionnaires.html

Meador, A. (2018). Examining recruitment and retention factors for minority STEM majors through a stereotype threat lens. *School science and mathematics, 118*(1–2), 61–69

Mendes, W. B., & Jamieson, J. (2012). Embodied stereotype threat: Exploring brain and body mechanisms underlying performance impairment. In M. Inzlicht & T. Schmader (Eds.), *Stereotype threat: Theory, process, and application.* (pp. 51–68). New York, NY: Oxford University Press. Retrieved from http://search.ebscohost.com.lb-proxy9.touro.edu/login.aspx?direct=true&db=psyh&AN=2011-27639-003&site=ehost-live

Merriam-Webster. (n.d.). Sociodemographic. In Merriam-Webster.com dictionary. Retrieved March 3, 2021, from https://www.merriam-webster.com/dictionary/sociodemographic

Montgomery Rice, V. (2021). Diversity in Medical Schools: A Much-Needed New Beginning. *JAMA: Journal of the American Medical Association*, *325*(1), 23–24. https://doi.org/10.1001/jama.2020.21576

Moore, B., Biegel, D., & McMahon, T. (2011). Maladaptive Coping as a Mediator of Family Stress. *Journal of Social Work Practice in the Addictions, 11*(1), 17–39. https://doi.org/10.1080/1533256X.2011.544600

Moritz, S., Jahns, A. K., Schröder, J., Berger, T., Lincoln, T. M., Klein, J. P., & Göritz, A. S. (2016). More adaptive versus less maladaptive coping: What is more predictive of symptom severity? Development of a new scale to investigate coping profiles across different psychopathological syndromes. *Journal of Affective Disorders*, 191, 300–307. https://doi.org/10.1016/j.jad.2015.11.027

Morton, J. M., & Paul, S. K. (2019). Grit. *Ethics*, 129(2), 175–203. https://doi.org/10.1086/700029

Museus, S. D., Palmer, R. T., Davis, R. J., & Maramba, D. (2011). Racial and ethnic minority students' success in STEM education (Special issue). *ASHE Higher Education Report*, *36*(6), 1–140.

Museus, S. D., & Park, J. J. (2015). The continuing significance of racism in the lives of Asian American college students. *Journal of College Student Development*, *56*(6), 551–569. doi:10.1353/csd.2015.0059

Nguyen, J., Carter, J. S., & Carter, S. K. (2019). From Yellow Peril to Model Minority: Perceived Threat by Asian Americans in Employment*. *Social Science Quarterly* (Wiley-Blackwell), 100(3), 565–577. https://doi.org/10.1111/ssqu.12612

Odom, K. L., Roberts, L. M., Johnson, R. L., & Cooper, L. A. (2007). Exploring obstacles to and opportunities for professional success among ethnic minority medical students. *Academic Medicine*, *82*(2), 146–153.

Orem, H., Semalulu, T., & Underwood, W. (2013). The social and learning environments experienced by underrepresented minority medical students: A narrative review. *Academic Medicine*, 88(11), 1765–1777.

Owens, J., & Massey, D. S. (2011). Stereotype threat and college academic performance: A latent variables approach. *Social science research*, *40*(1), 150–166.

Pennington, C. R., & Heim, D. (2016). Creating a critical mass eliminates the effects of stereotype threat on women's mathematical performance. British Journal of Educational Psychology, 86(3), 353–368. https://doi.org/10.1111/bjep.12110

Pennington, C. R., Heim, D., Levy, A. R., & Larkin, D. T. (2016). Twenty Years of Stereotype Threat Research: A Review of Psychological Mediators. Plos One, 11(1), e0146487. doi:10.1371/journal.pone.0146487

Peterson, C. & Seligman, M. E. (2004). Character strengths and virtues: A handbook and classification, Washington, DC: American Psychological Association.

Rodríguez, J., Campbell, K., Mouratidis, R. (2014). Where are the rest of us? Improving representation of minority faculty in academic medicine. *South Med J*ournal, *107*(12):739-44. doi: 10.14423/SMJ.0000000000000204. PMID: 25502149.

Rotenstein, L., Reede, J., & Jena, A. (2021). Addressing Workforce Diversity — A Quality-Improvement Framework. *New England Journal of Medicine. 384.* 10.1056/NEJMp2032224.

Salles, A., Cohen, G. L., & Mueller, C. M. (2014). The relationship between grit and resident well-being. *American Journal of Surgery, 207*(2), 251–254. https://doi.org/10.1016/j.amjsurg.2013.09.006

Schmader, T. (2010). Stereotype Threat Deconstructed. *Current Directions in Psychological Science*, *19*(1), 14–18. https://doi.org/10.1177/0963721409359292

Schmader, T., & Hall, W. M. (2014). Stereotype threat in school and at work. *Policy insights from the behavioral and brain sciences*, *1*(1), 30–37.

Schmader, T., Johns, M., & Forbes, C. (2008). An Integrated Process Model of Stereotype Threat Effects on Performance. *Psychological Review*, *115*(2), 236–356. https://doi.org/10.1037/0033-295X.115.2.336

Shih, A. F., & Maroongroge, S. (2017). The Importance of Grit in Medical Training. *Journal of graduate medical education*, *9*(3), 399. doi:10.4300/JGME-D-16-00852.1

Smith, L. V., & Cokley, K. (2016). Stereotype Threat Vulnerability. *Measurement & Evaluation in Counseling & Development*, *49*(2), 145–162. https://doi.org/10.1177/0748175615625752

Sparks, D. (2015). An exploration of the connections between institution type and perceived levels of stereotype threat in African American engineering students. *Journal of African American Males in Education, 6*(1), 42-58.

Spencer, S. J. (1993). The effect of stereotype vulnerability on women's math performance. Unpublished doctoral dissertation, University of Michigan, Ann Arbor.

Spencer, S.J., Steele, C. M., Quinn, D.M. (1999). Stereotype Threat and Women's Math Performance. *Journal of Experimental Social Psychology, 35*(1):4-28.

Strayhorn, T. (2013). What Role Does Grit Play in the Academic Success of Black Male Collegians at Predominantly White Institutions? *Journal of African American Studies*, *18*(1), 1-10. https://doi.org/10.1007/s12111-012-9243-0

Stegers-Jager, K.M., Steyerberg, E.W., Cohen-Schotanus, J., Themmen, A.P. (2012). Ethnic disparities in undergraduate pre-clinical and clinical performance. *Med Educ., 46*:575–585

Steele, C. M. (2010). Whistling Vivaldi: How stereotypes affect us and what we can do. New York: Norton.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, *69*(5), 797-811.

Steele, C. (1997). A Threat in the Air: How Stereotypes Shape Intellectual Identity and Performance. *American Psychologist*, *52*(6), 613-29.

Sunny, C., Taasoobshirazi, G. g., Clark, L., & Marchand, G. (2017). Stereotype threat and gender differences in chemistry. *Instructional Science, 45*(2), 157-175.

Swanson, C. B. (2004). Who Graduates? Who Doesn't? A Statistical Portrait of Public High School Graduation, Class of 2001. Washington, DC: Urban Institute.

Talamantes, E., Henderson, M., Fancher, T. Mullan, F. (2019) Closing the Gap — Making Medical School Admissions More Equitable. *The New England Journal of Medicine*, *380*:803-805.

Thomas, N., & Erdei, R. (2018). Stemming Stereotype Threat: Recruitment, Retention, and Degree Attainment in STEM Fields for Undergraduates from Underrepresented Backgrounds Paper presented at 2018 CoNECD - The Collaborative Network for Engineering and Computing Diversity Conference, Crystal City, Virginia. https://peer.asee.org/29579

Yeager, D. S., Walton, G. M., Brady, S. T., Akcinar, E. N., Paunesku, D., Keane, L., Kamentz, D., Ritter, G., Duckworth, A. L., Urstein, R., Gomez, E. M., Markus, H. R., Cohen, G. L., & Dweck, C. S. (2016). Teaching a lay theory before college narrows achievement gaps at scale. *Proceedings of the National Academy of Sciences of the United States of America, 113*(24), E3341–E3348. https://doi.org/10.1073/pnas.1524360113

University College London. (2008, August 18). 'Stereotype Threat' Could Affect Exam Performance Of Ethnic Minority Medical Students. *ScienceDaily*. Retrieved January 2, 2019 from http://www.sciencedaily.com/releases/2008/08/080818101327.htm

Webber, K., Nelson Laird, T., & Brcka Lorenz, A. (2013). Student and Faculty Member Engagement in Undergraduate Research. *Research in Higher Education, 54*(2), 227–249. https://doi.org/10.1007/s11162-012-9280-5

Whitla, D., Orfield, G., Silen, W., Teperow, C., Howard, C., Reede, J. (2003) Educational Benefits of Diversity in Medical School, Academic Medicine, *78*(5), 460-466.

Writer, S. N. (2016, February 11). *Increasing minorities in medical schools: Programs alter the pipeline.* American Medical Association. https://www.ama-assn.org/education/medical-school-diversity/increasing-minorities-medical-schools-programs-alter-pipeline.

Zambrana, R. E., Harvey Wingfield, A., Lapeyrouse, L. M., Dávila, B. A., Hoagland, T. L., & Valdez, R. B. (2017). Blatant, Subtle, and Insidious: URM Faculty Perceptions of Discriminatory Practices in Predominantly White Institutions. *Sociological Inquiry*, 87(2), 207–232. https://doi.org/10.1111/soin.12147

Appendix A

Consent Form for Participation in a Research Study

Title of Study:

An Examination of the Impact Grit, Adaptive and Maladaptive Coping, and Sociodemographics Have on the Experiences of Stereotype Threat in Medical Students

Description of the research and your participation

You are invited to participate in a research study conducted Charlene Green. The purpose of this research is to examine the impact of grit, adaptive and maladaptive coping, and sociodemographics on the experience of stereotype threat in medical students. The following are research objectives for this study: 1) identify resiliency and vulnerability factors in medical students as it relates to the experience of stereotype threat and examine if protective factors affect experiences with stereotype threat in medical students; and 2), evaluate whether different protective factors govern different stereotyped medical student population populations.

Your participation will involve completing a 57-item survey questionnaire.

Risks and discomforts

There are no known risks associated with this research associated with this research.

Potential benefits

Overall results with participants, particularly regarding scores on protective measures and of course, stereotype threat vulnerability score. This would give school participants awareness of the need for support, if any, in this area. Additional, school administration would have data-driven insight on areas and categories of students to focus on for intervention and skills building.

Protection of confidentiality

Although, this survey is not anonymous, we will do everything we can to protect your privacy. Your identity will not be revealed in any publication resulting from this study.

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate, and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Contact information

If you have any questions or concerns about this study or if any problems arise, please contact Charlene Green at 916-734-1848. If you have any questions or concerns about your rights as a research participant, please contact the UC Davis Institutional Review Board at 916-703-9151 or hs-irbeducation@ucdavis.edu.

Consent

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participant's signature_____ Date:_____

A copy of this consent form should be given to you.

Appendix B

Survey Questionnaire Design

The survey was administered in an online format.

Pre-Survey contents:

- Research description and disclosures
- Informed Consent

The Survey Questionnaire consist of 61 total questions, including consent.

Section I: Demographics

1. Please indicate your class year:
    a. 2020
    b. 2021
    c. 2022
    d. 2023
    e. 2024
    f. Other: _____
2. Please indicate gender:
    a. Female
    b. Male
    c. Prefer not to say
    d. Prefer to self-describe _____
3. Please indicate race/ethnicity (check all that apply):
    a. Mexican, Mexican American, Chicano
    b. Puerto Rican

c. Cuban

d. Other Hispanic, Latino, or Spanish origin _____

e. White

f. Black, African American

g. African born

h. Asian Indian

i. Japanese

j. Korean

k. Chinese

l. Native Hawaiian

m. Guamanian or Chamorro

n. Vietnamese

o. Filipino

p. Samoan

q. Other Pacific Islander (Fijian, Tongan, etc.) _____

r. Other Asian (Hmong, Laotian, Thai, Pakistani, Cambodian, etc.) _____

4. Please indicate your parents' income for 2017-2018:

a. Less than $25,000

b. $25,000 to $34,999

c. $35,000 to $49,999

d. $50,000 to $74,999

e. $75,000 or more

5. Did you receive an AMCAS fee waiver when applying for medical school?

a. Yes

b. No

c. Unsure

6. Was your childhood spent in an underserved area?

    a. Yes

    b. No

    c. Unsure

7. Has your family ever been a recipient of a family assistance program (such as TANF, etc.)?

    a. Yes

    b. No

    c. Unsure

8. Please indicate your mother's highest level of education:

    a. No schooling completed

    b. Elementary school to 8th grade

    c. Some high school, no diploma

    d. High school graduate, diploma or the equivalent (for example: GED)

    e. Some college credit, no degree

    f. Trade/technical/vocational training

    g. Associate degree

    h. Bachelor's degree

    i. Master's degree

    j. Professional degree

k. Doctorate degree

l. Don't know

9. Please indicate your father's highest level of education:

a. No schooling completed

b. Elementary school to 8th grade

c. Some high school, no diploma

d. High school graduate, diploma or the equivalent (for example: GED)

e. Some college credit, no degree

f. Trade/technical/vocational training

g. Associate degree

h. Bachelor's degree

i. Master's degree

j. Professional degree

k. Doctorate degree

l. Don't know

10. Please indicate if you have parents or other family members who are physicians:

a. Parent(s) are physicians

b. Family member(s) are physicians

c. No other physicians in my family

11. Please provide your GPA when applying to medical school: _____

12. Please provide your MCAT score: _____

Section II: Grit Scale

Directions for taking the Grit Scale: Here are a number of statements that may or may not apply to you. For the most accurate score, when responding, think of how you compare to most people not just the people you know well, but most people in the world. There are no right or wrong answers, so just answer honestly!

1. I have overcome setbacks to conquer an important challenge.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

2. New ideas and projects sometimes distract me from previous ones.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

3. My interests change from year to year.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

4. Setbacks don't discourage me.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

5. I have been obsessed with a certain idea or project for a short time but later lost interest.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

6. I am a hard worker.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

7. I often set a goal but later choose to pursue a different one.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

8. I have difficulty maintaining my focus on projects that take more than a few months to complete.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

9. I finish whatever I begin.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

10. I have achieved a goal that took years of work.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

11. I become interested in new pursuits every few months.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

12. I am diligent.

Very much like me

Mostly like me

Somewhat like me

Not much like me

Not like me at all

Section III: Brief COPE Inventory

Directions for taking the brief COPE inventory: These items deal with ways you've been coping with the stress in your life since you have been in medical school. There are many ways to try to deal with problems. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you have been doing what the item says. How much or how frequently. Don't answer on the basis of whether it seems to be working or not—just whether or not you're doing it. Use these response choices. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

1 = I haven't been doing this at all

2 = I've been doing this a little bit

3 = I've been doing this a medium amount

4 = I've been doing this a lot

1. I've been turning to work or other activities to take my mind off things.
2. I've been concentrating my efforts on doing something about the situation I'm in.
3. I've been saying to myself "this isn't real.".
4. I've been using alcohol or other drugs to make myself feel better.
5. I've been getting emotional support from others.
6. I've been giving up trying to deal with it.
7. I've been taking action to try to make the situation better.
8. I've been refusing to believe that it has happened.
9. I've been saying things to let my unpleasant feelings escape.

10. I've been getting help and advice from other people.
11. I've been using alcohol or other drugs to help me get through it.
12. I've been trying to see it in a different light, to make it seem more positive.
13. I've been criticizing myself.
14. I've been trying to come up with a strategy about what to do.
15. I've been getting comfort and understanding from someone.
16. I've been giving up the attempt to cope.
17. I've been looking for something good in what is happening.
18. I've been making jokes about it.
19. I've been doing something to think about it less, such as going to movies, watching T.V., reading, daydreaming, sleeping, or shopping.
20. I've been accepting the reality of the fact that it has happened.
21. I've been expressing my negative feelings.
22. I've been trying to find comfort in my religion or spiritual beliefs.
23. I've been trying to get advice or help from other people about what to do.
24. I've been learning to live with it.
25. I've been thinking hard about what steps to take.
26. I've been blaming myself for things that happened.
27. I've been praying or meditating.
28. I've been making fun of the situation.

Section IV: Stereotype Threat Vulnerability Scale

Directions for Stereotype Threat Vulnerability Scale: The following questions are about how you feel your race/ethnicity affects you in medical school, and about how these feelings may affect your perceptions of your academic ability. For some people, their race is a major concern; for others it is less important. We would like you to consider your race and respond to the following statements on the basis of how you feel about your race and ethnicity. There is no right or wrong answers to any of these statements; we are interested in your honest reactions and opinions. Please rate your responses on a scale of 1 to 7 with 1 being “strongly disagree” and 7 being “strongly agree.”

1. Professors expect me to do poorly in class because of my race.
2. My academic success may have been easier for people of my race.
3. I doubt that others would think I have less academic success because of my race.
4. Some people feel I have less academic success because of my race.
5. People of my race rarely face unfair evaluations in academic classes.
6. In the academic setting, people of my race often face biased evaluations from others.
7. My race does not affect people’s perception of my academic achievement.
8. In the academic setting I often feel that others look down on me because of my race.