“I’m Black and I’m Strong:” The Health Effects of Resilience in the Face of Discrimination among Black American Men in Metropolitan Seattle

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Abstract

"I'm Black and I'm Strong:" The Health Effects of Resilience in the Face of Discrimination among Black American Men in Metropolitan Seattle

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Research and viral videos have repeatedly confirmed what Black men have been exclaiming since the beginning of American history: that they frequently experience multifaceted forms of discrimination (and adversity) throughout their lifespan – everywhere and anywhere. These frequent experiences can have negative effects on their mental, physical, and physiological health and explain much about the persistence of race-patterned health disparities in the US. The goal of this dissertation research is to determine if *resilience* modifies the health effects of discrimination among Black American men. And if so, through what psychosomatic pathways and in which direction (beneficial or harmful)? This relationship will be explored using interdisciplinary methods to survey perceived racism and discrimination, mental and emotional well-being, resilience, and their overall stimulus on the physiologic responsivity, and self-reported mental health of self-identified Black men living in Seattle, WA. In order to measure these relationships, this research endeavor proposes an alternative and more efficient method to collect and measure hair cortisol in extreme short-length Afro-textured hair. It then utilizes this method to answer the questions of focus. Given the overlapping consistency of a body of

research findings which intersect the construct of resilience, discrimination, as well as mental, physical, and physiological health markers, the research hypothesizes that: 1) A history of discrimination will be significantly associated with mental and emotional well-being (Stress, Depression, and Anxiety) among Black men, but this relationship will be weakest for those reporting high resilience; and 2) that a history of discrimination will be significantly associated with hair cortisol concentrations among Black men, but this relationship will be associated with lower cortisol concentrations among those reporting high resilience. Accordingly, this dissertation encompasses three main chapters, each of which will serve to address the proposed hypotheses.

DEDICATION

To my amazing mother, Sharonette, and my darling wife, Lyndsey, who have provided their steadfast support throughout my journey.

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INTRODUCTION

Racial disparities in health are pervasive, enduring, and have been a focus of academic investigation for decades. Evidence from a body of studies suggest that for most of the leading causes of death (e.g. heart disease, hypertension, diabetes, stroke), Black Americans have higher rates of morbidity and mortality than their White counterparts (Fiske et al., 2014; NCHS, 2016). The United States Centers for Disease Control and Prevention (CDCP:USDHHS (2016)) reported that from 2011-2014, for example, 58.7% of Black Americans suffered from uncontrolled hypertension compared to 48.4% of Whites. Among those taking anti-hypertensive medications within the same time period, 43.3% of Black Americans remained hypertensive compared to just 29.1% of Whites. Expanding to mortality, furthermore, recently published data in the National Vital Statistics Report noted that in 2014, the leading cause(s) of death among the American population were heart-related diseases (Kochanek et al., 2016). The report spotlighted that among selected causes of death, the mortality rates for hypertensive heart disease among Blacks and Whites were 19.3 and 11.6, respectively (Table 14). Additionally, mortality rates from diabetes among Blacks and Whites were observed at 30.3 and 23.8, respectively. Among these findings, this report noted that the age-adjusted death rate for non-Hispanic Blacks was 1.2 times greater than for non-Hispanic Whites. Race-patterned health disparities remain central to researchers identifying effective methods of reducing health-related differences.

Researchers have uncovered many different proximal and distal explanations that contribute to these disparities—everything from differential access to health care (Canedo et al., 2018), to multifaceted stressors throughout life that will impose damage on the soma (Sims et al., 2012;

David R Williams & Sternthal, 2010). However, one theme throughout much of this body of work that is relevant here is that racial health disparities may be uniquely related to the accumulation of multifaceted experiences of adversity throughout life. While there have been a large number of studies which have identified several social determinants of health (socioeconomic status, education, social support, etc.), few have identified the specific mechanisms by which these patterns emerge (Braveman, 2014; Braveman & Gottlieb, 2014). It is generally posited that the outcome of racial health differences may result from early exposures to stressful experiences in childhood (Collins Jr et al., 2004), with frequent bouts of adversity (via structural barriers, limited available resources or support, and negative social interaction) setting the trajectory for poorer chronic health and physiologic integrity later in life (Assari et al., 2017; Mustillo et al., 2004). Simply put, individuals who perceive and experience stress and adversity frequently will be more likely to endure increased blood pressure, increased mental stress, and elevated stress physiologic function, in turn cultivating the deleterious chronic health conditions which are reflected in the body of research.

For African-Americans, these stressors are deeply embedded in the context of race, which adds a multitude of dimensions by which social and structural forces impose damaging health effects. Racism is often cited as being at the center of existing race-patterned disparities in the US; borne from the inhumane legacies of slavery and Jim Crow, and cultivated by inequalities inherited from ancestral generations (Alexander, 2012; Clark et al., 1999; Jones, 2014). Racism is embedded within American culture and remains a deleterious force in Black lives. Consider for instance that before the 1960s, the US incarceration rate was relatively constant (Western & Wildeman, 2009). At the start of the civil rights movement and upon declaration of the war on drugs, the mid-1960s

saw a near 600 percent increase in the incarceration rate of Black Americans through the year 2000 (PBS, 2014). Under the 2011 stop-and-frisk program in New York, moreover, research found that 93.2 per cent of 1500 stop-and-frisk encounters involved people of color (57.3 percent, 32 percent, 3 percent, Black, Latino, and Asian, respectively) (Avdija, 2014). While police encounters under New York's stop-and-frisk policy can illustrate how racial/ethnic minorities are stung by racism, this is but one aspect of a larger problem.

One could expand the realities of the circumstance to the outright bigoted and xenophobic grandiloquence of Donald Trump's 2016 Presidential campaign. Before laying claim to the oval office, he had threatened to ban immigrants from Muslim-majority nations from entering the US, claimed that the citizens of Mexico were comprised of "rapists and murderers," and referred to his admitted acts of sexual assault as "locker room talk." Where Barack Obama ran his campaigns on the slogans "Hope," and "Yes, we can," Trump's slogan was "Make America Great Again;" drawing suggestions that 'Great' was a double-entendre for "White." He gathered overwhelming support from White Supremacist groups such as the alt-right conservatives, the Ku Klux Klan, and ultimately won position as Commander-in-Chief. A few weeks after his first one-hundred days post-inauguration saw members of an alt-right neo-Nazi group rallying in the streets of Charlottesville, VA. They had removed the cloth that once concealed their identities. A crowd of hundreds revealed the faces of young and middle-aged White men carrying Tiki torches, shouting anti-diversity and pro-Nazi slurs through the streets. Former leader of the KKK, David Duke, was recorded on camera saying that the rally, "represents a turning-point;" and that "we're [White people] going to take the country back to fulfill the promises of Donald Trump. We believe in him."

He said, “We’ve got to take the country back; and that’s what we’re going to do.” The protests saw numerous incidents of violence and a reckless act of murder.

From repeated publications of viral videos displaying overt acts of police misconduct and brutality, resulting in the unjust killings of Tamir Rice, Philando Castile, Alton Sterling, and Terrance Crutcher, to the systemic maintenance of the American socioeconomic structure. The list could go on forever, and while a description of these events sounds as though they should be read from the front pages of a 1964 New York Times newspaper, they reflect the pervasive and tense psychosocial and environmental conditions which Black men – and many other Americans of color – have been articulating for centuries. Dangerous and potentially lethal conditions that can result in damaging long-term health outcomes.

A body of research has documented the deleterious effects of racial discrimination. Mouzon et al. (2016), for example, have measured the associations of discrimination with poorer mental health in older individuals, for example, noting that it can have long-lasting effects beyond the span of time of its occurrence. In their National Survey of American Life (NSAL) study among 773 individuals, they examined the associations between everyday discrimination and general distress and psychiatric disorders. They noted that racial and non-racial everyday discrimination was consistently associated with worse mental health for older Black Americans. That is, those who had experienced higher levels of everyday discrimination were at higher risk of developing a psychiatric disorder, mood disorder, anxiety disorder, depressive symptoms, or psychological distress.

In another study, Sims et al. (2012) observed the negative effects of discrimination on physical health markers, namely, blood pressure and cardiovascular health, directly linking these observations to racial differences in morbidity and mortality in national health research. Using Jackson Heart Study data, with a sample population of over 4900 individuals, they examined whether every day and lifetime discrimination was associated with the prevalence of hypertension among Black Americans. The examination of burden and stress from discrimination was a unique feature of their investigation. Their findings suggested that not just the lifetime experience of discrimination, but also the burden and stress derived from the experience, was positively associated with the prevalence of hypertension.

Lastly, Zeiders et al. (2014) spotlighted that discrimination can trigger neuroendocrine responses which include cortisol secretion, a biomarker of stress that is stimulated from woeful experiences. After measuring diurnal salivary cortisol rhythms in relation to self-reported discrimination among 140 participants, their findings suggested that reports of discrimination predicted flatter diurnal slopes, particularly among racial/ethnic minorities. Although there is much more to extrapolate from findings like this, this investigation – as well as the other previously mentioned works – suggest that discrimination can affect the body in a number of ways, consequently generating the racially-patterned health disparities that continue to be seen among the larger body of investigations.

While majority of these studies link with the persistence of racial health disparities, an unforeseen result of these continued investigations is that through time, they have produced a body of academic works that are qualitatively jaundiced. That is, the body of these investigations have laid the foundation for an increasingly narrow focus on the factors of livelihood that serve to *weigh down* African-Americans. The emphases on negative health relationships and associations, however, is not conscious or intentional by the researchers of this work. In fact, many conduct these investigations with intent to provide an empirical basis for increased advocacy. By narrowly scrutinizing such negative factors rooted in Black livelihood, however, these studies inadvertently serve to reinforce the notion that the core principle of being African-American centers on stress, struggle, and the negative health consequences therein. We can see a view of this type of research and the skewed impressions it can create in the candid opening remarks of Ms. Harriet Jones, an interviewee in Dr. John L. Gwaltney's anthropological investigation, *Drylongso: A Self-Portrait of Black America*. She comments, "*Since I don't see myself or most people I know in most things I see or read about black people, I can't be bothered with that. I wish you could read something or see a movie that would show the people just, well, as my grandmother would say, drylongso*[1]*. You know, like most of us really are most of the time – together enough to do what we have to do to be decent people*." Here, she unequivocally expressed a criticism of studies of Black livelihood that the current research is still missing among the body of investigations: a spotlight on the alternative, more ordinary sides of life. Historically, Black Americans, and in particular Black men, have been demonized, feared, and pathologized. They have been regarded as lazy, criminally prone, hypersexual, intellectually inept, genetically inferior, and even violent (Payne, 2011). Low-income Blacks moreover have been under constant scrutiny by social scientists. Where researchers have

[1] "*Ordinary.*"

put forward their best effort to "objectively" examine Black livelihood, it often comes with conclusions that are overwhelmingly negative and pejorative.

The reason why Ms. Jones felt the way she did is not unusual. It is because within the core of the African-American historical timeline are rich and pervasive themes, which deeply inform the nature of exposures and responses to institutionalized and personalized discrimination. Yet they are seldom examined. From the revelations of hardship and resilience in slave era narratives, to the critical academic works of W.E.B. DuBois on double-consciousness as a stressful, yet advantageous psychosocial trait. From James Baldwin's 1960's outspoken truths to White-majority academic audiences on the realities of racism for Black people; to the bold and illustrious revelations of the politics of 'Black excellence' inscribed in a wide range of hip-hop albums. From the unified Black Lives Matter movement in response to police brutality and institutional oppression, to the inauguration of the nation's first African-American President, Barack Obama. In other words, one needn't study beyond the common narratives and themes of African-American history to see that lay individuals can have a variety of responses to the stimulus of stress and adversity. Individuals may accordingly succeed in these responses with different levels of effectiveness, in turn producing differential effects on their overall health and well-being.

The common thread throughout all of these experiences, moreover, which is seldom emphasized, is *resilience*; a trait exemplified by countless many who have endured a diverse array of racialized challenges and obstacles in the US. Furthermore, it is not *just* resilience that is notable, but rather the *normalcy* of that resilience—the fact of successive, intergenerational displays in the face of

unfair and un-relinquishing bouts of adversity and discrimination throughout the timeline of American history. Note that my emphasis here is not to suggest that *resilient responses* should somehow become a functional resolution to the persistence of racial health disparities. Instead, somewhere among this vast body of research concerning Black health should be an attempt to recognize that Black people are not simply passive receptors of discrimination and adversity either. They, too, have ways of molding their stances and positions toward challenges and obstacles; and these responses may also have unexplored mental, physical, and physiological health implications. This is likely a most centralized, earnest approach to understanding Black livelihood in both qualitative and quantitative contexts, and is a particularly fitting gap in knowledge in which to insert a Biocultural Anthropological investigation. Accordingly, this research seeks to observe and highlight the health effects of resilience in the face of discrimination and adversity among Black men in metropolitan Seattle.

Stepping into the Heart of a Historically Black Community

This investigation began in a location known as the 'heart' of Seattle's Black community, the Central District (CD). The community began in the late 19th century, and grew rapidly during the Great Migration when thousands of Blacks moved from the US South to Seattle, many to work for Boeing or other wartime industries. Due to a combination of many factors, including explicitly discriminatory practices like redlining and racially restrictive neighborhood covenants, by the 1960's the CD was the one African-American majority neighborhood (70 percent Black) in a city that was otherwise mostly White but with a sizeable Asian minority (Taylor, 2011). The CD was a midpoint for the Seattle civil rights movement. Protesters took to the streets and stood against

racial discrimination, participated in sit-ins, and did everything they could to make their voices heard and their presence known. Today, social tensions in the CD have evolved, and given the nature of this research, it was important not to visit just *any* Black community, but also to find a place where discussions of the politics of Black livelihood occurred. There was no better place to step into than Black-owned barbershops, including Earl's Cuts and Styles, at the corner of 23rd and Union.

Black-owned barbershops have always been more than just places to get a shave and a cut. They are places to talk about the events of the day, to exchange stories, and to fortify and cement the politics of Black excellence and resilience. Little did I know, however, that Earl's shop would not only be located at the heart of this historically Black community, it was more like the aorta: a vital structure to the community's very integrity.

Conversations at Earl's jump around like a weekend basketball game on the neighborhood court. Those who enter have two choices: jump in and speak up, or fall back and just watch. On any given weekend morning, one may find patrons and barbers disputing who their favorite and not-so-favorite rappers are. High school regulars talking about their recent track race or sports hobbies. And if there is Old School R&B jams playing in the background, the men may time-travel to the years of their youth and bring the whole room with them. Stories of tense football games, of mayoral candidates assaulted with bullhorns, of young women they took to senior prom in 1989. The ordinary sides of life.

This barbershop is a place where Black men of all backgrounds, ages, and lifestyles find a place of communion. Some come in just to hang out. Others enter with scruffy afro-puffs for a walk-in appointment. Some are fathers who make a high-end salary; others are business professionals, PhDs, or working class. Men with Afros, Dreadlocks, some with faded cuts simply looking for line-ups. A place where people of different walks, varied health, and diverse experiences are uniquely concentrated. Barbershops, for this reason, are ideal places to collect data on the wide range of experiences of African-American men.

However, what used to be a hustle-and-bustle lively Black community that happened to have a barbershop within it has receded dramatically, and Earl's has effectively become a last bastion for this slowly eroding and gentrified neighborhood. The culture this community once fostered was a thriving district filled with Black-owned businesses, churches, and schools. Now, newly built luxury apartments have replaced twenty-year old soul food restaurants, and recreational pot shops have replaced bars and hangouts. With the recent gentrification, the community's history has become constrained to nostalgic conversations, museum venues, and the declining prevalence of Black residents.

The district is 16.8 percent Black, down from over 70 percent in the 1960s when housing discrimination and residential redlining forced Blacks and others to live in the CD. Given the location's convenient access to downtown, the University district, and a near straight-shot to the airport, recent White residents now comprise 55 percent of the total population (US Census Bureau, 2010). In addition to their increasing numbers have come increasing property values and costs of

living; in turn forcing lower-income Black residents to move south. The massively shrunken community I entered was once the shining epitome of the very resilience I wished to investigate. Now, after all of these years of change, it was insightful to witness how the livelihoods of this community compared today.

If it was not obvious already, this community had been enduring multifaceted forms of discrimination and adversity well before the time I had introduced myself to it. A large portion of their struggle was historically systemic, but there were many other kinds of struggle as well. Regular police raids on the AfricaTown cultural center, forced evictions of occupying storefronts, and even shootings within the barbershop itself. Things that served to destabilize this already eroding and withering community. One man named Eric (name altered for privacy reasons) expressed that Seattle's elected officials did not care about Black folks or what was happening in the CD. "Many of them [elected officials] are in on the gentrification," he said. "They only come around communities of color with a shovel or a camera when something happens and they want to pander for votes. They only ever really care about the issues Whites face, and never ours [African-Americans]."

Another man in the shop at this time, Von, had been living in the CD for fifty-five years. Allegedly, his nephew, who he chose not to name, was 33 years-old when he was gunned down by law enforcement in March of 2016. He was shot seven times during what was supposed to be a routine traffic stop – a similar scenario to the nationally known case of Philando Castile. "Losing him [his nephew] destroyed his family," Von sighed, "He left behind a six year-old baby girl, and now her

mom is just struggling. Barely keeping food on the table, let alone paying bills. It's like they [are] exterminating us out of here." And then Eric replied to Von's reflections, "It just ain't fair. And look at what they just did with that [Charleena] Lyles girl, killing that woman in front of her babies. Ain't a damn thing changed. They ain't gonna get justice and their babies are gonna be left to fend for themselves."

After rapidly exchanging difficult experiences, another patron Stephaun chimed in, "I know two of my homeboys been in the [penitentiary] for six years for selling weed in the CD. They [are] still in prison today. And look [at] what they got across the street – Uncle Ike's pot shop. They over there making $1,000,000 [per] month and they lock up my guys who just trying to make a dollar for they [sic] families." Another young man at another barbershop location named Darrell, a recent graduate from the University of Washington, also mentioned his experience with the police, "Me and my friend were headed back to campus when we were pulled over by the cops. Even though we weren't drunk, had done nothing wrong, he requested both of our IDs. About 5 minutes later, he pulls my friend out of the car, hands on the hood, and he began antagonizing us; telling us that if we didn't obey him bad things could happen. We tried explaining to him that we were just college students and his only response was, 'Oh so you think you're one of the smart ones? That doesn't mean anything to me. Do I need to get a K9 unit out here?'" Darrell explained that the officer kept them for 45 minutes with at least five cop cars and a drug-sniffing dog surrounding them before they were finally let go. "We didn't do nothing," he said, "and it was like they just wanted to test us and push our buttons. I was scared they were going to plant drugs on us." These men, and many others who grew up in the CD, had been through a lot. There were many disturbing

events that had disrupted their lives, and yet here they were still able to reflect and openly discuss them, all while clinging on to the withered community they still called home.

Recruitment Efforts in this Black Community

To introduce my research initiative into this environment revealed another layer of complication: many of these men were distrustful of participating in any biomarker or scientific endeavor that included them in the spotlight. African-Americans, and other racial/ethnic minorities, remain underrepresented in scientific research, and the reason abound. Among the body of research literature, the most prevalent explanation concerns limited access to specialty care centers and an overall lack of awareness about scientific endeavors (Brown Speights et al., 2017; Castillo-Mancilla et al., 2014). However, after probing into this topic within the barbershop community, I found most of these men's reasons to be less systemic-oriented and more personal. The idea of research on the health effects of resilience sounded fine and inspiring on its own to them, but many who were distrustful repeated citations of the Tuskegee syphilis trials, in which Black men were understood to be injected with the disease, and barred from receiving treatment. Others cited the immortal cell line of Henrietta Lacks, and the billions of dollars in profits made from her body for which her family has received nothing. Among their reasons, 'fears of exploitation' greatly outnumbered a 'lack of access' to such opportunities. So the mere thought that an unknown researcher could potentially record descriptive information about them, take a biological sample (otherwise, a piece of their body), and possibly frame them at a crime scene by planting their specimens as evidence, for example, may sound outlandish on the surface, but was entirely warranted to them.

Mentioning the topic of this research then garnered divisive reception. On one end, there were men who were largely distrustful for the reasons above. On the other, some were enthusiastic. Then there were the ones in the middle – the ones who 'fell back and just listened'; open to persuasion from both sides. Debates about the intentions and objectives of this research overshadowed my attempts to recruit research subjects. Participating seemed less important than debating whether one should, and for good reason. Some men spent efforts trying to convince others not to participate; others met those dissuasions with counter arguments. On and on this went, and in the midst of these debates *everyone* probed me about the theoretical framework of the research itself, an effort to scrutinize the soundness and honesty of my intentions.

Central Measures of Interest

Measuring Racial Discrimination

As explained to them, the factors measured in the research are straightforward. The basic structure of this framework focuses on racial discrimination. To the extent that the cumulative effects of discrimination are negatively associated with mental and emotional well-being, chronic health status, and that these experiences originate in childhood, it was important to measure discrimination in different ways. As explained to the Barbershop communities, this study measures racial discrimination using three unique survey tools: (1) the everyday discrimination scale, (2) the major experiences of discrimination scale, and (3) the ambiguity of discrimination scale.

Everyday Discrimination

The first tool captures the perceptions of discrimination that occur in everyday life, called the *everyday discrimination scale* (Clark et al., 2004; David R Williams et al., 1997). It has good internal consistency (alpha coefficient = 0.91), reliable sampling adequacy (KMO = 0.82), and construct validity for application among Black Americans (Doyle 2017 Unpublished Pilot Study).This 9-item tool screens for how a person feels they are perceived or treated within a society. The survey items are listed as statements which address themes such as whether a person is treated with less courtesy or respect than others are, receives poorer service than others do, is perceived to be less intelligent or more dishonest than others, and other proximally related matters. For example, a statement may read, "You are treated with less courtesy than other people are;" or, "You are treated with less respect than other people are." Given the nature of cumulative experience, the survey tool is structured on a Likert Frequency Scale and the numerical values of each answer are summed to composite an overall score. 'Frequency' here refers to how often each event happens, whether it is 'Almost every day' (scored as 5), 'At least once a week' (4) 'A few times a month' (3) 'A few times a year' (2) 'Less than once a year' (1), or 'Never' (0). Once completed, the items are summed to create an overall Everyday Discrimination score. Scores may range from 0 to 45.

Major Experiences of Discrimination

The second tool captures specific experiences of discrimination that have occurred throughout one's adult life, called the *major experiences of discrimination scale* (David R. Williams et al.,

2008). It has decent internal consistency (alpha coefficient = 0.78), reliable sampling adequacy (KMO = 0.64), and construct validity (Doyle 2017 Unpublished Pilot Study). This 9-item tool accounts for nine major experiences of *unfair treatment* in domains such as employment, education, housing, and interactions with the police that respondents have experienced. For example, a statement may read, "At any time in your life, have you ever been unfairly fired?" or, "Have you ever been unfairly stopped, searched, questioned, physically threatened or abused by the police?" In the context of the survey, 'Major experiences' were attributed to one's race/ethnicity (i.e. racial discrimination), and were distinguished from those attributed to other social status categories (i.e. non-racial discrimination). The response structure in this tool is a simple 'Yes' (coded as 1) or 'No' (coded as 0). Once completed, the items are summed to create an overall Major Discrimination score. Scores may range from 0 to 9.

Ambiguity of Discrimination [2]

The third tool measures the perceived ambiguity of discriminatory experiences called the *ambiguity of discrimination scale* (Thomas, 2015). This 4-item tool has reliable, and expected, internal consistency (alpha coefficient = 0.7) and sampling adequacy (KMO = 0.57) among Black Americans (Doyle 2017, Unpublished Pilot Study). Although one might expect for the threshold of significance to be exactly 0.7 for Cronbach's Alpha Scores, in this case, internal consistency is met because the tool is designed to measure *ambiguity*, and would therefore be expected to score 0.7 in order to be included in the study. The idea behind the inclusion of this tool is straight-forward: discrimination does not always have to be overt. It occurs more often on a spectrum of

[2] This measure was later removed from formal analysis in the current investigation because it did not significantly relate to any of the investigations of interest.

severity and clarity, for which on one end, experiences can be rather obvious; and through to the other, can be subtle, implicit, or otherwise go unnoticed. Within the middle ground of this spectrum is the ambiguity of such discrimination. That is, individuals may undergo an internal attempt to reconcile whether discrimination is actually occurring, or whether it is coming from an interpretation of otherwise innate and autonomous behavior. Previous research on racial discrimination and health suggests that the experience of ambiguous discrimination may be more detrimental to mental and emotional well-being than overtly prejudiced treatment (Crocker & Major, 1989; Major et al., 2003). The usefulness of this tool is to examine the health-related consequences of one's uncertainty about whether they are being treated differently due to their race. The instrument is structured on a frequency scale exactly like the Everyday Discrimination scale. However, the domains addressed here are *how often* (1) a respondent expects to be viewed differently because of their race, (2) they wonder whether their race influenced how they were treated, (3) they regretted not challenging or questioning how they were treated, and (4) they regret having suggested or wondered whether racism occurred. Once completed, the items are summed to create an overall Ambiguity of Discrimination score. Scores may range from 0 to 20.

Measuring Resilience

Among the discussions about racism and the stressful conditions it has caused throughout several men's lives, the central topic of interest in this research was their resilience despite these negative encounters. As this investigation of the concept of "resilience" and "resiliency" applies to the attitudes and behaviors of Black men in these spaces, *resilience* in this context should be understood in terms of how these men organize meaning around feeling well or secure, and how the men choose to survive in relation to adverse socio-structural conditions.

The stressors reported by individuals in resilience research have been similar to those reported by individuals in other clinical and depression studies. Participants of these investigations often report experiencing elevated adversity, emotional distress, mild and moderate depression, and heightened psychosocial stress. Current research endeavors show, however, that resilience can be a strong modifier of these problems. Hjemdal et al. (2007) found, for example, that high scores using the Resilience Scale for Adolescents were associated with fewer depressive symptoms among young adolescents, even when controlling for other known risk factors. Hjemdal et al. (2011) later found that higher resilience scores predicted lower levels of depression, anxiety, stress, and obsessive-compulsive symptoms after controlling for age and gender. Campbell-Sills and Stein (2007) moreover used the Connor-Davidson Resilience Scale (CD-RISC) among five-hundred men and women in the US and found that this scale strongly modified the experience of trauma on an individual's resilience score. Resilience research using the READ and CD-RISC have been validated for use among diverse global populations, yielding consistent and compelling findings. However, there are few, if any, studies that analyze these effects on mental health markers in Black Americans who experience discrimination; this is problematic, particularly given the timeless historical and local relevance of the topic. Additionally, there are some limitations to current existing measures of resilience, which have not been identified and accommodated for suitable application to Black American populations.

Freitas and Downey (1998), for example, conceptualized resilience as a dynamic model, which draws upon cognitive-affective systems. That is, a person who maintains positive-oriented dispositions and affectivity will be more likely to be resilient in the face of adversity and struggle.

This framework presents resilience as a psychological factor that mediates units on contextual and environmental variables (Payne, 2011). A theoretical causal model of the psychosomatic effects of resilience may follow accordingly (Figure 1). First, an individual must be exposed to discrimination or adversity in order for their resilience to be relevant in the model. On its own, these negative exposures would be expected to cause a number of degenerative health outcomes including decreased mental and emotional well-being, poorer health status and health outcomes, and even potentially higher stress physiologic output. Synchronously, these multifaceted somatic responses to these stressful experiences will result in truncated overall quality of health and life, and may be measured through Everyday and Major Discrimination, hair cortisol concentrations, as well as in reports of symptoms of depression, anxiety, and stress. However, for those individuals who have resilient responses to these exposures may buffer some of the damage expected to harm their minds and bodies. Resilience would be expected to act as an intervening force in this causal relationship. Consequently, as resilience may modify the effects on health, one would expect to observe comparably positive health outcomes.

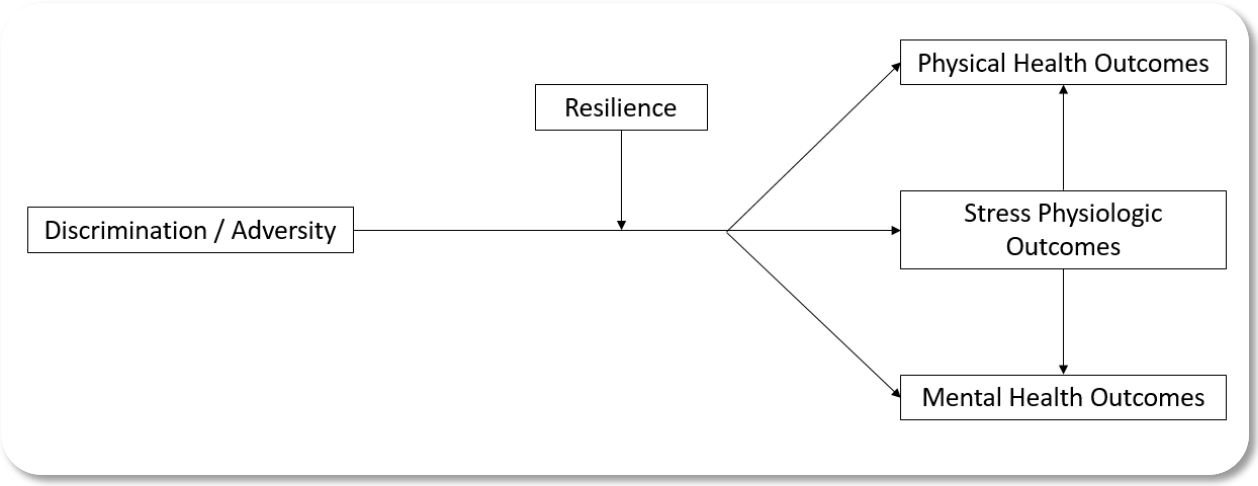

Figure 1. A causal theoretical model of the way that resilience may influence health outcomes in Black Americans

While this conceptual framework has strong validity, it is still limited in its application for two reasons. First, it places too much onus and responsibility on individuals, and can give social scientists empirically based endorsement for identifying who is and is not *resilient*. On this presumptive basis, if the men do not meet the perceived standards of *success*, then one may conclude that they are not resilient. Second, the framework does not account for any historical or environmental context from which displays of resilience may arise. Freitas and Downey (1998) do not consider the responsibilities of the community or the effects of broader social structures (police harassment, economic struggle, family) as having a significant influence on the development of one's resilience.

This is one area where the present research attempts to improve upon the existing ideation of resiliency. A historically informed contextual perspective is useful for identifying patterns of resiliency across time, and in the context of African-American livelihood and history, intergenerational displays of resilience have been a fundamental part of Black identity, rooted in communal places such as churches, and even barbershops. Adopting instead the "Site of Resilience" theoretical model proposed by Payne (2011), the current investigation relied upon measures of resilience from barbershops settings, a traditional place of communion in which the entanglement of Black masculinity and resilience is a fundamental part of the culture. It is only through critical examination of resilience in a space such as this, which accounts for multiple influences, that resilience can be properly measured and understood in Black livelihood. In this context, resilience is dependent on essential ethnic and culturally based relationships with people in those spaces, or "sites."

Accordingly, the topic of resilience sparked the most discussion in the barbershops we visited. Despite the numerous stressors that existed in these men's lives, such as racism, incarceration, and homicide, most men expressed their forms of resilience in four key ways. The first was perseverance, their ability to move forward despite the hardships with which life weighed on them. This included behaviors like trying harder, refusing to quit, and not letting society dictate what are and are not their own limitations in life. Second was the idea of reflecting on difficulties and failures in order to bounce back with an improved and nuanced approach; that is, displaying a commitment to learn from their hardships and grow forward rather than regress backward or become stagnant. Third, was their recognition that the barbershop was one of the places they would go to for some psychological and emotional support. Although the shop is not often a place where Black men come to vent their frustrations and difficulties, a common expression was the sentiment that the barbershop was a place to go to for a "breath of fresh air"; in essence, the place to go to fortify and cement one's own resilience despite the hardships they face week-in and week-out. Fourth, among some of the men was a sentiment for spirituality and religion as an essential part of their resilience. Some men expressed that without their reliance on faith, and the knowledge that God (or some other form of spirituality) was a crucial part of their existence and their ability to deal with challenges as they presented themselves, they may not have otherwise held a foundation for displaying a resilient disposition. While spirituality was not used to describe resilience among everyone, it was a repeated topic of discussion that illustrated the many ways in which some men may produce resilient mentalities and behaviors. All of these themes were accounted for the in CD-RISC model of resilience, and was accordingly utilized in the present study.

With the environmental and historical contexts in mind, it should be emphasized that resilience may still have some unexplored mental, physical, and physiological health dimensions. Due to its inherent relations to the experience of stress, moreover, constructs of resilience may be applied to theory surrounding the mechanisms of chronic health and disease. In a recent study, Smith (2006) demonstrated, for example, that personality characteristics can have significant influences on a person's physical health, where chronic anger/hostility and overall negative affectivity were identified as risk factors for poorer health. Conversely, optimism, social dominance, and other traits (potentially resilience) were observed to reduce risks. Accordingly, the question at the center of this dissertation is: given the context in which resilience may arise, can resilience in Black men partly determine the influence of discrimination on their physical and mental health? If so, is it beneficial? Research intersecting these areas may provide a rather refreshing and empowering reminder of the importance of resiliency – as well as available opportunities for success – in the search for health equity.

This investigation uses the abridged Connor-Davidson Resilience scale, which comprises 10-items (CD-RISC-10) factor scored on a 5-point Likert scale ranging from 1 (Completely Agree) to 5 (Completely Disagree). The items are measured in relation to the context of the environment, in this case race-based discrimination and stress. Examples of items are "I am able to adapt when changes occur," "I am not easily discouraged by failure," "Under pressure, I tend to stay focused and think clearly," and "I tend to bounce back after illness, injury, or other hardships,". These items were determined by the originators of the scale as capturing the essence of resilience, an otherwise difficult construct to measure. It has a good internal consistency (alpha coefficient = 0.92), stable sampling adequacy (KMO = 0.82), and construct validity. Significant correlations

have been found between the CD-RISC-10 and mental and emotional well-being (depression and anxiety) metrics (Campbell-Sills et al., 2006; Vaishnavi et al., 2007). The reliability and validity of the scale have been demonstrated in clinical studies and through correlation matrices by measures of hardiness, perceived stress, and stress vulnerability (Campbell-Sills & Stein, 2007; Cohen et al., 1983; Kobasa, 1979).

Measuring Mental and Emotional Well-Being

The men I had spoken to in the barbershops had endured many different kinds of discrimination. Yet, one thing that was not visible were the ways that they had internalized those experiences. It was one thing to have a conversation with them about their woeful encounters, and their varied resilient responses to such stressors. However, it was another to be able to probe deeply about their feelings and emotions regarding those events. In non-personal, masculine spaces such as the barbershop, these aspects of discussion were among the least to surface. While mental and emotional well-being were not central to the candid discussions I had with them, it was a particular theme of interest that the survey packet was designed to account for. Given the prevalence of research noting a strong association between exposures to discrimination and poorer mental health outcomes, it was important to account for psychological well-being in three domains: depression, anxiety, and stress. Conceptually, depression and anxiety are rather distinct, but *stress* poses some other problems in understanding negative affective conditions; that is, that both depression and anxiety are *stressful*. Regardless, a person is also capable of being stressed without suffering entirely from depression or anxiety. For this reason, Lovibond and Lovibond (1995) have established three clinically validated metrics for each domain respectively, and this tool, called the Depression, Anxiety, and Stress Scale (DASS) has been adapted for use in this study. The tool is

structured on a Likert scale with a value of '1' denoting 'Completely Agree,' '3' denoting 'Somewhat Agree,' and '5' denoting 'Completely Disagree;' while '2' and '4' serve as intermediary values, respectively. Values are then reverse coded in the post-data collection phase, and scored twice: (a) on each domain, respectively, and (b) with all three domains together.

Depressive Symptoms

The domain of depressive symptoms shows strong internal consistency (alpha coefficient = 0.93) and construct reliability (KMO = 0.83) among Black participants (Doyle 2017, Unpublished Pilot Study). The 7-item tool addresses themes of dysphoria, hopelessness, devaluation of life, self-depreciation, lack of interest or involvement in activities, anhedonia (the inability to experience positivity), and inertia (difficult to work up initiative). For example, a statement may read, "Sometimes I feel downhearted and blue," or, "Sometimes I feel that life is meaningless." Scores for depressive symptoms may range from 7 to 35.

Symptoms of Anxiety

The domain of anxiety symptoms also shows strong internal consistency (alpha coefficient = 0.86) and construct validity (KMO = 0.78) among Black participants (Doyle 2017, Unpublished Pilot Study). The 7-item tool addresses themes such as autonomic arousal (the body reacting physically to psychological stress), skeletal-muscular effects (trembling in the hands), situational anxiety, and the subjective recollection of one's own anxiety. For example, a statement may read, "I sometimes experience trembles," or, "I tend to feel like I'm close to having a full-on panic attack." Scores for symptoms of anxiety may range from 7 to 35.

Symptoms of Stress

The domain of stress symptoms shows strong internal consistency (alpha coefficient = 0.92) and construct validity (KMO = 0.82) among Black participants (Doyle 2017, Unpublished Manuscript). The 7-item tool accounts for topics relating to difficulty relaxing, nervous arousal, becoming easily agitated or upset, becoming irritable, and impatience with situations. For example, a statement may read, "I tend to feel impatient," "I tend to overreact to situations," or, "I tend to get agitated easily." Scores for symptoms of stress may range from 7 to 35.

Measuring Hair Cortisol as a Longitudinal Marker of Physiologic Stress

The collection and assessment of hair cortisol was the most hotly debated aspect of the research in that it was met with the most resistance, and rightly so. Given the historical legacy of scientific racism and the scars of trauma it has left on these people, collection of hair samples required the most effort and finesse. Research has shown that acute and chronic stress from frequent exposure to depression, anxiety, (and therefore discrimination, potentially) weaken the regulatory abilities of the hypothalamic-pituitary-adrenal (HPA) axis (Pochigaeva et al., 2017; Stalder et al., 2017). Dysregulated physiologic activity under constant stress then forces the body to withstand unending marathons of somatic wear-and-tear, elevating a person's morbidity and mortality risks through time. This biopsychosocial model is supported by a body of evidence and explains much about the persistence of racial health disparities in the US (Clark et al., 1999; Zeiders et al., 2014).

Recent research endeavors have turned to hair cortisol as a method for measuring longitudinal experiences of stress (Meyer et al., 2014). That is, as hair grows, cortisol is continuously embedded into the strand, serving as a marker of stress exposure over the length of time that the hair has accumulated. Given the nature of interest in experiences of discrimination throughout every day and major aspects of life, this study has also collected hair specimens from patrons in Black-majority barbershops to measure stress exposure in the context of these survey questions. But what about the outcome of stress among men who display high levels of resilience? Little to no research has explored this area. Therefore, this investigation makes effort to understand the mechanisms concerning resilient dispositions and their potential effects on physiologic status.

Collection of hair samples among these men not only revealed social and historical hurdles, but logistical ones as well. Although our collection methodology was inspired by currently established and standardized collection techniques (Meyer et al., 2014), the prevailing standards are apt for application in populations with straighter-textured and longer-length hair types. The first chapter of this investigation then seeks to validate a specially developed hair collection method for use in populations with Afro-textured and extremely short-length hair (i.e. Black men).

Adverse Childhood Experiences Survey (ACEs)

The Adverse Childhood Experiences Survey (ACEs) has been linked to psychiatric difficulties in children and adults and may relate to our other measures of interest (Chapman et al., 2004; Schilling et al., 2007). A number of research endeavors have investigated the predictors of ACEs and their causal effects on later-life health, and yet few studies have investigated the potential

racial differences therein (Chapman et al., 2004; Schilling et al., 2007). Also seldom investigated is how those experiences may relate to other positive oriented and resilient dispositions later in life. Accordingly, in the search for understanding how resilience may relate to mental and emotional well-being, it was important to collect data on participants' ACEs. The tool measures experiences such as physical and sexual abuse, poverty, homelessness, as well as witnessing things like death, illicit drug use, and family-member incarceration. The response structure in this 17-item survey tool is simply 'Yes' (coded as 1) or 'No' (coded as 0); where total scores are added across all questions. Scores may range from 0 to 17; where 'high' scores (scaled two standard deviations above the mean) would indicate high levels of adverse experience in childhood, while 'low' scores (scaled two standard deviations below the mean) indicate low levels of adverse experience. The scale has strong validity and reliability as demonstrated in a longitudinal study of adult retrospective responses (Hardt & Rutter, 2004).

Just World Beliefs

At times, the way in which a person views the world can often dictate the kind of experiences they have and the ways they may respond to those experiences. While racial discrimination can, indeed, be a jarring and stressful experience, it is possible that there could be differences in the way one perceives it. If an individual does not believe in a fair and just world, and is not guided by the expectations that their engagements in life ought to be, research suggests that they may be less likely to experience the deleterious effects that come from stressful experiences when compared to someone who believes in a just world (Eliezer et al., 2011; Hagiwara et al., 2015). Survey items include responses to whether an individual feels as though the world treats them fairly, that they get what they deserve, whether they earn the rewards and punishments they get. For example, a

statement may read, “I feel that I get what I deserve,” “I feel that I earn the rewards and punishments I get,” or, “I feel that people treat me fairly in life.” Response options are structured using the Likert Scale (1 through 5) format seen in previously listed survey items. While this survey tool says little about one’s report of resilience in the face of adversity and discrimination, the Just World Beliefs scale may be useful for interrogating some of the psychological dispositions that come with appraisals of discrimination. Studies have demonstrated that the scale has strong validity and reliability and so has been included in further analysis (Dalbert, 1999; Eliezer et al., 2011; Hagiwara et al., 2015).

Additional Measures

There are additional measures which were included in this research endeavor but that are not elaborated on in the coming chapters. These are measures which are proximally related to the dynamic of discrimination and resilience, and will be investigated in future research.

John Henryism

John Henryism is a high-effort coping scale developed by James (1994) which appraises an individual’s feelings of control of their environment through hard work and determination. It is based on the American folklore of a Black steeldriver, and can be best understood as a cultural statement about how Black Americans must often attempt to control their stressors through hard work and determination in order to overcome adversity and struggle. It is a 12-item survey that captures similar themes relating to that of resilience. Items include statements related to the following, “I’ve always felt that I could make of my life what I wanted to make of it;” “Once I

make up my mind to do something, I stay with it until the job is completely done;" "I like doing things that other people thought could not be done;" and "When things don't go the way I want them to, that just makes me work even harder." A number of research initiatives have found that John Henryism can impose deleterious consequences on one's health, particularly among those Black Americans with low educational attainment but high John Henryism scores (Hudson et al., 2015; Subramanyam et al., 2013). In a research endeavor such as this, one important question to ask is how John Henryism differs from that of *resilience*, especially since one has been noted to have adverse consequences on health, while the other has more health-protective benefits. Pearson's Correlation statistic shows that John Henryism and Resilience have a correlation coefficient of 0.835, suggesting that they are highly correlated and potentially similar in a number of ways. The scale shows strong internal consistency (alpha coefficient = 0.89) and construct validity (KMO = 0.69) among Black participants (Doyle 2017, Unpublished Pilot Study).

Double-Consciousness

In using the term "double consciousness," W.E.B. DuBois drew on two main sources. One of these was the figurative product of European Romanticism and American Transcendentalism. The ways in which these ideas of reality and perceptions of the world were ingrained into the very fabric of his psyche, in turn resulting in a skewed perspective of his own racial identity. The other, not entirely unrelated, were his reflections as an African-American. Together these generated a case of split personality, in which conflicting ideas about one's identity of being Black clashed with cultural standards of normativity and hegemony that existed within his society and within himself. We developed a scale to measure the incongruity of this dichotomy, based on cognitive dissonance theory (Elliot & Devine, 1994; Festinger, 1962; Shultz & Lepper, 1996). That is, if the reflections

of oneself in the world, and the beliefs about the way that the world views oneself are incongruent, this may be a cause for more stress than if these two views were more aligned. This metric was piloted during the data collection phase, and will be investigated in future research.

Markers of Physical Health

Bridging the gap between exposures to discrimination and physical markers of health is difficult. David R Williams et al. (1997) examined the extent to which racial differences in socioeconomic status, social class, and acute and chronic indicators of perceived discrimination accounted for Black-White differences in self-reported physical health (as measured by a clinically-validated self-reported health survey). They found that racial differences in self-reported health were attributed to high scores of perceived discrimination among Black participants. In a similar study, Borrell et al. (2006) measured the associations of self-reported physical health and discrimination among 1,722 American men and women as part of the Coronary Artery Risk Development In young Adults study (CARDIA). They found that good self-reported health (a proxy of physical health status) was significantly negatively associated with perceived discrimination. A number of other studies have also validated and recommended the use of self-reported health metrics in future research endeavors concerning experiences of discrimination (Harris et al., 2006; Krieger et al., 2005). For this reason, this study includes the Medical Outcomes Study Short Form (SF-8) (Lefante et al., 2005). The survey addresses themes regarding the overall health-related quality of life.

Resting Blood Pressure and Heart Rate

In addition to the physical health metrics, resting blood pressure and heart rate were also measured using a calibrated Panasonic EW-3109W Blood Pressure monitor. These were recorded because of their previously discussed connections to exposures to discrimination in multifaceted ways (Krieger & Sidney, 1996; Krieger et al., 2005).

Important Ideas to Keep in Mind

The Overlapping Effects of Race and Class

Given the legacy of systemic and institutionalized forms of discrimination, there has been debate in academic forums as to whether one's race, the racism they endure, or their position in society plays a greater role in determining health outcomes of individuals. Undoubtedly, all factors play a significant role. And although there is a body of investigation spotlighting the relationship between socio-economic status (SES) and health, as well as race-specific differences in health outcomes, the effects of race and SES are often confused and confounded. Thomas (2015) notes that the confusion can be simplified to two main issues. First, research on SES-health relationships have standardized White-majority samples as a means of interpreting societal and health-specific mechanisms among multi-racial/ethnic populations. Despite the body of work emphasizing the importance of race *and* class in determining health outcomes, the research in these areas have preserved the assumption that social processes work the same way across racial and ethnic groups without ever empirically testing them. Second, in the context of African-American livelihood, the body of these studies also reflect the failure to assess social relationships and modalities across the spectrum of the Black American experience. Simply put, such narrow-focused investigations then

have led to an overgeneralization of the mechanisms that may drive racial disparities, resulting in the confluence of race and class.

So what might this imply on the dynamic of racism and resilience? It is possible that our expected findings will be different from studies conducted among, and findings representing, a predominantly White subject population. Accordingly, given the social and environmental contexts of this research, it is possible that the findings from the current investigation will not reflect the findings of other research studies. Scholars are still trying to understand the mechanisms through which both race and class remain salient, particularly as they concern individual health and well-being. When applied to the context of health, research suggests that Black Americans often face a situation of "diminishing returns," meaning that they have fewer gains from income and education relative to Whites (Thomas, 2015). This position is rather consistent with the broader research on the Black experience in America, and may underscore the racially relevant development of a theoretical framework of Black resilience (in place of a more generalized construct of *resilience*).

This dissertation seeks to investigate the health effects of resilience in Black Men who face discrimination and adversity through two important ways. First, it seeks to observe how resilience, in the context of discrimination, affected the physiologic stimulus of the body by analyzing hair cortisol concentrations (HCCs). The first study attempts to develop and standardize specimen collections for extremely short-length afro-textured hair because the current prevailing collection methodology is inadequate for application among this group. The second study then tests the

effect-modifying property of resilience on HCCs in the context of perceived discrimination. Lastly, the third study seeks to test the effect-modifying property of resilience on mental and emotional well-being in the context of discrimination and adversity. Accordingly, this dissertation reports the results of an interdisciplinary quantitative study of the resilience of Black American men. It explores the significance of their exposures to unique stressors and their ability to cope across social and health-related lines in a three-paper investigation. By measuring the health effects of resilience, particularly in relation to the experience of discrimination, findings could provide further understanding of the complex mechanisms involved in the experience of psychosocial stress, discrimination, and their relation to the health of Black men and beyond.

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STUDY #1: DEVELOPMENT AND VALIDATION OF HAIR SPECIMEN COLLECTION METHODS AMONG EXTREMELY SHORT-LENGTH AFRO-TEXTURED HAIR

ABSTRACT

Cortisol, a biomarker of stress, is slowly deposited into the growing hair strands on the head. Meyer and Novak (2014) established a method for hair cortisol extraction and analysis, and showed that hair cortisol can serve as an integrated measure of psychophysiological stress activity during the period of hormone incorporation into the hair. The hair sample collection methods offered by Meyer and Novak (2014) however, (i.e. cutting as close to the scalp as possible with scissors,) is inefficient when collecting samples among participants with Afro-textured and extremely short-length hair types (Black men). In this article, we propose an alternative standardized method for collecting hair among this group. Our findings suggest that this new method may be a viable alternative, and underscores the importance of diversifying hair cortisol research beyond the limitations of relying on data from European and European-descendent populations.

BACKGROUND

Hair cortisol concentrations (HCCs) have recently emerged as a biomarker of *chronic* stress. Although measurement of cortisol in saliva, plasma, and urine has been useful for understanding physiologic stress activity (Nepomnaschy et al., 2012), the samples from these matrices only reflect *acute* responses to stressful stimuli, presenting a number of logistical and methodological hurdles in their assessments (Pollard, 1995). Hair, however, grows over extended periods, and HCCs are incorporated continuously into growing strands. Strands of significant length preserve hormone concentrations for up to six months of accumulation (Dettenborn et al., 2012), in turn

allowing researchers to examine the relationship between *chronic* stress and HCCs across multiple dimensions of life-related stress (Pochigaeva et al., 2017; Russell et al., 2012; Vliegenthart et al., 2016).

Current research findings suggest that elevated HCCs are associated with sociodemographic factors (Vaghri et al., 2013), mental and emotional well-being (Pochigaeva et al., 2017; Staufenbiel et al., 2013), and even cardiovascular disease (L. Manenschijn et al., 2013). The body of published HCC studies, however, either focus exclusively on Europeans or European-descendant populations, or have not included assessments of the racial/ethnic composition of their sample (L. Manenschijn et al., 2013; Stalder et al., 2017; Vliegenthart et al., 2016). Little attention, consequently, has been given to scientifically underrepresented groups – including African-Americans – who are likely to have high rates of chronic stress in the US. Although there are a few studies which have assessed the feasibility of HCC research among racially and ethnically diverse sample populations (Fischer et al., 2017; O'Brien et al., 2013; Wosu et al., 2015), these studies have not addressed a remarkably important challenge in this work among such groups—That is, that the current prevailing collection method (scalp-level scissors collection) is not well suited for application among individuals who do not have straighter-textured and long (> 1 cm) hair. Where at least one study has made an attempt to spotlight this group, it was limited by its overwhelming observation of Black women (80%), for whom hair samples are generally of abundance (Lehrer et al., 2016). The prevailing methodological standard, then, has inadvertently created a category of exclusion for many Black men, whose hair is usually kinky-coiled and shorter than 1 cm in length. Despite the average growth rate of human hair being approximately 1 cm per month (Wennig, 2000), for example, many Black men cut their hair to scalp-length, on average, every two to three weeks,

consequently resulting in their exclusion from studies, or at least their disproportionate under-representation in HCC research.

On the Importance of including Black Americans in HCC Research

Given that HCCs are associated with sociodemographic factors, mental and emotional well-being, and even cardiovascular disease, it is surprising that only few research endeavors have made efforts to expand their investigations to include assessments of people of color, with none including a representative sample of American Blacks. The CDC reported that in 2014, for example, one of the leading intrinsic causes of mortality for this group was cardiovascular disease, brought about in part by the long-lasting systems of unequal treatment and discrimination (Heron, 2016). In addition, Mouzon et al. (2016) spotlighted that Black Americans who are exposed to these chronic bouts of discrimination and stress will experience degenerative effects on their mental and emotional health and well-being. Other research endeavors continue to recognize these relationships as well (Thomas, 2015; Triana et al., 2015), suggesting potentially deeper-rooted connections that may be effectively addressed through HCC research.

Research into psychosocial forces on health can be traced to the early studies of stress and disease by Selye (1955). His work suggested that the body would seek to maintain homeostasis when aroused by environmental stressors. In other words, the body will respond to stressors in such a way that it will attempt to maintain somatic equilibrium through physiologic processes. The hypothalamus, to illustrate, is a portion of the brain that has important regulatory functions for the body, including psychophysiologic stress responses called *allostasis* (McEwen & Seeman, 1999).

Upon detection of an environmental or social stressor, the hypothalamus will send a message through nerve pathways to the pituitary gland, which translates the message into hormones that are discharged into the bloodstream (HPA axis) (Kudielka et al., 2004). When stress responses are adequate, homeostasis (or equilibrium) is achieved and the body can be buffered from the negative effects of stress. When responses cannot compensate for taxing stimuli, however, a deleterious strain is placed on the HPA axis. Under continuous strain, or chronic stress, the organism's allostatic capabilities will slowly erode, in turn impairing the robustness and effectiveness of future physiologic responses to stress through time. This circumstance is called *allostatic load*. The basic concept behind this is that the more wear-and-tear imposed on the soma, the higher level of deleterious load there will be on its allostatic properties, in turn increasing later-life risks of disease (Barr, 2008; Edes & Crews, 2017). Given that chronic stress and wear-and-tear are fundamental components of this mechanism, it is surprising that attempts to measure allostatic load rely on cross-sectional and acute markers of somatic stress. With these research foci, it is implicitly key to observe how they may affect the body in a longitudinal context. Although HCCs may not represent the vast number of markers that are available for assessment, HCC measurement is a pivotal next step in the advancement of longitudinal psychophysiological research.

In their assessments of the factors associated with allostatic load in a racially/ethnically diverse sample population, Howard and Sparks (2016) found that the biggest differences in allostatic load between non-Hispanic Blacks and Whites were that outcomes among Blacks tended to be associated with inflammatory markers (albumin, C-reactive protein (CRP)), whereas among Whites, outcomes were largely related to metabolic markers (body mass index (BMI), cholesterol, and glycated hemoglobin). Geronimus et al. (2006) previously proposed the heavily criticized

"weathering" hypothesis, which explains these differences as resulting from the biological chronic stress responses associated with cumulative exposure of racial minorities to social, economic, and political inequalities and marginalization. In other words, the outcome of allostatic load in Blacks is directly related to the experience of psychosocial stress from multifaceted forms of adversity. Synchronously, this body of research points to the importance of further investigations into the physiologic mechanisms of health and disease among Black Americans. Moreover, attempts to understand the broader context of these mechanisms may benefit from including Black Americans in future HCC examination, as cortisol is a biomarker that is triggered by the same events that deposit inflammatory markers into the body. But there are a number of limitations in attempts to include Black men in this research. In this paper, we discuss these important conceptual issues with the prevailing standard methodology as it applies to Black men, and propose an alternative collection method that accommodates these problems.

ISSUES WITH STANDARD SCALP-LEVEL HAIR COLLECTION USING SCISSORS

To include Black Americans in HCC research introduces methodological hurdles, many of which surround the physical properties of their hair. The prevailing standard hair collection methodology in HCC research, for example, follows a simple procedure: secure the entire length of the hair located at the posterior-vertex position (hereby referred to as the 'back' of the head), and cut as close to the scalp as possible with scissors, taking care not to nick the skin (Meyer et al., 2014). On a practical level, this collection method is rather straightforward – i.e. collect the hair. The idea is that as cortisol is incorporated into growing hair, the hair reflects a record of stress exposure over the span of time during which the hair grows, with most recent exposure nearest the scalp. It has been found that the back of the head has the greatest growth cycle synchrony and exhibits the

lowest intra-individual variation (Sauvé et al., 2007), and so researchers tend to sample approximately 150 strands from the back of the head only. One-hundred fifty strands is conventionally favored so that the researchers have gathered enough volume to run wet-lab analyses. This method has been established primarily with a desire for consistency with other studies conducted in this way. In our pilot investigation of the efficacy of this method among a randomly sampled group of 15 men or so, however, we found that this scissor collection method was undesirable and impractical in its application among Black men in four essential ways, resulting in their non-participation: (1) deterrence, (2) aesthetics, (3) hair length, and (4) curl pattern.

Deterrence

Keeping in mind the legacy of scientific racism and exploitation on Black Americans in science research, the idea of participating in a biomarker study on its own can serve as a method of deterrence. Although this represents a different set of issues than ones we are concerned with in this paper, it is important to recognize that this method of deterrence overlaps our more central methodological problem. Imagine that among those who might consent to participate in HCC investigations, there is still the issue of deterrence because of the prevailing standard collection methodology. It simply scares Black male participants away.

Aesthetics

Consider, for example, using the standard recommended hair collection method on a Caucasian woman with long, straight hair. Hair collection sites on the back of the head at scalp-level would

typically conceal any trace of missing hair (bald spot) under surrounding growth. Additionally, the number of strands hypothetically collected would not exceed 150 hairs (Sauvé et al., 2007). This method has relatively little aesthetic impact, and on this basis, it may be easy to recruit women in this category. This case is less so, however, for Black men. For the most common instance in which the man's hair is short, traditional collection methods would leave behind an obvious bald spot that could take weeks to recover (Figure 1). Having longer hair such as an Afro puff might hide this spot, but even then, the natural symmetry of the hair would be visibly disrupted, creating an undesirable condition that could also last for weeks. Consequently, the costs of participation for the Black male subject likely outweigh the benefits, resulting in his potential decline to contribute. In our preliminary research, and for this very line of reasoning, all prospective Black men recruited into our pilot study declined to participate if scissors were to be used on the back of their head. In addition, even if these individuals had consented to the scissors method, two other collection problems remain.

Extremely Short Hair Length

It has been estimated that human hair grows on average 1 cm per month (Wennig, 2000). Many Black men, however, cut their hair every two to three weeks, in turn creating another issue for which collection of Afro-textured hair in men can be difficult. Hair from the back of the head of many Black men is not likely to provide enough sample for extraction and assay analysis because it is generally too short for adequate mass to be collected. In HCC research methodologies that exclude Black participants, 150 strands, or sometimes 10 mg of hair, are generally gathered (Laura Manenschijn et al., 2011; Sauvé et al., 2007), but these collection strategies are not feasible with this group. First, it is difficult to control for strand count. With the 150-strand strategy, it is standard

to collect hair that is longer than 1 cm because it is easy to grasp and manage and is representative of approximately one month of stress exposure. Moreover, 150 strands gives the researcher more than enough hair to control for intra-strand variation. The scalp end of that hair is then placed on scotch tape to note its orientation, and hair is gathered from the same location of the head until the desired volume of hair is collected. Among Black men, and for lack of a better analogy, trying to grasp individual strands of short-length Afro-textured hair – and then taping the scalp-end of the strands – is like attempting to gather 150 individual grains of sand by hand and then strapping each of them on scotch tape relative to the side of the grain that was facing the ocean. It simply cannot be done (Figure 1).

One alternative would be to collect 10 mg, regardless of the orientation of the hair. The issue remains that some men's hair is so short that 10 mg cannot be reasonably collected from the back of the head on its own. Additionally, Meyer et al. (2014) recommends collecting samples greater than 10 mg to minimize the likelihood of obtaining assay readings below the lowest cortisol standard. In our preliminary study, there were many backside specimens collected that scarcely amounted to 10 mg. Given the added need to account for standard specimen loss from repeated tube transfers during sample processing, one can readily see that it would be difficult to work with

such small volumes of hair from just one section of the scalp from any single individuals belonging to this group.

Figure 1. A contrast of the conditions required to implement the scissors technique among straighter-textured, long hair, and extremely short-length, afro-textured hair.

Curl Pattern and Length Variation

Curl patterns also present some difficult hurdles in implementing the prevailing standard collection methodology. There are visible differences in hair types and textures across the spectrum of human diversity (Hrdy, 1973). The hair of people of African ancestry is no exception. Porter et al. (2005) demonstrated, for example, that Afro-textured hair can encompass a wide array of curl patterns and lengths, and that this diversity can result in significant natural mechanical differences between individuals. Such natural variation and dissimilarity among a single subject group, then, may suggest that employing the same scalp-level scissors sampling technique across all could function with differential levels of feasibility, efficacy, and success. If one were to limit collection to long Afro-textured hair, for example, one would encounter some samples that would be easy to control

for length, but also inevitably encounter others made up of interwoven coiled hair that could be next to impossible to control for "true" length.

Imagine then that many with short hair still have tightly coiled curl patterns. Attempts to identify the scalp end of the hair, and place them uniformly on scotch tape, would be futile because the hair inevitably coils on itself, and onto other strands. Unavoidably, a conglomerate of hair may simply end up stuck to the tape with no clear distinction of which end corresponds to which.

Other Factors of Variation

Next to these four essential factors of non-participation, there is still the issue of sample variation. Some participants may provide hair samples of significant length, while others may fall into the "extremely short" criteria previously discussed. One could certainly structure the eligibility criteria to include only those who have substantially lengthy hair (as the current criteria are structured), but most Black men would not be eligible and so this structure would hamper attempts at obtaining representative samples.

PROPOSED ALTERNATIVE

The current prevailing collection standards create a complex circumstance in which the recommended collection methods are inadequate when applied to many Black men. We propose an alternative collection method that may account for the issues of deterrence, hair length, aesthetics, and curl pattern outlined above.

Addressing Deterrence

Our collection method for recruiting a representative sample of Black men that accounts for deterrence is straightforward. First, in order for this collection methodology to be effective, recruitment and collection must be conducted in a barbershop, preferably those that cater predominantly to Black men. Black-majority barbershops are often places of communion, where the men go on weekends to get haircuts, and also to hang out and talk about important issues and events. While the politics of Afro-textured hair have been subject to debate for many years, this setting is the most ideal for recruiting potential Black research participants because collecting hair samples is something that sparks discussions and interests. Barbers and patrons will be more likely to participate when it is pointed out that while their hair could be thrown away, it may be better put to use through their anonymous donation to scientific research. While many will undoubtedly be deterred by the mention of science research—and for legitimate historical reasons—others will be happy to participate, knowing that the donation of their specimens is *anonymous*. Additionally, by providing transparency to patrons throughout the data collection and analysis process, through e-mail updates, online videos, and forum discussions, researchers can assure their participants that the hair will not be used in an exploitative, inhumane, or otherwise non-consented manner.

Addressing Aesthetics

Concerning deterrence through aesthetics by using scissors, patrons have typically entered the shop to get a scalp-level haircut, regardless of the length of their hair. Given this circumstance, rather than scissors being used on their heads, clean hair clippers are instead recommended because it is a tool that the patrons implicitly consent to use when they sit in the barber's seat. During collection,

the barber separates the hair from the scalp by running the clippers over the desired section of the head in one single swoop. The researcher collects the hair and inserts the specimen into a tube, noting the section of the head to which it belongs. Using this method, patrons will still get the haircut they entered for without fear of sacrificing a neat and clean style for the sake of science research. The only difference in their experience is that their hair is collected by a researcher rather than tossed in the disposal bin.

Addressing Short Hair Length

Since it is difficult to control for true length, and to sample from the back of the scalp alone in many cases, we propose collecting from sections of the entire head; that is, from the superior region of the scalp (hereby referred to as the 'top'), the left and right lateral regions (hereby referred to as the 'side(s)'), and the back. Here, it is important to collect uniform samples across participants. Given that attempting to secure the hair to note its orientation and to measure its length is difficult, we instead recommend controlling for length by asking the participant, "Approximately how long has it been since your last haircut?" Generally, if the participant's hair is notably short, it can be safe to assume that the most recent haircut they received before participation was within a short, memorable window of time. This question then serves as an effective approximation of the length of their hair relative to the time of their overall stress exposure. This method makes no assumptions about growth rates. Although we understand that there is considerable between-individual variation on the top and sides of the head, an adequate volume of hair may be more effectively obtained if specimens are collected from these areas.

Additionally, there will inevitably be patrons who enter the shop for a touch-up, meaning that they are not looking for a scalp-level haircut but are simply taking hair off the top (that is, the outer-most region of their hair). In this case, as long as the hair being cut is younger than or shorter than six months of accumulated growth (Meyer et al., 2014), hair can still be collected. The researcher simply needs to note that the hair is "off the top". A conceptual challenge remains that the time-specific context of the hair growth from this category may be lost. While this circumstance is true, the participant may remain eligible, depending on the purpose of the research investigation and the time frame associated with the cortisol measures for that investigation. Indeed, it is difficult to account for how old the "off-top" sample may be, yet the individual's continuous cortisol output may still be connected to survey data measuring stress exposure.

Addressing Curl Pattern

There is no need to control for or accommodate curl patterns. This is because the hair collected will simply be measured by mass. The length of the hair is measured implicitly by the "time since last haircut" question, and so length measurement is unnecessary.

Measuring HCCs in Individuals with Extremely Short Hair Lengths

Traditionally, the prevailing recommended collection methodology may exclude participants with extremely short hair, as it samples from only the back of the head. Given that many Black men will not provide enough volume for collection from this location, this criterion would consequently exclude them from participation. Our proposed alternative: after collecting hair from the back, sides *and* top of the head, independently, mix an even volume of hair from each section of the head

into a single homogeneous mixture (colloquially referred to as a "hair salad") for each individual, respectively. The goal is then to get the mixture to weigh more than 10 mg. This will create a reading of the average cortisol output of each individual. We hypothesize that a homogeneous mixture of hair sampled from the entire head of each individual, respectively, can serve as an adequate measure of the total cortisol output from each participant.

This new approach requires validation through comparison to traditional measures before widespread adoption. In the remainder of this paper, then, we analyze hair specimens provided by sixteen participants from a larger on-going study. Hair was collected using this new method, standardized cortisol extraction, and HCC measurement via enzyme-linked immunoassay (ELISA) techniques (Meyer et al., 2014). We then justify this new method by comparing a calculated average of the independently measured HCC sections to a homogeneous mixture of specimens belonging to the same participants. Finally, we discuss this new method's conceptual distinctiveness, benefits, and limitations.

METHODS

This study was conducted between July and August 2017, as the initial stages of a larger, ongoing research project. Recruitment and data collection occurred at a barbershop in the Central District of Seattle, Washington that predominantly caters to Black men. Hair specimens were collected by professional barbers from thirty-three clients who visited this shop. Of those thirty-three individuals, sixteen provided enough sample from all three sections to test the conceptual validity of our methodology. Therefore, sixteen individuals were included in this study. Specimen analysis

was conducted in the Biodemography lab at the University of Washington's Center for Studies in Demography and Ecology. The procedures used in this study were approved by the Human Subjects Division of the University of Washington's Institutional Review Board.

Recruitment

Potential participants were approached in the barbershop waiting area and were informed of the study purpose and procedures. Eligibility criteria were as follows: (1) participants must have been born and raised in the US, (2) participants must self-identify as African-American, Black, Afro-Caribbean, or Afro-Latino, potentially in combination with some other racial/ethnic identity, (3) participants must be 18 years of age or older, and (4) participants must have residency in the State of Washington. Hair length was not a determining factor for inclusion/exclusion, as long as the individual was not bald. Hair samples were cut and collected by professional barbers upon consent from participants. All participants provided oral informed consent. At the end of specimen collection, participants were given a $10 gift card that partially recovered the costs of their haircut.

Data Collection

Using a basic structured questionnaire, participants provided sociodemographic information including age group (years), sex (male), self-identified race and or/ethnicity, highest level of education achieved, and the length of time that had passed since their last haircut (1 week, 1.5 weeks, 2 weeks, 2.5 weeks, 3 weeks, 3.5 weeks, one month, longer than one month).

Hair Sample Collection and Cortisol Measurements

Approximately 1 – 300 mg of hair were individually collected from each section of the whole head (back, sides, and top) of each participant. Sample and survey uniformity was maintained by attaching a randomized alphanumeric sequence to identify any single participant's anonymized specimens. We made no assumptions about hair growth rates based on race or ethnicity. Additionally, we assume that the right and left "sides" of the head produce cortisol concentrations equally. Hair from the "sides" of each head were collected in a single tube. All participants who received scalp-level and "off-the-top" haircuts participated in this study.

Hair cortisol extraction procedures followed the methods provided by Meyer et al. (2014). Samples were washed in 3 mL of isopropanol twice for three minutes each time, and evaporated to dryness for three days. Afterward, the entire sample of hair was homogeneously mixed, so that the sample evenly represents the entire head and not just a single portion of it. Approximately 40 mg of hair from each sample were weighted in reinforced microtubes, minced to a fine dust, and eluted in 1.5 mL of methanol for 24 hours to extract the cortisol. Samples were then centrifuged for five minutes at 10,000 RPM to separate solid waste from the supernatant. One mL of supernatant was extracted without disturbing the lower pellet waste, and the liquid extract was evaporated to dryness. Dried extract was reconstituted in 200 µL assay buffer (0.1 M phosphate buffered saline containing 0.1% w/v bovine serum albumin) and vortexed thoroughly. Reconstituted extracts were frozen at -20℃ until enzyme-linked immunoassay.

Cortisol Enzyme-linked Immunoassay (ELISA)

A competitive microtiter plate enzyme immunoassay was used to measure cortisol in hair extracts. This assay was previously validated for use in serum specimens (Munro & Stabenfeldt 1985), and has been used for saliva (Skinner et al 2012), urine (Trumble et al 2010) and dried blood spot (Konishi et al 2012) specimens. The assay uses a purified polyclonal anti-cortisol antibody, R4866, provided by C. Munro, UC Davis, and cortisol reference calibrators (Steraloids, cat. no. Q3880). The antibody cross reacts 100% with cortisol, 10% with prednisolone, 6% with prednisone, 6% with compound S, 5% with cortisone, and less than 1% with all other steroids (data provided by C. Munro). The minimum detectable concentration is 302 pg/mL. In assay performance validation testing, inter- and intra-assay CVs were 2.4% and 13.3% respectively for urine control specimens (based on n = 20 plates), and 3.8% and 11.7% for saliva specimens (based on n = 15 plates).

Two ELISA procedures were conducted. In the first assay procedure, hair cortisol was extracted and assayed from every section (back, sides, and top) of each participants' head, independently. We then produced a calculated average of the hair cortisol output from the three sections for each participant. In the second assay procedure, a single homogeneous hair salad (consisting of equal volumes of hair from the three sections) were sampled for each individual. We then compared the results of our calculated average to the results of the homogeneous mixture. Detection of a statistical difference between our calculated average and the homogeneous mixture, would suggest that we reject the validity of our collection method. If we *do not* detect a statistical difference between our calculated average and the homogeneous mixture, however, we may say that we have not found any statistical evidence requiring us to reject this aspect of our method's validity; we

may then provisionally accept this collection method as a means for including Black men with extremely short hair in HCC research.

Statistical Analyses

Statistical analysis was performed using Stata 14 Statistical Software. During our collection phase, at least a single section was missing for some samples. These samples were excluded. It should be noted that 62.5% of the participants of this study reported either '1 month', or 'longer than 1 month' for time since last haircut. This is larger than would be the case for a representative sample of Black men since our one-time validation required twice as much hair volume as would be needed in a typical study. A paired t-test was performed to determine the statistical difference between our calculated average of independent sections, and the homogeneous mixture. An additional paired t-test was performed to determine the statistical difference between the homogeneous mixture and the back of the head, the region most relied upon in other HCC analyses. Significance was set to $P < 0.05$.

RESULTS

Sociodemographic characteristics including estimated time since last haircut are shown in Table 1. Table 2 shows the results of the paired t-test on all participants. There was no significant difference in the scores for the calculated average (M = 42.54, 95% CI = 25.82, 59.25) and the homogeneous mixture (M = 47.62, 95% CI = 14.64, 80.61) conditions; t (15) = -0.54, P = 0.59. There was no significant difference in the scores for the homogeneous mixture (M = 47.62, 95%

CI = 14.64, 80.61) and the back of the scalp (M = 45.82, 95% CI = 27.00, 64.64); t (15) = 0.19, P = 0.8463.

Table 1. Descriptive statistics of the sample participants.

Characteristics	N	Frequency
Age Group		
18 - 29 Years-old	8	50%
30 - 49 Years-old	6	37.5%
50 - 64 Years-old	2	12.5%
Educational Attainment		
Some High School	1	6.25%
High School Graduate	3	18.75%
Some College	4	25%
College Graduate	5	31.25%
Some Post-graduate Work	1	6.25%
Post Graduate Degree	2	12.5%
Time Since Last Haircut		
2 Weeks	3	18.75%
2.5 Weeks	1	6.25%
3 Weeks	1	6.25%
3.5 Weeks	1	6.25%
1 Month	5	31.25%
Longer than 1 Month	5	31.25%
Sample Type		
"Off-the-Top" Samples	2	12.50%
Scalp-Level Cut	14	87.50%

Table 2. Paired Sample Test between the calculated average of the independently measured sections and the homogeneous mixture.

Paired Samples Test

	Paired Differences					t	df
	Mean	Std. Dev.	Std. Error	95% CI of the Difference			
				Lower	Upper		
Paired 'Average - Mixture'	-5.08	37.07	9.26	-24.84	14.67	-0.54	15
Paired 'Mixture – Back'	1.80	36.58	9.14	-17.69	21.30	0.19	15

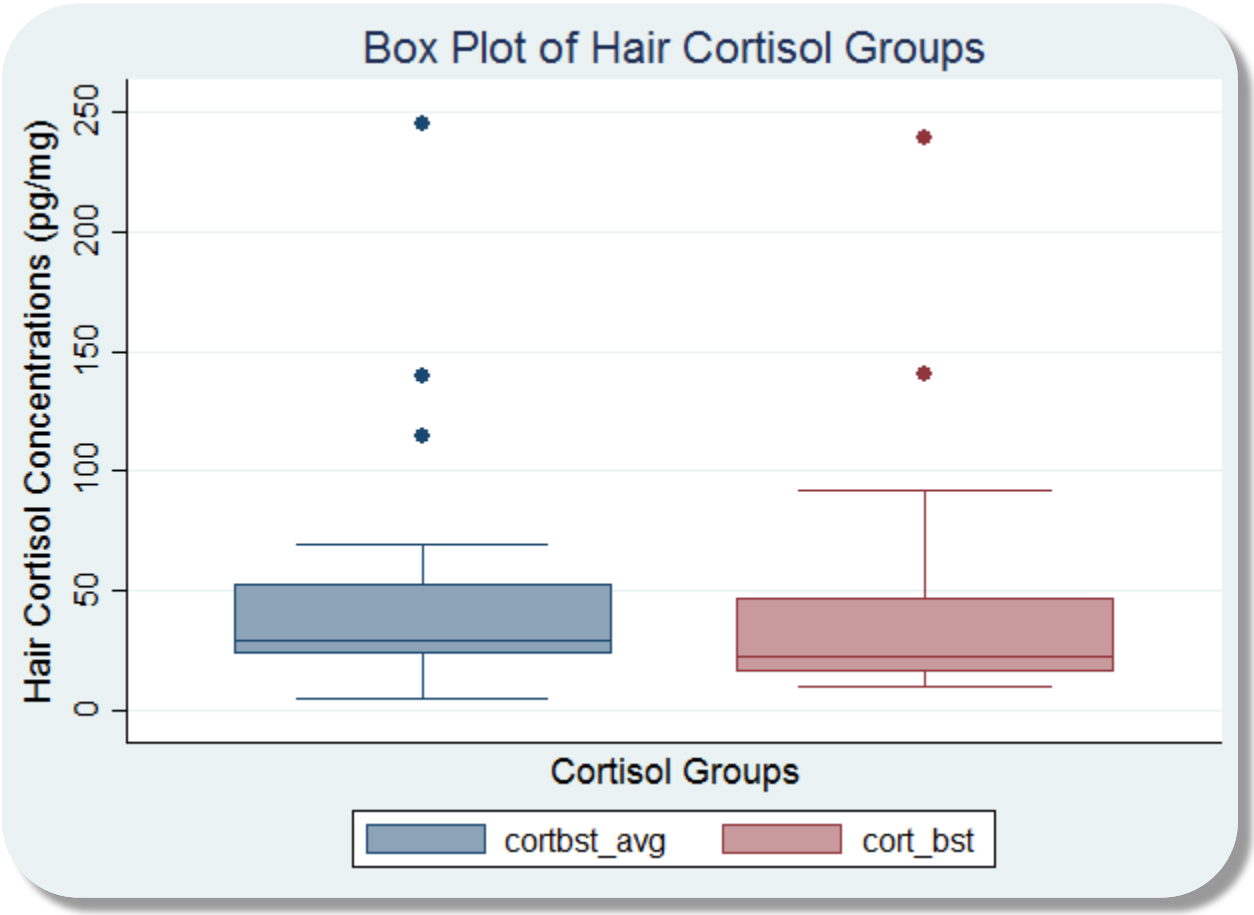

Figure 2. A box plot of the relationships between the calculated average of the independently measured sections and the homogeneous mixture.

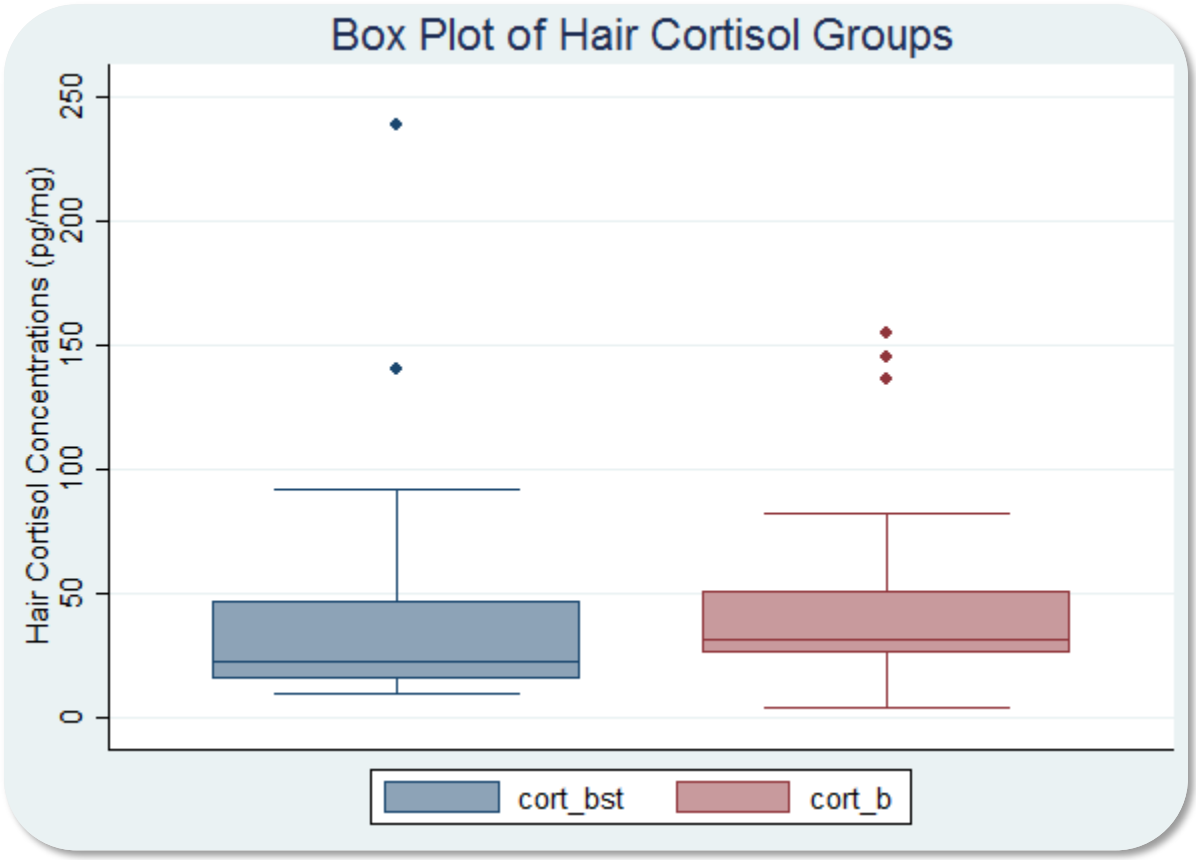

Figure 3. A box plot of the relationships between the Homogeneous mixture and the back of the scalp.

DISCUSSION

In this study, we tackle one important piece of this puzzle: ensuring that biomarker collection methods are not inadvertently designed in ways that exclude members of some populations unnecessarily. We describe a novel collection method for measurement of cortisol levels in Afro-textured human hair obtained from all sections of the head. Although previous studies have described and recommended specific standardized methods of collection, these techniques are inefficient in their application on African-American men with extremely short hair lengths. Our

proposed method of collection in Black men with short hair is derived from the current prevailing standards, but is unique in several ways. First, while the prevailing standards involve specimen sampling using scissors, we instead recommend using electric hair clippers to collect scalp-level samples where possible. Second, where the current strategy suggests obtaining hair from the back of the head only, our technique samples from three sections of the head independently: top, back and sides. Many Black men may not provide enough volume of hair in most circumstances. Therefore, by collecting from all sides of the head, researchers may maximize the amounts sampled. Third, in cases for which there is not enough volume collected to measure each section of the head independently, we recommend combining specimens from each location of the scalp equally to generate a homogeneous mixture of hair, which can serve as an average of the total output of cortisol produced by one participant. Finally, given that strong curl pattern variations make it difficult to measure "true" lengths when following the prevailing collection standard, we instead recommend asking participants, "Approximately how long has it been since your last haircut?" This serves as an adequate measure of the time of stress exposure that has passed by the length of their hair growth.

We found no significant difference between cortisol in hair measured from an averaged calculation of each location of the head independently and our homogeneous mixture (Figure 2). We also found no significant difference between the homogeneous mixture and the back of the scalp (Figure 3). This finding suggests that our alternative collection method may be an adequate substitute for measuring hair cortisol in Black men with extremely short hair lengths. However, we emphasize that these results are a first step; there are several limitations associated with our recommended methodology and this study. First, our study was restricted to individuals who

provided sufficient volumes of hair. Ironically, in a study proposing a new method for measurement in men with extremely short hair lengths, we only included men who provided substantially longer and larger volumes of hair. The reason for this is that we needed to validate our methods before they could be applied to real-world samples. In this case, the method's validity must be checked by running the samples through an independent control, in turn requiring our collected specimens to undergo assay procedures two different times. Second, we did not control for growth rates. It is not known whether hair cortisol levels vary with hair growth rate, which could be important as the activity of the hair follicles is intermittent. Third, given that we are deviating from the prevailing structure, it is unknown how hair cortisol that is collected and measured in this way compares to readings that utilize the prevailing straighter-textured hair methodology. Future studies may benefit from conducting comparison analyses, as this may open opportunities for between and across race/ethnicity assessments. Fourth, our study is hampered by the fact that only 16 individuals fit the criteria of eligibility for participation in this study. It is possible that more samples would be needed to solidify the validity of the methods proposed in this study. It should be noted, however, that given our restricted number of participants, this condition perfectly illustrates the need for developing expanded collection strategies that do not exclude Black men from participation.

This study offers methodological nuance for including African-American men in future HCC research. It is vital that biomedical, biobehavioral, and other forms of health research draw on the full spectrum of human diversity in order to ensure that the implications of their research accurately represent the people to whom they expand their findings. The current prevailing collection method is one that implicitly excludes them, and on this basis, alternative collection methodologies must

be developed and validated to achieve the goal of obtaining specimens representative of the human diversity spectrum. The underrepresentation or exclusion of African-Americans and other populations of color is a major problem that must be addressed if researchers intend to pioneer new lines of investigation in HCC research. Although the reasons for underrepresentation and non-participation are multifaceted, it is ultimately the responsibility of science researchers to make efforts to improve the quality of their investigations by actively seeking out ways to increase participation among populations of color.

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STUDY #2: THE EFFECTS OF RESILIENCE ON HAIR CORTISOL SECRETION IN BLACK MEN WHO FACE DISCRIMINATION AND ADVERSITY

ABSTRACT

Cortisol, a biomarker of stress, is slowly deposited into growing hair strands on the head. This article examines the effect modifying property of resilience on hair cortisol concentrations in Black men who experience Everyday and Major Forms of discrimination. Resilience was observed to modify the relationship between Major discrimination and hair cortisol concentrations, suggesting that resilience may be a protective psychosomatic buffer in the face of discrimination and injustice. These findings underscore the need for research efforts to identify salutogenic components and mechanisms by which positive affective dispositions can buffer the body against psychosomatic harm in the face of systemic and personally-mediated injustice.

BACKGROUND

The deleterious effects of racial categorization on the social status of Black Americans can be seen across a wide range of domains, such as health status, social economic position, and education (Pieterse & Carter, 2007; David R Williams & Sternthal, 2010). While these domains can deleteriously affect the livelihood of Black men and women, there may be some elements of being Black that affect the two groups differently. For example, although social scientists often reference social participation and rates of incarceration when discussing the status of Black men in modern social politics, there is some evidence that Black men experience some forms of discrimination that may differ from those experiences of Black women beyond these limited indicators. The FBI Expanded Homicide Dataset, for example, was published in 2014 and compiled law enforcement

data between 2008 – 2012. Within this 5-year period, 12,765 individuals were killed by law enforcement. Of those, 51.1% were Black men, whereas less than 30% were Black women. Although one may contend that many of these men may not have been acting in rather innocent ways, Black men are seen here to represent the statistical majority in a nation-wide study, where they otherwise belong to the statistical minority. When one looks to the needless killings of Trayvon Martin, Philando Castile, Eric Garner, and countless others, for whom justice is never attained, or to the 2017 neo-Nazi rally in Charlottesville, VA that saw some Black men being brutally beaten with melee weapons, one might readily see that the consequences of racial categorization for Black men go beyond social participation domains, and can be potentially lethal. Discrimination and adversity in the US have been taxing conditions that Black men, and women, have had to endure throughout their lifetimes for over four centuries. These race-related occurrences can affect their mental and physical well-being and may therefore be understood within a biopsychosocial framework of racism-related stress.

While the consequences of such conditions have been negative on their health, the virtuous responses of Black Americans to this reality may also have some unexplored health implications. A stress response, for example, consists of three phases: stress reaction, recovery, and adaptation (Staufenbiel et al., 2013). Black men have been constantly adjusting to conditions of social, psychological, and economic discrimination and hardship for so long that one could say that their resilience in the face of these struggles is itself an adaptive response. While difficult to define, it has been suggested that *resilience* implies experiencing adversity or illness, and adapting in order to bounce back and thrive, oftentimes in changed ways (West et al., 2012). Resilience has been a trait displayed by countless Blacks who have endured, and in many ways embody, the American

racial struggle. When one observes the critical contributions of scholars and figures such as Angela Davis, James Baldwin, or Maya Angelou; when one observes the collective Black Lives Matter movement in response to consistent bouts of injustice; or when one observes the inauguration of the nation's first African-American President Barack Obama, one may readily see that resilience is a pertinent existential trait that is deeply embedded within the politics of Black excellence, brilliance, and strength in the face of racialized adversity and obstacles.

Constructs of resilience, or effective coping and adaptation in the face of significant life stress, has been the focus of growing research attention (Brown, 2008; Campbell-Sills & Stein, 2007; Sturgeon & Zautra, 2010). A body of investigative endeavors have shown that resilience can serve as a protective factor when people are confronted with chronic bouts of stress and pain, in turn increasing the likelihood of positive mental and physical health outcomes (Hjemdal et al., 2011; Smith, 2006; Tedeschi & Kilmer, 2005). Surprisingly, although resilience constructs have been applied to linguistically and culturally diverse global populations, few studies have applied them to Black Americans (Brown, 2008). It is generally accepted that racism, as often experienced through multifaceted forms of discrimination, is associated with poorer physical health status, poorer mental health, and higher reports of stress (Assari et al., 2017; Fuller-Rowell et al., 2012; Lewis et al., 2014; Triana et al., 2015). Given the biopsychosocial nature of adverse experiences and health outcomes, a necessary and progressive step in resilience research then would be to assess its effects on Black health and well-being. Additionally, as the body of research findings bridge connections between psychological assessments of resilience and physical health outcomes, resilience research may also benefit from pursuing endeavors which seek to measure and observe

its pathophysiology. This is a fitting gap in knowledge to insert a Bio-cultural Anthropological investigation.

The current study seeks to incorporate a construct of resilience into a broader understanding of biopsychosocial pathology. In other words, this study has two goals: (1) to determine if resilience can be observed as an effect-modifier of biopsychosocial stress in African-American men who experience discrimination; and if so, (2) to measure the physiologic-related effects of resilience in the context of racism-related stress.

Hair Cortisol as a Biomarker of Longitudinal Stress

Cortisol is a glucocorticoid hormone that is released by the adrenal cortex after the hypothalamic-pituitary-adrenal (HPA) axis has been triggered. It is vital for maintenance of somatic equilibrium as it regulates blood pressure, inflammatory and immune responses, and even glucose and fat metabolism (Stalder et al., 2017; Staufenbiel et al., 2013; Zeiders et al., 2014). It is generally regarded as 'the stress hormone,' particularly because it is secreted into the blood stream under stressful psychological and environmental conditions. Given these important roles, cortisol is frequently assessed in psychoneuroendocrine research. Although it has typically been measured using acute matrices such as blood, urine, and saliva, new research is expanding to include assessments of the hormone found in hair, a medium that may serve as a longitudinal marker of production and output. As hair grows, cortisol is continuously deposited into the strands, where it has been observed that higher reports of stress are correlated with higher concentrations of hair cortisol (Stalder et al., 2017; Vliegenthart et al., 2016). As investigations in hair cortisol concentration (HCC) research expands, researchers have seldom assessed hair cortisol secretion in African-Americans. Where at least one study has made an attempt to spotlight this group, it was

limited by its overwhelming observation of Black women (80%), for whom hair samples are generally of abundance (Lehrer et al., 2016).

Little is thus known about how resilience may potentially moderate the effects of discrimination on HCCs in Black men. Given the synchronous findings from previous studies, we hypothesize that a history of discrimination will be significantly associated with hair cortisol concentrations among Black men, but this relationship will be weakest for those reporting high resilience. This hypothesis serves to address and resolve the two over-standing goals of the study. This paper then describes our findings exploring the potential effect-modifying properties of resilience on the relationship between discrimination and HCCs in Black men.

METHODS

Participants

As part of a larger on-going study, we used purposive sampling to recruit 65 Black men from five Black-majority barbershops for a haircut in historically Black neighborhoods across Seattle, Washington. Of the 65 participants, 33 hair samples were collected by professional barbers upon consent from participants. All participants provided oral informed consent. The eligibility criteria for the study were as follows: participants must (1) have been born and raised in the US, (2) self-identify as African-American, Black, Afro-Caribbean, or Afro-Latino, potentially in combination with some other racial/ethnic identity, (3) be 18 years of age or older, and (4) have residency in the State of Washington. Hair length was not a determining factor for inclusion/exclusion, as long as the donating men were not bald. At the end of specimen collection, participants were given a $10 gift card that partially recovered the costs of their haircut. All participants completed a paper-

based questionnaire in the same order. The research project, of which this study was a part, was approved by the Human Subjects Division at the University of Washington.

Measures

Everyday Discrimination Scale

The first tool captures the perceptions of discrimination that occur in everyday life, called the *everyday discrimination scale* (Clark et al., 2004; David R Williams et al., 1997). It has good internal consistency (alpha coefficient = 0.91), reliable sampling adequacy (KMO = 0.82), and construct validity for application among Black Americans (Doyle 2017 Unpublished Pilot Study).This 9-item tool screens for how a person feels they are perceived or treated within a society. The survey items are listed as statements which address themes such as whether a person is treated with less courtesy or respect than others are, receives poorer service than others do, is perceived to be less intelligent or more dishonest than others, and other proximally related matters. For example, a statement may read, "You are treated with less courtesy than other people are;" or, "You are treated with less respect than other people are." Given the nature of cumulative experience, the survey tool is structured on a Likert Frequency Scale and the numerical values of each answer are summed to composite an overall score. 'Frequency' here refers to how often each event happens, whether it is 'Almost every day' (scored as 5), 'At least once a week' (4) 'A few times a month' (3) 'A few times a year' (2) 'Less than once a year' (1), or 'Never' (0). Once completed, the items are summed to create an overall Everyday Discrimination score. Scores may range from 0 to 45.

Major Experiences of Discrimination Scale

The second tool captures specific experiences of discrimination that have occurred throughout one's adult life, called the *major experiences of discrimination scale* (David R. Williams et al., 2008). It has decent internal consistency (alpha coefficient = 0.78), reliable sampling adequacy (KMO = 0.64), and construct validity (Doyle 2017 Unpublished Pilot Study). This 9-item tool accounts for nine major experiences of *unfair treatment* in domains such as employment, education, housing, and interactions with the police that respondents have experienced. For example, a statement may read, "At any time in your life, have you ever been unfairly fired?" or, "Have you ever been unfairly stopped, searched, questioned, physically threatened or abused by the police?" In the context of the survey, 'Major experiences' were attributed to one's race/ethnicity (i.e. racial discrimination), and were distinguished from those attributed to other social status categories (i.e. non-racial discrimination). The response structure in this tool is a simple 'Yes' (coded as 1) or 'No' (coded as 0). Once completed, the items are summed to create an overall Major Discrimination score. Scores may range from 0 to 9.

The Connor-Davidson Resilience Scale

The abridged Connor-Davidson Resilience scale comprises a single 10-items (CD-RISC-10) factor scored on a 5-point Likert scale ranging from 1 (Completely Agree) to 5 (Completely Disagree). Examples of items are "I am able to adapt when changes occur," "I am not easily discouraged by failure," "Under pressure, I tend to stay focused and think clearly," and "I tend to bounce back after illness, injury, or other hardships," and other proximally related factors. These items were determined by the originators of the scale as etymologically capturing the essence of resilience.

Significant correlations have been found between the CD-RISC-10 and mental and emotional well-being (depression and anxiety) metrics (Campbell-Sills et al., 2006; Vaishnavi et al., 2007). The reliability and validity of the scale were demonstrated in clinical studies, and through correlation matrices by measures of hardiness, perceived stress, and stress vulnerability (Campbell-Sills & Stein, 2007; Cohen et al., 1983; Kobasa, 1979). This scale was validated with a Black sample in the pilot investigation and showed a Cronbach's Alpha score of 0.92.

Data collection

Using a basic structured questionnaire, participants provided sociodemographic information including age group, highest level of education achieved, employment status, income, marital status, religious affiliation, CD-RISC-10, and the length of time that had passed since their last haircut (1 week, 1.5 weeks, 2 weeks, 2.5 weeks, 3 weeks, 3.5 weeks, one month, longer than one month).

Hair Sample Collection

Few studies of HCC have been conducted in populations of African descent, and existing methods for hair sample collection do not account for hair texture and average length for the members of this sample; we thus developed novel methods for hair collection, which we have presented and validated elsewhere (See Chapter 1). In summary, approximately 0.001-3 grams of hair were collected from three sections of each participants' head: the superior region of the scalp (hereby referred to as the 'top'), the left and right lateral regions ('side(s)'), and the posterior vertex ('back'). We made a few conceptual assumptions. First, we assumed that the right and left sides of the head produced cortisol concentrations equally. Therefore, hair from both sides were

collected in a single tube. Second, few participants were not looking for a scalp-level haircut but simply wanted hair taken off the top (that is, the outer-most region of their hair). In this case, we assumed that HCC incorporation into growing strands, relative to the time since last haircut, would be constant. Therefore, all participants who received 'off-the-top' haircuts participated in this study. Finally, we made no assumptions about hair growth rates based on race or ethnicity.

Hair Cortisol Extraction

Hair cortisol extraction procedures followed the methods provided by Meyer et al. (2014). Samples were washed in 3 mL of isopropanol twice for three minutes each time, and evaporated to dryness for three days. Afterward, the entire sample of hair was homogeneously mixed, so that the sample evenly represents the entire head and not just a single portion of it. Approximately 40 mg of hair from each sample were weighted in reinforced microtubes, minced to a fine dust, and eluted in 1.5 mL of methanol for 24 hours to extract the cortisol. Samples were then centrifuged for five minutes at 10,000 RPM to separate solid waste from the supernatant. 1 mL of supernatant was extracted without disturbing the lower pellet waste, and the liquid extract was evaporated to dryness. Dried extract was reconstituted in 200 µL assay buffer (0.1 M phosphate buffered saline containing 0.1% w/v bovine serum albumin) and vortexed thoroughly. Reconstituted extracts were frozen at -20℃ until enzyme-linked immunoassay.

Hair Cortisol Assay (ELISA)

A competitive microtiter plate enzyme immunoassay was used to measure cortisol in hair extracts. This assay was previously validated for use in serum specimens (Munro & Stabenfeldt, 1985), and has been used for saliva (Skinner et al., 2011), urine (Trumble et al., 2010) and dried blood spot

(Konishi et al., 2012) specimens. The assay uses a purified polyclonal anti-cortisol antibody, R4866, provided by C. Munro, UC Davis, and cortisol reference calibrators (Steraloids, cat. no. Q3880). The antibody cross reacts 100% with cortisol, 10% with prednisolone, 6% with prednisone, 6% with compound S, 5% with cortisone, and less than 1% with all other steroids (data provided by C. Munro). The minimum detectable concentration is 302 pg/mL. In assay performance validation testing, inter- and intra-assay CVs were 2.4% and 13.3% respectively for urine control specimens (based on n = 20 plates), and 3.8% and 11.7% for saliva specimens (based on n = 15 plates).

Statistical Analysis

Univariate analysis was performed on the sample characteristics by discrimination measures, where a one-way ANOVA test was used on categorical variables, and Pearson's Correlation matrix tests were used for continuous variables. Probability significance for these tests were set to $P \leq 0.05$. The variables that resulted in significance were included in regression tests.

Moderation of resilience on the relationship between discrimination and HCCs was tested using hierarchical linear regression tests, including adjustment for the potential interaction between resilience and discrimination. This test requires two steps. In the first step, the lineal regressive relationship between all factors of interest are assessed. In the second step, interaction terms are included to observe the overall change in variance and statistical significance of the regression tests.

RESULTS

Descriptive Statistics and Levels of Resilience by Discrimination

Sociodemographic characteristics in each scale or factor are shown in Table 1, where the numerical quantity sampled corresponds to *N* and its frequency denoted by %; while the calculated means correspond to *M* and their standard deviations are noted by *SD*. Most of the men are between the ages of 18 and 49 years, and most have some college experience or more. When compared to census data of African-American men in Seattle, these education distributions are slightly higher. That is, the men in this study tended to have higher educational attainment. Additionally, the majority of the men's household income was above $70,000 / year, this was also reflective of census data estimates for Black households in the Seattle region.

Out of a possible score of 39, the mean score of the Everyday Discrimination Scale among the sample population was 17.42 (SD = 10.18). Additionally, out of a possible score of 9, the mean score of major discrimination was 3.13 (SD = 2.43). Both scores were highest among individuals aged 30-49 years-old, and among those with some, but not completed, college education. Additionally, major and everyday discrimination were strongly correlated. A test for Pearson's correlation statistic yielded a coefficient of 0.500. Finally, out of a possible score of 50, the mean score for the CD-RISC was 39.28 (SD = 8.85).

One-way ANOVA tests revealed that none of the sample characteristics tested for significance on the discrimination measures and were therefore not included in regression tests. Pearson's correlation test showed that resilience was not strongly correlated with everyday discrimination (using the common cut-off of ±0.3); however, resilience did strongly correlate with major

discrimination. Despite these differences, both Pearson's Correlation coefficients displayed negative coefficients, meaning that more resilience is associated with less reported major discrimination.

Table 3 shows the relationship of HCCs from each section of the head by discrimination measures. Everyday discrimination was not strongly correlated with HCCs and therefore was not included in the moderation analysis. However, major discrimination showed strong positive relationships with HCCs from all regions of the head, and was selected for further investigation.

Regression Moderation Analysis

Resilience was examined as a moderator of the relation between major discrimination and HCCs on the top ($R^2 = 0.603$, F (3, 34) = 12.68, $P < 0.001$), sides ($R^2 = 0.650$, F (3, 34) = 21.13, $P < 0.001$), and average cortisol concentrations ($R^2 = 0.617$, F (3, 25) = 13.43, $P < 0.05$) , but did not show significant moderation from the back of the head ($R^2 = 0.316$, F (3,34) = 5.25, $P = 0.210$) (Table 3). Major discrimination and Resilience were entered into regression tests followed by the interaction term between them, and explained a significant decrease in HCCs. Thus Resilience was a significant moderator of the relationship between major discrimination and HCCs (see Figures 1-4).

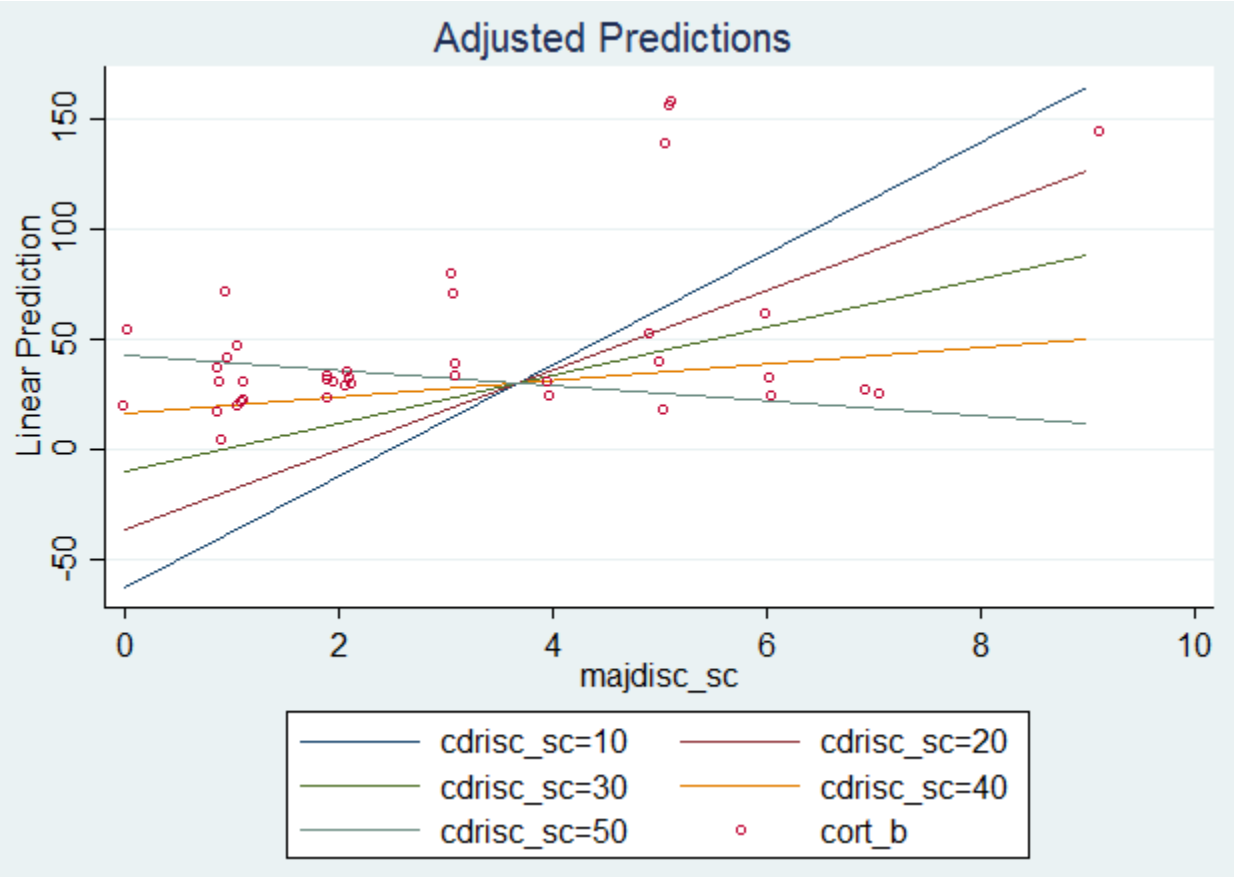

Figure 1. A scatter plot of the relationship between major discrimination scores and HCCs (Back) with adjusted predictions for resilience scores overlayed.

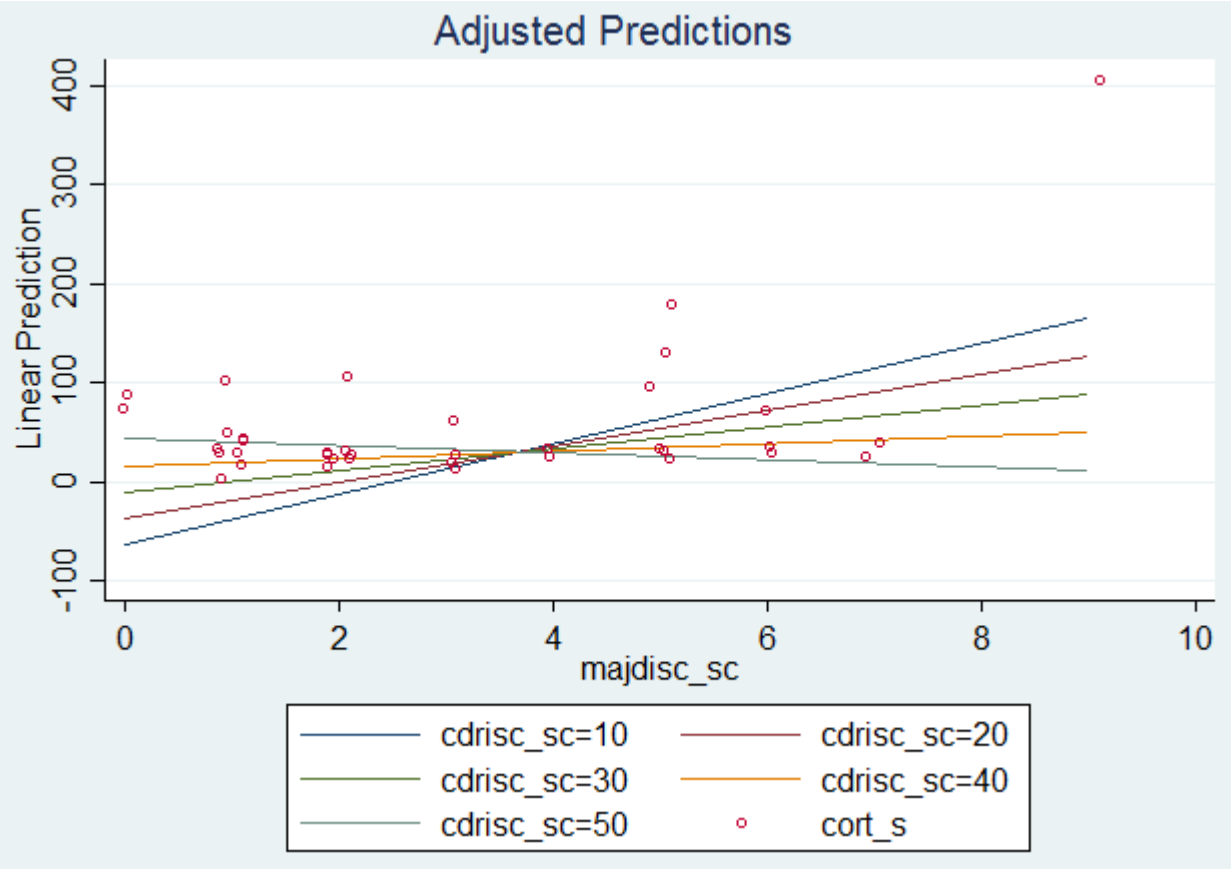

Figure 2. A scatter plot of the relationship between major discrimination scores and HCCs (side) with adjusted predictions for resilience scores overlayed.

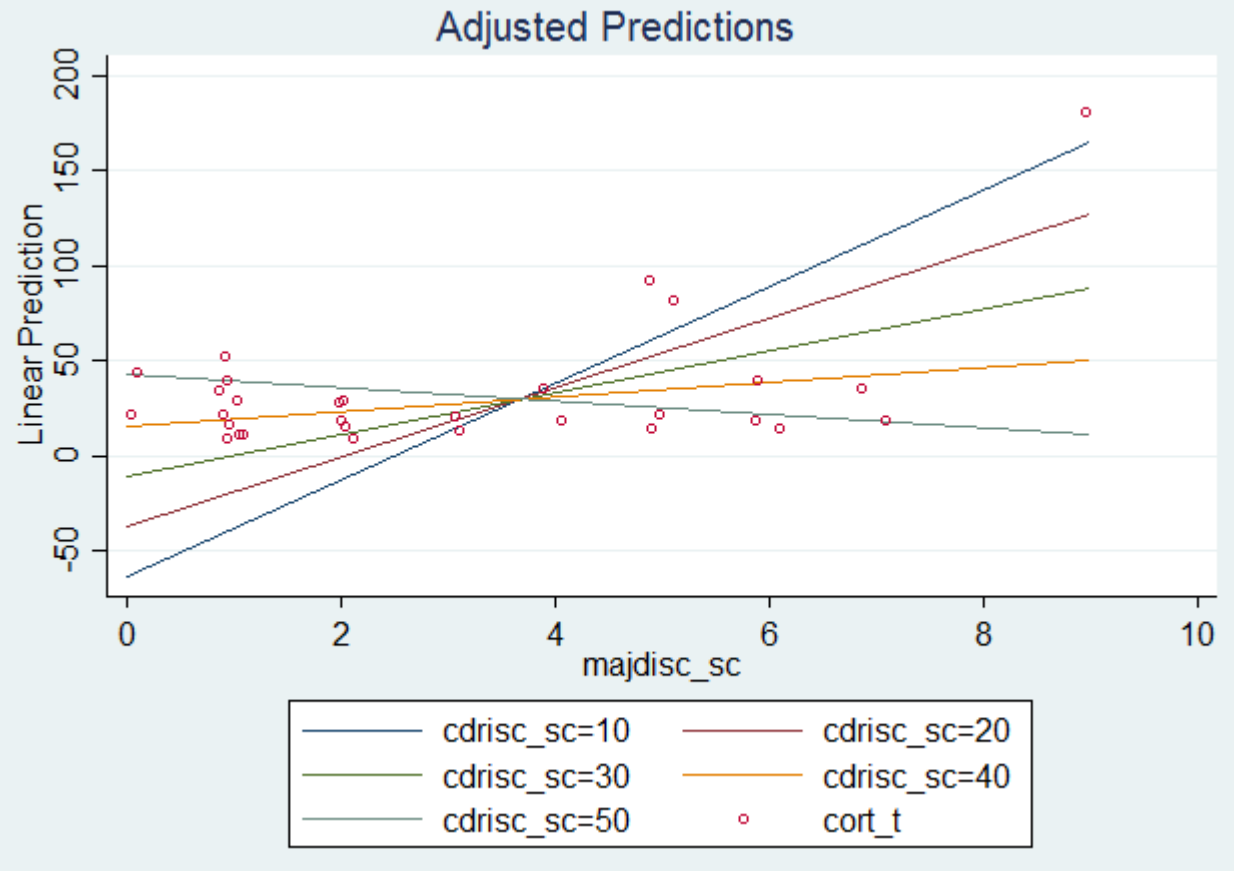

Figure 3. A scatter plot of the relationship between major discrimination scores and HCCs (top) with adjusted predictions for resilience scores overlayed.

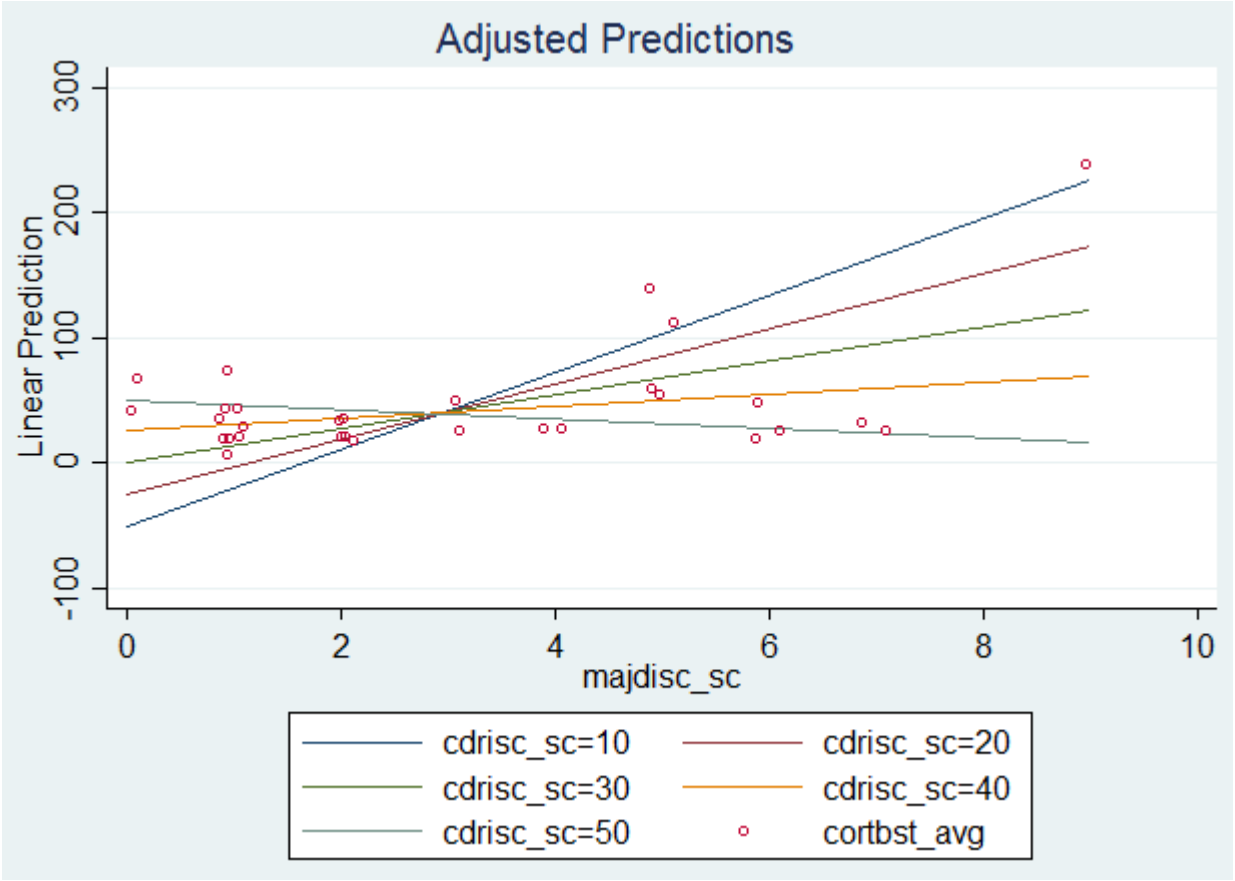

Figure 4. A scatter plot of the relationship between major discrimination scores and HCCs (side) with adjusted predictions for resilience scores overlayed.

Table1. Demographic Characteristics and variables of interest stratified by Discriminatory Experiences (N = 33)

	Total Sample	Everyday Discrimination	Everyday Discrimination Test Statistic (X2 or Corr)	Everyday Discrimination P value	Major Discrimination	Major Discrimination Test Statistic (X2 or Corr)	Major Discrimination P value
	N = 33	N = 33			N = 30		
	M (SD) or N (%)	M (SD) or N (%)			M (SD) or N (%)		
Age Group	32 (96.9%)	32 (96.9%)			29 (87.8%)		
18 - 29 Years-old	16 (50%)	17.5 (8.37)			2.6 (1.96)		
30 - 49 Years-old	11 (34.38%)	20.36 (13.14)	2.48	0.288	3.77 (2.48)	3.31	0.19
50 - 64 Years-old	4 (12.5%)	10.25 (8.73)			3.5 (4.04)		
65 Years and Over	1 (3.13%)	15 (N/A)			6 (N/A)		
Education	33 (100%)	33 (100%)			30 (90.9%)		
Some High School	1 (3.03%)	34 (N/A)			1 (N/A)		
High School Graduate	6 (18.18%)	17.33 (10.01)			3.2 (3.83)		
Some College	9 (27.27%)	21.22 (11.77)	3.11	0.374	3.85 (2.73)	2.78	0.426
College Graduate	9 (27.27%)	14 (10.01)			2.88 (2.08)		
Some Post-graduate	1 (3.03%)	27 (N/A)			3 (N/A)		
Post Graduate Degree	7 (21.21%)	13.28 (5.58)			3 (2)		
Household Income	32 (96.9%)	32 (96.6%)			29 (87.8%)		
Less than $10,000 /yr	1 (3.13%)	34 (N/A)			1 (N/A)		
$10,000 to $19,999 /yr	2 (6.25%)	16 (21.21)			1 (N/A)		
$20,000 to $29,999 /yr	2 (6.25%)	19.5 (3.53)			7 (2.82)		
$30,000 to $39,999 /yr	1 (3.13%)	27 (N/A)	4.24	0.374	3 (N/A)	0.03	0.959
$40,000 to $49,999 /yr	1 (3.13%)	27 (N/A)			7 (N/A)		
$50,000 to $59,999 /yr	5 (15.63%)	16.4 (13.79)			3.33 (2.08)		
$60,000 to $69,999 /yr	3 (9.38%)	24.67 (9.60)			3 (1.73)		
$70,000 + /yr	17 (53.13%)	14.17 (8.28)			2.64 (2.62)		
Employment Status	32 (96.6%)	32 (96.6%)			30 (90.9%)		
Unable to Work	0 (0%)	N/A (N/A)			N/A (N/A)		
Employed for Wages	27 (84.38%)	19.70 (9.58)			3.25 (2.48)		
Self-Employed	2 (6.25%)	4.5 (6.36)	0.61	0.736	2.5 (2.12)	0.36	0.835
Un-employed and looking	1 (3.13%)	10 (N/A)			1 (N/A)		
Un-employed not looking	0 (0%)	N/A (N/A)			N/A (N/A)		
Retired	2 (6.25%)	11.5 (4.94)			5 (1.41)		
Marital Status	33 (100%)	33 (100%)			30 (90.9%)		
Never Married	20 (60.61%)	18.2 (10.59)			2.61 (2.22)		
Currently Married	7 (21.21%)	17.57 (9.51)	0.5	0.917	4 (2)	1.89	0.387
Widowed	0 (0%)	N/A (N/A)			N/A (N/A)		
Divorced	4 (12.12%)	12 (9.34)			4.5 (3.69)		
Separated	2 (6.06%)	20 (15.55)			1 (N/A)		
Religious Affiliation	33 (100%)	33 (100%)			30 (90.9%)		
Not Religious	10 (30.3%)	21.1 (10.85)			2.75 (1.66)		
Christian	20 (60.61%)	15.35 (9.29)			3.31 (2.74)		
Muslim / Islamic	1 (3.03%)	35 (N/A)	0.29	0.588	5 (N/A)	2.01	0.155
Buddhism	0 (0%)	N/A (N/A)			N/A (N/A)		
Jewish	0 (0%)	N/A (N/A)			N/A (N/A)		
Other	1 (3.03%)	13 (N/A)			0 (N/A)		
Resilience	39.28 (8.85)	N/A (N/A)	-0.1945	N/A	N/A (N/A)	-0.4007	N/A
* $P < 0.05$							
** $P < 0.01$							
*** $P < 0.001$							

Table 2. Dependent variables of interest stratified by Discriminatory Experiences

	Total Sample	**Everyday Discrimination**	**Everyday Discrimination Pearson's Correlation**	**Major Discrimination**	**Major Discrimination Pearson's Correlation**
	N	N		N	
	M (SD)	M (SD)		M (SD)	
Cortisol Average	33	33	0.0833	33	0.4847*
	45.44 (45.27)	28.01 (7.93)		44.16 (8.39)	
Cortisol - Back	42	42	0.1425	39	0.4175*
	45.15 (37.45)	27.1 (5.75)		43.51 (6.0)	
Cortisol - Side	42	42	0.019	39	0.4117*
	62.83 (65.59)	34.78 (10.19)		51.26 (10.73)	
Cortisol - Top	33	33	0.0827	30	0.4814*
	31.99 (33.53)	14.57 (5.95)		30.11 (6.15)	

Table 3. Results of the Hierarchical Linear Regression tests between Major Discrimination and HCCs (Back, Side, Top, Avg)

	Analysis	Predictor Coefficient	Predictor P-Value	Resilience Coefficient	Resilience P-Value	Interaction Coefficient	Interaction P-Value
Analysis 1	Major Discrimination and Resilience on HCCs (Back)	5.44	<0.05	-1.67	<0.05	-	-
	Interaction on HCCs (Back)	17.5	0.082	0.145	0.928	-0.318	0.21
Analysis 2	Major Discrimination and Resilience on HCCs (Side)	8.81	<0.05	-4.00	<0.01	-	-
	Interaction on HCCs (Side)	70.7	<0.001	5.29	<0.05	-1.62	<0.001
Analysis 3	Major Discrimination and Resilience on HCCs (Top)	4.24	0.092	-1.78	<0.05	-	-
	Interaction on HCCs (Top)	32.5	<0.001	2.64	0.055	-0.719	<0.001
Analysis 4	Major Discrimination and Resilience on HCCs (Avg)	5.40	0.095	-2.80	<0.01	-	-
	Interaction on HCCs (Avg)	39.3	<0.01	2.15	0.164	-0.864	<0.05

DISCUSSION

The results from the present study suggests that resilience appears to moderate the effects of major discrimination on HCCs. In the regression moderation analysis, findings suggest moderation because the interaction between major discrimination and resilience remained significant when associated with HCCs on most sections of the head (including the averaged assessment); where high tendencies in resilience served to decrease HCC output as major discrimination scores increased. Although this pattern was not found statistically significant for the posterior-vertex region of the head, this relationship is still visible in the visual illustrations of Figures 1-4.

It is interesting to note that everyday discrimination was not significantly associated with any other measures in this study. It may be intuitive to believe that everyday forms of discrimination may play a more influential role in psychoneuroendocrinal experiences; we offer a few interpretations for why this relationship does not appear in our data. First, the everyday discrimination scale is a tool which measures the frequency of mundane experiences, most of which are *individually* trivial (even if their combined effect is large), and these individual events may not stay with a person any longer than the time they recognized them. Individuals who encounter everyday forms of discrimination may not regard those experiences as having a significant impact on their life, and in turn on their chronic stress physiology. By comparison, the major discrimination scale is a tool which measures the occurrence of discriminatory experiences that have long-lasting life consequences (e.g. being unfairly fired, denied a promotion or a bank loan). Second, everyday discrimination relies on frequency scoring, with item responses being in the context of several weeks and months. Many of the men's sampled hair, however, reflects stress exposure within a two- to three-week period. Therefore it is possible that the length of these specimens do not reflect

the broader context of the item responses. Hair specimens of greater lengths may provide the measurements of significance needed to observe the effects of everyday discrimination on HCCs. However, this comes at the cost of restricting the number of potential Black men who may participate in this kind of investigation (see Chapter 1). Additionally, the Everday Discrimination Scale may better capture these experiences by changing response items to match the conditions of the hair. Lastly, the everyday discrimination scale is a report of subjective experiences. It is entirely possible that everyday discrimination happens more often than any participant reported simply because they did not recognize its occurrence. It is also possible that where an individual reports its occurrence, their report may not accurately reflect whether discrimination actually occurred.

It should also be noted that none of the demographic characteristics were associated with major discrimination, and so were not included in this analysis. Indeed, the reality for many Black men is that discrimination knows no boundaries and can occur in any and every corner of life.When one looks to the deaths of Tamir Rice, Trayvon Martin, Eric Garner, and many others, it should be clear that age is not a criterion of distinction for these experiences. When one looks to the scholarly contributions of James Baldwin, Ta-nehisi Coates, or Cornell West—who all report on lifetimes of experience with profound discrimination, it should be clear that education is not a criterion of distinction for these experiences. When one looks at the many points of intersectionality[1] on which a person's life may exist, it should be clear that marital status, household income, or any other factor than the color of one's skin is not a criterion of distinction for these experiences.

[1] A term to describe the interconnected nature of social categorizations such as race, class, and gender as they apply to a given individual or group.

There are a number of limitations to keep in mind for the context of these findings. First, our analysis only assesses these relationships among 33 individuals – those who consented to hair sample collection. As mentioned in the previous chapter, there are several factors that can deter Black participants from joining science research endeavors, including the act of participating in research. There were no clear patterns of distinction concerning a bias of those 33 individuals sampled, however given that almost half of those surveyed did not donate hair, there is the likelihood that our results are biased. Given this particular obstacle, it is necessary to keep in mind that these findings are not representative of all Black men. Second, it is still unknown how the context of our collection method compares to other studies of stress and HCCs. Hair cortisol has been shown to be a promising marker of physiologic stress and activity. However, a single measurement representing a retrospective time period can be affected by many variables, some unmeasured, which may limit its use as a marker of long-term stress exposure. Nonetheless, we were able to detect significant relationships among our core variables despite the impfect nature of these markers, suggesting that they do retain important signal. Finally, we were unable to control for steroid use, early life trauma, and exercise, all of which may significantly confound variables in our analysis. This may add an obstacle of difficulty in making our results more generalizable.

Despite these limitations, there are a number of strengths in this work. First, this study is unique in that it assesses HCCs in Black men, a population who has been excluded from previous work of this nature, despite the fact that they experience some of the highest levels of adverse experiences in American society. Second, this study adds validity to the hair sample collection methods offered in Chapter 1, which contend that Black men with extremely short hair textures can and should be included in HCC research. Third, this work underscores the importance of

assessing longitudinal markers of stress in Black men, as it may potentially contribute to deeper understanding of mechanisms of race-patterened health disparities. Lastly, our findings suggest that resilience can be observed as a marker of biopsychosocial pathology, and that, in the context of racism-related stress, resilience can significantly influence the type and magnitude of response that the body experiences during and beyond such woeful encounters.

CONCLUSION

Our research suggests that hair cortisol is associated with reports of major discrimination among a sample of Black men in Seattle, however, that relationship decreased significantly among participants who reported high levels of resilience. Thus, it appears as if resilience can act as a moderator that reduces negative psychophisiological responses to discrimitation. It should be noted that our findings are not presented to offer *resilience* as an antidote to experiences of discrimination; nor are they meant to minimize the experience of discrimination and its multifaceted concequences. On the contrary, this work is meant to shine a light on the adaptive psychological trait that many African-Americans have developed to deal with these experiences. It is our hope that this investigation will contribute to work that seeks to find ways to build upon these strengths. For future endeavors, further detailed studies will be needed to investigate the profiles of hair cortisol and HPA capacity in the context of discrimination with repeated measurements through time. Such data will contribute to more relevant interpretation and evaluation of the results than individual HCCs.

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STUDY #3: THE EFFECTS OF RESILIENCE ON MENTAL AND EMOTIONAL WELL-BEING AMONG BLACK MEN WHO EXPERIENCE DISCRIMINATION AND ADVERSITY

ABSTRACT

This article examines the two-fold potential effect modifying properties of resilience on: (1) Everyday and Major Forms of discrimination, and (2) Adverse Childhood Experiences, on the mental and emotional well-being of Black men. Although Everyday discrimination was associated with reports of stress and anxiety, resilience did not appear to modify these relationships. However, resilience significantly modified scores of anxiety and stress symptoms in the context of Adverse Childhood Experiences, suggesting that resilience may be a protective psychosocial buffer in the face of adversity. These findings underscore the need for research efforts to identify salutogenic mechanisms through which positive affective dispositions can buffer the body against psychosomatic harm in the face of systemic and personally-mediated injustice.

BACKGROUND

Racial discrimination can be defined as organized systems between and within societies that cause otherwise avoidable and unfair inequalities in power, resources, capacities, or opportunities across racial or ethnic groups (Paradies et al., 2015). Discrimination can accordingly be found everywhere, from open threats and physical assaults, to social disparity phenomena deeply embedded in institutional systems and structures (David R Williams & Jackson, 2005; David R Williams & Sternthal, 2010). Racial discrimination is a pertinent life stressor with significant adverse effects on both physical and mental health. Many bouts of discrimination can affect both men and women,

but some can be particularly severe for Black men. As seen from the explosion of viral videos involving adverse encounters with the police, Black men are disproportionately targeted and killed by law enforcement and, in combination with other encounters, tend to report higher levels of discrimination than other minority groups such as Hispanics (Assari et al., 2017; Brondolo et al., 2008; McLaughlin et al., 2010).

A body of investigations have found that discrimination, and particularly racial discrimination, can deteriorate Black mental health (Clark et al., 1999; Kessler et al., 1999; Paradies et al., 2015). Over 328 studies published between 1986 and 2012 have found strong negative associations between discrimination mental and emotional well-being (Pascoe & Smart Richman, 2009; Schmitt et al., 2014). The aspects of psychological health and well-being most affected were factors such as self-esteem, psychological distress, life satisfaction, anxiety, and depression (Goto et al., 2013; Paradies et al., 2015). Many of these factors, including heightened negative psychological stress responses, increased physiologic stress responses, and hypervigilance, may impose deleterious effects on health (Assari et al., 2017).

Missing among this broad body of research, however, is an examination of the salutogenic effects of positive-oriented coping responses. While the consequences of living in a racially tense psychosocial environment may impose deleterious effects on mental and emotional well-being, appraisals of African-American history have shown that displays of resilience may have some unexplored, and potentially beneficial, mental health implications. Resilience can be viewed as a defense mechanism, which enables people to thrive in the face of adversity and discrimination

(Davydov et al., 2010). Although financial resources, socioeconomic position, and health behaviors are known to have significant health determinants, not everyone who is exposed to stressful life conditions has poor health outcomes. Numerous studies have shown that resilience can serve as a protective factor when people are confronted with chronic bouts of stress and pain, in turn increasing the likelihood of positive mental and physical health outcomes (Hjemdal et al., 2011; Smith, 2006; Sturgeon & Zautra, 2010; Tedeschi & Kilmer, 2005). Accordingly, individual resilience, then, may enable resistance to factors that undermine health, such as racial discrimination (Friedli & Organization, 2009). Although constructs of resilience have been applied to diverse international populations, few studies have examined the effects of resilience on Black Americans (Brown, 2008). Given the biopsychosocial nature of adverse experiences and health outcomes, a necessary and forward-moving step in resilience research would be to assess its effects on the mental and emotional well-being of Black men.

In Chapter 2, we observed the effects of resilience in the relationship between discrimination and hair cortisol among these men. We saw that hair cortisol could be used as a reliable measure of stress, and that resilience had significantly modified hair cortisol output among those who reported high resilience scores. In this chapter, our continued aim is to measure the psychologic-related effects of resilience in the context of racism-related stress.

METHODS

Participants

As part of a larger on-going study, we used purposive sampling to recruit 65 Black men who visited Black-majority barbershops for a haircut in historically Black neighborhoods across Seattle, Washington. All participants provided oral informed consent. The eligibility criteria for the study were as follows: participants must (1) have been born and raised in the US, (2) self-identify as African-American, Black, Afro-Caribbean, or Afro-Latino potentially in combination with some other racial/ethnic identity, (3) be 18 years of age or older, and (4) have residency in the State of Washington. At the end of data collection, participants were given a $10 gift card. All participants completed a paper-based questionnaire in the same order. The research project, of which this study was a part, was approved by the Human Subjects Division at the University of Washington.

Measures

Everyday Discrimination Scale

The first tool captures the perceptions of discrimination that occur in everyday life, called the *everyday discrimination scale* (Clark et al., 2004; David R Williams et al., 1997). It has good internal consistency (alpha coefficient = 0.91), reliable sampling adequacy (KMO = 0.82), and construct validity for application among Black Americans (Doyle 2017 Unpublished Pilot Study).This 9-item tool screens for how a person feels they are perceived or treated within a society. The survey items are listed as statements which address themes such as whether a person is treated

with less courtesy or respect than others are, receives poorer service than others do, is perceived to be less intelligent or more dishonest than others, and other proximally related matters. For example, a statement may read, "You are treated with less courtesy than other people are;" or, "You are treated with less respect than other people are." Given the nature of cumulative experience, the survey tool is structured on a Likert Frequency Scale and the numerical values of each answer are summed to composite an overall score. 'Frequency' here refers to how often each event happens, whether it is 'Almost every day' (scored as 5), 'At least once a week' (4) 'A few times a month' (3) 'A few times a year' (2) 'Less than once a year' (1), or 'Never' (0). Once completed, the items are summed to create an overall Everyday Discrimination score. Scores may range from 0 to 45.

Major Discrimination Scale

The second tool captures specific experiences of discrimination that have occurred throughout one's adult life, called the *major experiences of discrimination scale* (David R. Williams et al., 2008). It has decent internal consistency (alpha coefficient = 0.78), reliable sampling adequacy (KMO = 0.64), and construct validity (Doyle 2017 Unpublished Pilot Study). This 9-item tool accounts for nine major experiences of *unfair treatment* in domains such as employment, education, housing, and interactions with the police that respondents have experienced. For example, a statement may read, "At any time in your life, have you ever been unfairly fired?" or, "Have you ever been unfairly stopped, searched, questioned, physically threatened or abused by the police?" In the context of the survey, 'Major experiences' were attributed to one's race/ethnicity (i.e. racial discrimination), and were distinguished from those attributed to other social status categories (i.e.

non-racial discrimination). The response structure in this tool is a simple 'Yes' (coded as 1) or 'No' (coded as 0). Once completed, the items are summed to create an overall Major Discrimination score. Scores may range from 0 to 9.

The Connor-Davidson Resilience Scale

The abridged Connor-Davidson Resilience scale comprises a single 10-items (CD-RISC-10) factor scored on a 5-point Likert scale ranging from 1 (Completely Agree) to 5 (Completely Disagree). Examples of items are "I am able to adapt when changes occur," "I am not easily discouraged by failure," "Under pressure, I tend to stay focused and think clearly," and "I tend to bounce back after illness, injury, or other hardships," and other proximally related factors. These items were determined by the originators of the scale as capturing the essence of resilience as it is exhibited within personal traits. Significant correlations have been found between the CD-RISC-10 and mental and emotional well-being (depression and anxiety) metrics, but have not been observed in African-American populations (Campbell-Sills et al., 2006; Vaishnavi et al., 2007). The reliability and validity of the scale were demonstrated in clinical studies, and through correlation matrices by measures of hardiness, perceived stress, and stress vulnerability (Campbell-Sills & Stein, 2007; Cohen et al., 1983; Kobasa, 1979).

DASS: Depression, Anxiety, and Stress Scale

Given the prevalence of research noting strong associations between discrimination and poor mental health outcomes via multiple dimensions, it was important to account for psychological well-being within three domains: depressive symptoms, anxiety symptoms, and symptoms of stress. Conceptually, depression and anxiety-related symptoms are rather distinct, but symptoms of *stress* pose some other problems in understanding negative affective conditions; that is, that both depression and anxiety are *stressful*. Regardless, a person is also capable of being stressed without suffering from depression or anxiety. For this reason, Lovibond and Lovibond (1995) have established three clinically validated metrics for each domain respectively, and this tool, called the Depression, Anxiety, and Stress Scale (DASS) has been adapted for use in this study. The tool is structured on a Likert scale with a value of '1' denoting 'Completely Agree,' '3' denoting 'Somewhat Agree,' and '5' denoting 'Completely Disagree;' while '2' and '4' serve as intermediary values, respectively. Values are then reverse coded and scored twice: (a) on each domain, respectively; and (b) with all three domains together. The domain of depressive symptoms shows strong internal consistency (alpha coefficient = 0.93) and construct reliability (KMO = 0.83) among Black participants (Doyle 2017, Unpublished Pilot Study). The 7-item tool addresses themes of dysphoria, hopelessness, devaluation of life, self-depreciation, lack of interest or involvement in activities, anhedonia (the inability to experience positivity), and inertia (difficult to work up initiative). For example, a statement may read, "Sometimes I feel downhearted and blue," or, "Sometimes I feel that life is meaningless." Scores for depressive symptoms may range from 7 to 35. The domain of anxiety symptoms also shows strong internal consistency (alpha coefficient = 0.86) and construct validity (KMO = 0.78) among Black participants (Doyle 2017,

Unpublished Pilot Study). The 7-item tool addresses themes such as autonomic arousal (the body reacting physically to psychological stress), skeletal-muscular effects (trembling in the hands), situational anxiety, and the subjective recollection of one's own anxiety. For example, a statement may read, "I sometimes experience trembles," or, "I tend to feel like I'm close to having a full-on panic attack." Scores for symptoms of anxiety may range from 7 to 35. The domain of stress symptoms shows strong internal consistency (alpha coefficient = 0.92) and construct validity (KMO = 0.82) among Black participants (Doyle 2017, Unpublished Manuscript). The 7-item tool accounts for topics relating to difficulty relaxing, nervous arousal, becoming easily agitated or upset, becoming irritable, and impatience with situations. For example, a statement may read, "I tend to feel impatient," "I tend to overreact to situations," or, "I tend to get agitated easily." Scores for symptoms of stress may range from 7 to 35. Additionally, given that emotional states can vary from time to time, and our interest here is in chronic stress, rather than acute stress; it was important to ask about these experiences in the context of short periods of time using the phrase "sometimes." For example, participants were asked to state whether they agreed with the following statement, "*Sometimes* I feel downhearted and blue," rather than, "*In the last two weeks*, I have felt downhearted and blue." The structure of these questions gives participants the ability to fill in their own subjective report of emotion, without accounting for the potentially wild variability that emotions can have in daily life.

Just World Beliefs

At times, the way in which a person views the world can often dictate the kind of experiences they have and the ways they may respond to those experiences. While racial discrimination can, indeed, be a jarring and stressful experience, it is possible that there could be differences in the way one

perceives it. If an individual does not believe in a fair and just world, and is not guided by the expectations that their engagements in life ought to be, research suggests that they may be less likely to experience the deleterious effects that come from stressful experiences when compared to someone who believes in a just world (Eliezer et al., 2011; Hagiwara et al., 2015). While this survey tool says little about one's report of resilience in the face of adversity and discrimination, the Just World Beliefs scale may be useful for interrogating some of the psychological dispositions that come with appraisals of discrimination.

The Just World Beliefs scale comprises a single 8-items factor scored on a 5-point Likert scale ranging from 1 (Completely Agree) to 5 (Completely Disagree). Examples of items are "I feel that the world treats me fairly," "I feel that people treat me fairly in life," "I feel that when I am met with misfortune, I have brought it upon myself," and "I feel that I get what I am entitled to have," and other proximally related factors. These items were determined by the originators of the scale as capturing the essence of beliefs in a fair and just world as it is exhibited within personal traits. Significant correlations have been found between the just world beliefs and mental and emotional well-being (depression and anxiety) metrics, and have assessed these the internalization of JWB among African-Americans (Hunt, 2000). The reliability and validity of the scale was demonstrated by a number of studies, and is applicable for assessment in the present study (Dalbert, 1999, 2002; Hafer & Olson, 1989).

Adverse Childhood Experiences Survey (ACEs)

Adverse childhood experiences have been linked to psychiatric difficulties in children and adults (Chapman et al., 2004; Schilling et al., 2007). The survey is a tool that measures experiences such

as physical and sexual abuse, poverty, homelessness, as well as witnessing things like death, illicit drug use, and family-member incarceration. However, the relationship between ACEs and resilience have been understudied. A number of research endeavors have investigated the predictors of ACEs and their causal effects on later-life health, and yet few studies have investigated the potential racial differences therein. Also seldom investigated is how those experiences may relate to other positive oriented and resilient dispositions later in life. Accordingly, in the search for understanding how resilience may relate to mental and emotional well-being, it was important to collect data on participants' ACEs. The response structure in this 17-item survey tool is simply 'Yes' or 'No'; where total scores are added across all questions.

The ACEs scale comprises a single 17-items factor scored on a 5-point Likert scale ranging from 1 (Completely Agree) to 5 (Completely Disagree). Examples of items are "Before age 18, did a parent or other adult in the household often or very often…push, slap, or throw something at you," "Before age 18, did you see serious criminal activity, such as street violence," and "Before age 18, did someone very close to you die,". These items were determined by the originators of the scale as capturing the essence of adverse childhood experiences, through a composite of a number of jolting life events. Significant correlations have been found between the ACEs and mental and emotional well-being (depression and anxiety) metrics, and correlations have been detected among African-Americans (Dube et al., 2001; Dube et al., 2002). The reliability and validity of the scale was demonstrated by a number of studies, and is applicable for assessment in the present study (Anda et al., 2002; Chapman et al., 2004; Haatainen et al., 2003; Schilling et al., 2007).

Data Collection

Using a basic structured questionnaire, participants provided sociodemographic information including age group, highest level of education achieved, employment status, income, marital status, religious affiliation, and the survey tools of interest discussed above.

Statistical Analysis

Univariate analysis was performed on the sample characteristics by discrimination measures, where a one-way ANOVA test was used on categorical variables, and Pearson's Correlation matrix tests were used for continuous variables. Probability significance for these tests were set to $P \leq 0.05$. The variables that resulted in significance were included in regression tests.

Moderation of resilience on the relationship between discrimination and depression, anxiety, and stress scores were tested using hierarchical linear regression tests proposed including adjustment for the potential interactions between resilience and discrimination, resilience and just world beliefs, resilience and ACEs, everyday discrimination and ACEs, and everyday discrimination and just world beliefs. Interaction terms are included to observe the overall change in statistical significance of the regression tests.

RESULTS

Descriptive Statistics and Levels of Resilience by Discrimination

Sociodemographic characteristics in each scale or factor are shown in Table 1, where the numerical quantity samples corresponds to *N* and its frequency denoted by *%*; while the calculated means correspond to *M* and their standard deviations are noted by *SD*. Most of the men are between the ages of 18 and 49 years, and most have some college experience or more. When compared to census data of African-American men in Seattle, these education distributions are slightly higher. That is, the men in this study tended to have higher educational attainment. Additionally, the majority of the men's household income was above $70,000 / year, this was also reflective of census data estimates for Black households in the Seattle region.

One-way ANOVA tests revealed that none of the sample characteristics tested for significance on the discrimination measures and were therefore not included in regression tests. The mean for Connor-Davidson resilience scale total scores was approximately 41.2 (SD = 7.63) out of a possible score of 50. Resilience did not appear to correlate strongly with everyday discrimination and major discrimination (using the common cut-off of ±0.3). The mean score for Just-world beliefs was 24.04 (SD = 5.26) out of a possible score of 37. Pearson's correlation coefficients showed that just world beliefs were negatively correlated with everyday discrimination (-0.4483), and mildly negatively correlated with major discrimination (-0.2859). Just world beliefs was included in further analyses of everyday discrimination. The mean score for ACEs was 4.83 (SD = 3.29) out of a possible score of 17 and appeared to strongly correlate with everyday discrimination (0.4719) and major discrimination (0.3989).

Table 2 shows the relationship of DASS (combined and separated) by discrimination measures. The means and standard deviations for each are as follows: Depression was 10.89 (SD = 3.85), Anxiety 12.41 (SD = 4.01), Stress 14.98 (SD = 6.23), and combined 38 (SD = 11.54). Major discrimination was not strongly correlated with any of the mental and emotional well-being measures and therefore was not included in the mediation analysis. However, everyday discrimination showed strong positive correlation with DASS (compiled) and stress, and was selected for further investigation. Note that this is the reverse pattern as was seen in Chapter 2, where major discrimination was strongly correlated with hair cortisol concentrations, while everyday discrimination was not.

Regression Moderation Analysis

Resilience was examined as a moderator of the relation between everyday discrimination and DASS measures (compiled or separate) and was not found to be significant. Everyday discrimination and resilience were entered into regression tests followed by the interaction terms between them, and it did not explain many significant relationships. It was discovered, however, that there was a strong negative interaction between resilience and ACEs in relation to their effects on Anxiety and the complete DASS measures, but not stress or depression (Table 3). Thus, resilience was not observed to moderate the relationship of mental and emotional well-being and everyday discrimination.

Table 1. Demographic Characteristics and variables of interest stratified by Discriminatory Experiences (N = 65)

	Total Sample	Everyday Discrimination	Everyday Discrimination Test Statistic (X2 or Corr)	Everyday Discrimination P value	Major Discrimination	Major Discrimination Test Statistic (X2 or Corr)	Major Discrimination P value
	N = 65	N = 62			N = 61		
	M (SD) or N (%)	M (SD) or N (%)			M (SD) or N (%)		
Age Group	64 (98.4%)	61 (98.3%)			60 (98.3%)		
18 - 29 Years-old	34 (53.13%)	19.74 (9.02)			2.81 (1.76)		
30 - 49 Years-old	21 (32.81%)	19.38 (11.55)	1.04	0.7899	3.31 (2.26)	4.18	0.2419
50 - 64 Years-old	8 (12.5%)	16 (9.82)			4.37 (2.82)		
65 Years and Over	1 (1.56%)	15 (N/A)			6 (N/A)		
Education	65 (100%)	62 (95.3%)			61 (100%)		
Some High School	1 (1.54%)	34 (N/A)			1 (N/A)		
High School Graduate	9 (13.85%)	20.37 (11.61)			3.12 (3.22)		
Some College	19 (29.23%)	21 (11.5)	6.31	0.2756	3.56 (2.12)	2.17	0.8244
College Graduate	20 (30.77%)	16.78 (8.25)			3.05 (1.98)		
Some Post-graduate	1 (1.54%)	27 (N/A)			3 (N/A)		
Post Graduate Degree	15 (23.08%)	16.78 (7.93)			3.2 (1.89)		
Household Income	63 (96.9%)	60 (96.7%)			59 (96.7%)		
Less than $10,000 /yr	4 (6.35%)	22.33 (16.86)			2.66 (1.52)		
$10,000 to $19,999 /yr	3 (4.76%)	17 (15.09)			0 (0)		
$20,000 to $29,999 /yr	5 (7.94%)	25.4 (9.09)			5.6 (2.19)		
$30,000 to $39,999 /yr	2 (3.17%)	26 (1.41)	7.55	0.373	2.5 (0.70)	2.311	0.889
$40,000 to $49,999 /yr	4 (6.35%)	24.75 (8.77)			4 (2.16)		
$50,000 to $59,999 /yr	10 (15.87%)	14.44 (11.39)			3.25 (1.75)		
$60,000 to $69,999 /yr	4 (6.35%)	26.5 (8.66)			3.25 (1.5)		
$70,000 + /yr	31 (49.21%)	16.43 (7.82)			2.87 (2.18)		
Employment Status	64 (98.4%)	61 (98.3%)			60 (98.3%)		
Unable to Work	0 (0%)	N/A (N/A)			N/A (N/A)		
Employed for Wages	46 (71.88%)	19.77 (8.87)			3 (2.24)		
Self-Employed	11 (17.19%)	18.63 (11.54)	1.93	0.586	4 (1.73)	2.46	0.481
Un-employed and looking	3 (4.69%)	6.5 (4.94)			2.66 (1.52)		
Un-employed not looking	1 (1.56%)	32 (N/A)			2 (N/A)		
Retired	3 (4.69%)	18.66 (12.89)			5 (1)		
Marital Status	64 (98.4%)	61 (98.3%)			60 (98.3%)		
Never Married	43 (67.19%)	19.68 (9.88)			2.67 (1.92)		
Currently Married	13 (20.31%)	18.5 (10.34)	0.35	0.949	4.30 (1.88)	2.49	0.476
Widowed	0 (0%)	N/A (N/A)			N/A (N/A)		
Divorced	5 (7.81%)	13 (8.39)			4.6 (3.20)		
Separated	3 (4.69%)	22.66 (11.93)			2 (1.41)		
Religious Affiliation	64 (98.4%)	61 (98.3%)			60 (98.3%)		
Not Religious	18 (28.13%)	21.31 (9.76)			2.81 (1.72)		
Christian	39 (60.94%)	17.65 (10.03)			3.28 (2.35)		
Muslim / Islamic	1 (1.56%)	35 (N/A)	0.39	0.941	5 (N/A)	3.1	0.376
Buddhism	0 (0%)	N/A (N/A)			N/A (N/A)		
Jewish	0 (0%)	N/A (N/A)			N/A (N/A)		
Other	6 (9.38%)	N/A (N/A)			N/A (N/A)		
Resilience	41.20 (7.63)	N/A (N/A)	-0.1449	N/A	N/A (N/A)	-0.1515	N/A
Just-World Beliefs	24.04 (5.26)	N/A (N/A)	-0.4483	N/A	N/A (N/A)	-0.2859	N/A
Adverse Childhood Exp.	4.83 (3.29)	N/A (N/A)	0.4719	N/A	N/A (N/A)	0.3989	N/A
* $P < 0.05$							
** $P < 0.01$							
*** $P < 0.001$							

Table 2. Dependent variables of interest stratified by Discriminatory Experiences

	Total Sample	**Everyday Discrimination**	**Everyday Discrimination Pearson's Correlation**	**Major Discrimination**	**Major Discrimination Pearson's Correlation**
	N	N		N	
	M (SD)	M (SD)		M (SD)	
DASS	64	61	0.365*	61	0.138
	38 (11.54)	37.91 (11.49)		37.45 (11.16)	
Depression	64	61	0.279	61	0.0537
	10.89 (3.85)	10.83 (3.78)		10.63 (3.68)	
Anxiety	65	62	0.293	61	0.115
	12.41 (4.01)	12.48 (4.08)		12.19 (3.95)	
Stress	65	62	0.362*	61	0.150
	14.98 (6.23)	14.90 (6.23)		14.62 (5.94)	

Table 3. Results of the Hierarchical Linear Regression tests between Everyday Discrimination and HCCs (Back, Side, Top, Avg)

	Analysis	Predictor Coefficient	Predictor P-Value	Resilience Coefficient	Resilience P-Value	Interaction Coefficient	Interaction P-Value
Depression	Everyday Discrimination and Resilience	0.074	0.138	-0.111	0.092	-	-
	↳ Interaction	-0.37	0.277	-0.347	0.071	0.01	0.188
	JWB Interaction with Resilience	0.077	0.164	0.054	0.751	-0.008	0.262
	JWB Interaction with Everyday Discrimination	0.088	0.623	-0.12	0.093	0	0.98
	ACEs Interaction with Resilience	0.06	0.299	-0.022	0.817	-0.03	0.105
	ACEs Interaction with Everyday Discrimination	0.135	0.18	-0.129	0.068	-0.013	0.403
Anxiety	Everyday Discrimination and Resilience	0.11	0.052	-0.06	0.358	-	-
	↳ Interaction	0.158	0.66	-0.036	0.863	-0.001	0.891
	JWB Interaction with Resilience	0.128	*	0.079	0.675	-0.008	0.33
	JWB Interaction with Everyday Discrimination	0.182	0.361	-0.09	0.235	-0.002	0.444
	ACEs Interaction with Resilience	0.027	0.649	0.095	0.346	-0.051	**
	ACEs Interaction with Everyday Discrimination	0.039	0.718	-0.111	0.126	0	0.993
Stress	Everyday Discrimination and Resilience	0.203	*	-0.09	0.384	-	-
	↳ Interaction	0.488	0.365	0.068	0.827	-0.006	0.592
	JWB Interaction with Resilience	0.237	*	0.143	0.611	-0.014	0.278
	JWB Interaction with Everyday Discrimination	0.657	*	-0.132	0.233	-0.017	0.14
	ACEs Interaction with Resilience	0.083	0.365	0.065	0.666	-0.051	0.068
	ACEs Interaction with Everyday Discrimination	0.164	0.305	-0.142	0.178	-0.013	0.598
DASS	Everyday Discrimination and Resilience	0.37	*	-0.19	0.344	-	-
	↳ Interaction	-0.137	0.896	-0.458	0.44	0.012	0.63
	JWB Interaction with Resilience	0.417	*	0.371	0.476	-0.032	0.106
	JWB Interaction with Everyday Discrimination	0.868	0.114	-0.272	0.212	-0.017	0.408
	ACEs Interaction with Resilience	0.172	0.306	0.139	0.614	-0.137	*
	ACEs Interaction with Everyday Discrimination	0.357	0.232	-0.318	0.13	-0.031	0.106

* $P < 0.05$

** $P < 0.01$

*** $P < 0.001$

DISCUSSION

In this study, we set out to determine whether resilience modified scores of depression, anxiety, stress, and all three compiled (DASS) on resilience. This was an effort to determine the potential psychologic-related effects of resilience in the context of racism-related mental and emotional well-being. The results from the current study indicate that Black men have experienced discrimination, and it is correlated with higher levels of the self-reported negative mental health states of depression, anxiety and stress, but that resilience may not moderate these relationships. In the regression moderation analysis, each DASS measure of interest was significantly related with everyday discrimination, however, findings did not support moderation of these relationships by resilience.

It is interesting to note that everyday discrimination was significantly associated with all DASS measures but not with resilience. Indeed, the experience of everyday discrimination through various micro-agressors may be stressful and may negatively affect one's mental and emotional well-being. But when one thinks about mundane and pervasive experiences, say, receiving poorer service, or noting that people act as if they are afraid of oneself, it is possible that there may not be a fitting method for one to exercise their resilience. These experiences may just be stressful encounters that one must endure, even if their resilience is high in other life-related contexts. But with this finding and speculation in mind, it is even more perplexing that major discrimination was not significantly correlated with any of our measures of interest. In comparison to the everday discrimination scale, major discrimination is a tool which measures the occurrence of discriminatory experiences that can have long-lasting life consequences (e.g. being unfairly fired,

denied a promotion or bank loan). One might reason that experiencing these kinds of life-altering forms of discrimination may be strongly associated with reports of depression, anxiety, and stress; and that high resilience may offset those mental and emotional well-being scores. And yet our analysis does not provide support for this reflection.

It is additionally mystifying to see that resilience and reports of mental and emotional well-being are not correlated either. Given that both factors of interest rely on psychometric properties, one may reason that these two factors may be negatively correlated with one another. Indeed, several previous studies on the psychological effects of resilience have found this outcome, but alas, not among Black men (Hjemdal et al., 2011; Smith, 2006; Sturgeon & Zautra, 2010; Tedeschi & Kilmer, 2005). What should be understood, however, that the results illustrate, is that having a high ACEs score negatively interacts with resilience in relation to both anxiety and DASS measures. In other words, the more adverse childhood experiences one has had in their early life, the less effect resilience will have on their reports of anxiety. Conversely, the higher one's resilience score, the less effect their adverse childhood experiences will have on their report of anxiety. While we cannot conclude that resilience moderates the effects of discrimination on mental and emotional well-being, we can speculate that the reason resilience appears to interact with ACES on anxiety, is because it may – in fact – mildly modify these relationships in a sensible way. In other words, one's early life history may dictate how resiliently one responds to external stressors, and we may best witness this relationship through observation of reports of anxiety. Alas, more data is needed.

There are a number of limitations to keep in mind that may explain why we were not able to reproduce the broader general patterns seen in the larger body of research. First, our analysis assesses these relationships among 65 barbershop patrons. Our data then represents information collected in a setting that is responsible for fortifying and cementing the politics and integrity of Black resilience. In other words, by collecting this data in this setting, individuals may be imbued with a form of cognitive bias, a pliable internal optimism that may be recorded differently if these data were collected elsewhere. Second, one recruitment technique that was used for increasing the likelihood of participation among these Black men, was utilizing the topic of interest (resilience) as a motivational factor for participation. By priming resilience in participants' minds, it is entirely possible that our recruitment strategy imposed a form of cognitive bias in our research participants, one in which their mental fixation is on demonstrating their strengths and integrities while placing their more stressful aspects of life under a shadow. Third, our sample size is only 65 individuals and so it is possible that with a larger sample size, we may be able to detect more relationships. Additionally, our sample was predominantly middle-income and employed men. Having a more socioeconomically diverse sample would have allowed us to explore in greather depth whether the challenges of low-, middle-, and upper-class Black men and their resilience strategies are similar to those of our sample. There is, however, a caveat to this point of critique regarding sample size. In the previous chapter, only 35 individuals were needed to observe statistically significant and meaningful patterns. However, this chapter relies on those individuals and more. This suggests that small sample size alone is not a barrier to detecting significant patterns relating to discirmination and resilinece in this population. Nevertheless, future studies could build upon this investigation by collecting resilience and mental and emotional well-being data in larger samples outside of the barbershop setting.

Despite these limitations, our findings have important implications for research. In the future, researchers should employ multiple recruitment strategies to build upon these findings, and refrain from limiting data collection to places of potential cognitive bias (i.e. the barbershop). However, this represents a trade-off, given the many benefits of recruitment in such a setting, and potentially sacrificing ease-of-access to data, for measuring whether that data is reported accurately. Additionally, given the unclear patterns found surrounding everyday and major discrimination, more qualitative and exploratory inquiries would be necessary to provide a deeper understanding of the complex nature of Black men's stressors, including specific probes into how and from where or whom they derive their resilience. Such findings could provide pointed suggestions on how to modify or revise theoretical models of resilience to better match Black men's experiences. More informative investigations will also benefit from focusing more on Black men's strengths across the lifespan in effort to explore the fluidity of resilience across the everchanging nature of Black men's lives.

CONCLUSION

Our research suggests that mental and emotional well-being, as measured through the DASS (depression, anxiety and stress scale), is related to experiences of everyday discirmination among Black men in Seattle, as we predicted, and as has been found in other populations. However, contrary to our hypotheses, that relationship does not appear to be affected by resilience. These findings could be said to support the idea that resilience is a psychological construct that may not have measurable psychological effects. As this cannot be theoretically possible, we have provide

a detailed interpretation of the circumstances that inform this data collection and make recommendations for future research endeavors to accommodate these areas of potential limitation. Future research should seek to expand recruitment efforts beyond barbershops, a potential location that may implicitly confound results related to the question of interest. Additional efforts should be made to understand the sources and motivations for Black resilience in greater depth. It is possible that in their diverse socio-economic positions, Black men may draw their resilience from a variety of different sources, one of which is most commonly the barbershop. Finally, research endeavors should make a concerted effort to identify the internal components of Black resilience, as they may be different from constructs of resilience more generally applied to other diverse populations.

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DISSERTATION CONCLUSION

The present study sought to investigate the health effects of resilience in Black Men who face discrimination and adversity through two important ways. The first was to observe how resilience, in the context of discrimination, affected the physiologic stimulus of the body by analyzing hair cortisol concentrations (HCCs). In the first chapter, we needed to develop and standardize specimen collections methods for extremely short-length afro-textured hair because the current prevailing collection methodology among the existing body of research literature has been inadequate for application among this group. By developing a technique that accounted for factors like curl pattern variation, length variation, and aesthetic impact, we were able to successfully implement, and therefore validate, our new collection methodology among this group. We then incorporated this strategy into our investigation in Chapter 2, where we tested the effect-modifying property of resilience on HCCs in the context of perceived discrimination. We found that among those who reported high levels of major discrimination, high HCCs were produced. However, among those who reported high resilience scores in addition to high major discrimination scores, low HCCs were produced. These findings suggest that resilience can play an impactful role in stress physiologic stimulus and that it may have potentially beneficial longitudinal implications on psychosomatic health and integrity.

Given the biopsychosocial implications of these findings, we then expanded this investigation into Chapter 3, where we tested the effect-modifying property of resilience on mental and emotional well-being, an ideal intermediary between physiologic stimulus and psychosocial outcomes. We measured mental and emotional well-being through clinically validated survey appraisals of

depression, anxiety, and stress. However, we found potentially incongruent results that may be reflective of a number of logistical and conceptual limitations. Where major discrimination was the component of significance in Chapter 2, it showed no significant relationship with any factors of interest in Chapter 3. And where everyday discrimination showed no significant relationship with any factors of interest in Chapter 2, it showed significant associations with mental and emotional well-being in Chapter 3. Furthermore, where we would have expected resilience to show a strong negative relationship with depression, anxiety, and stress, it showed no significant association at all. Accordingly, where we would have expected an implicit connection between Chapters 2 and 3 (Figure 1), we see that the differences in our results are dependent on the kinds of discrimination we analyze. The apparent incongruity in our results suggest that we may need to deepen our investigation.

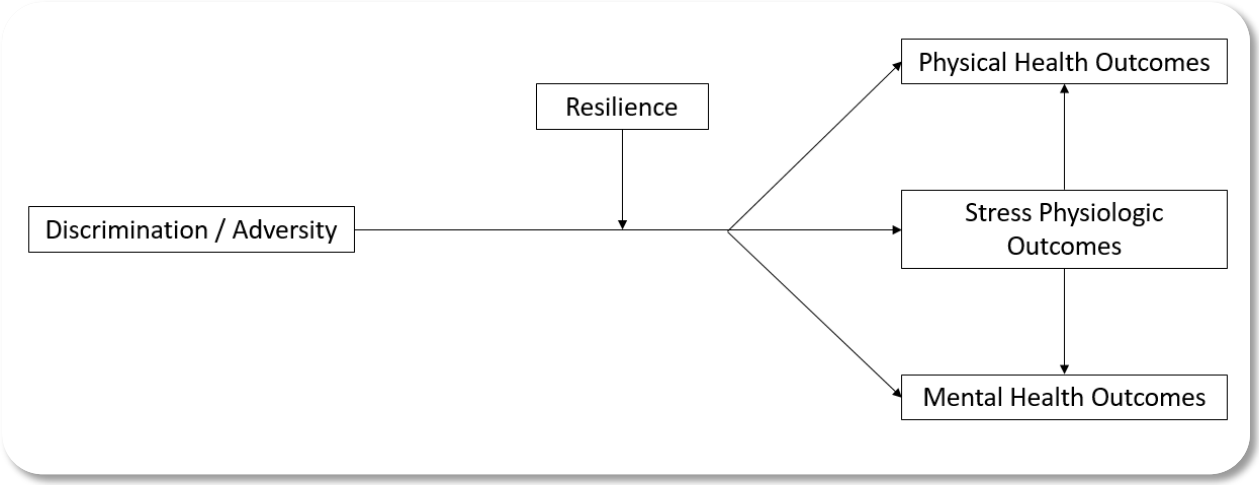

Figure 1. A causal theoretical model of the way that resilience may influence health outcomes in Black Americans.

Additionally, there are several criticisms of our measures of discrimination. Future research will be needed to investigate the intricacies of discrimination; that is, the fundamental differences between Everyday and Major discrimination. A future investigation in this area may establish a missing link in our theoretical model, which may help us to understand how resilience modifies

cortisol output but not depression, anxiety, and stress in the broader context of discrimination. However, given the differential results of everyday and major discrimination, it should be further investigated why and how both experiences affect the body and mind differently. In other words, what is it about major experiences of discrimination affecting HCCs, which everyday discrimination[1] does not? Simply put, future expansive research in this area is needed.

There are additional points of critique on other aspects of this work. First, future research may also benefit from investigating HCC output through follow-up engagements with participants. Indeed, it is easy and quick to collect hair specimens at a single point in time, but it is another to follow-up with individuals to measure their survey data and cortisol output over a longer span. This, in combination with repeated measures of everyday and major experiences of discrimination may provide expanisve context and analyses on the inner complexities of discriminatory stressors in Black men, in order to better understand how both affect the body and mind through time.

Additionally, more qualitative and exploratory inquiries are necessary to provide a deeper understanding of the complex nature of Black men's stressors, including specific probes into how and from where or whom they derive their resilience. It was briefly discussed in the introduction chapter that there are a number of other survey measures that were not included in the present study. These additional measures, things like John Henryism and Double-Consciousness, may provide insight into how resiliences is formulated, displayed, and internalized among Black men,

[1] …which, arguably, overlaps major experiences of discrimination…

but they are not qualitative assessments and so may suffer from their own conceptual and logistical limitations.

Furthermore, it should be noted that our use of the Connor-Davidson Resilience scale is not a universal model of resilience. Although it has been applied to culturally and linguistically diverse populations, and was highly apt for use among Black men, there are many other factors of life and circumstance that may influence a person's report of resilience. These factors may include, but are not limited to, a person's access to financial resources, their emotional stability through time, the variation of their internalization and responses to *some* stressors but not *others*, and much more. Recognition of this reality introduces a multi-dimensional concept of resilience which is not, and cannot, be captured in a single survey instrument. It should be noted then, that our findings in this research are limited to the information collected and provided, and do not speak to other complexities of the realities of social interaction.

Notwithstanding our recommended accommodations for future studies in the previous chapter, here our focus is on developing a plausible theoretical framework that may explain some of the incongruence seen in the data. We found that (major) discrimination was significantly associated with hair cortisol concentrations, and that (everyday) discrimination was associated with depression, anxiety, and stress. It is possible that the reason we are measuring these incongruences may be due to the fact that hair cortisol concentrations can be seen as an objective measure of stress, while depression, anxiety, and stress are subjective. Accordingly, it is plausible that individuals can modify their responses to DASS measures based on a few things: (1) how desirable

participating in a study of resilience is (or can be); (2) they may vary in responses from day-to-day; and (3) they may be inaccurately reporting the severity of their experiences through time. Furthermore, more data is needed in bridging the gaps between HCCs and measures of depression, anxiety, and stress. Where one would expect that HCCs would correlate with these measures – stress in particular – Pearson's correlation statistic showed no significant correlation between any measures of mental and emotional well-being and HCCs. Where mild insignificant relationships were detected, they were counter-intuitive to what would be expected when compared to the larger body of research. That is, for example, that all DASS measures were negatively correlated with cortisol output. In other words, the more stress one reports, the less cortisol would be concentrated in their hair. A reasonable takeaway would be to suggest that where HCCs may be an objective measure of stress, our issues in the findings of our data may be due to inaccurate reports of mental and emotional well-being – otherwise subjective reports. Nevertheless, there is the possibility to include other biomarkers of interest such as hair testosterone, C-reactive protein, and other biologically-related markers such as telomere length, and DNA methylation in future studies.

Finally, it should also be noted that the realities of discrimination can go far beyond what has been captured in the everyday and major discrimination scales. More specifically, the experience and existence of racial discrimination can change over time, and can be subject to many of the same selective forces that biological organisms are. Consider, for example, the peppermoths of England during the early 1800s. Once a species of the genus *Biston* whose winged individuals were predominantly white and with Black, pepper-coated spots, they came to produce all-Black moths through natural changes in their environment. As Black ash clouds from the industrial revolution began to expose the peppered moths to higher predation from birds and surrounding fauna,

selection favored those moths with darker hues, in turn producing moths that were capable of camouflage in their ash-covered environments. The peppered moths as a species were not driven to extinction, but merely evoloved to produce all-Black phenotypes which *disappeared* from the eyes of the predators. Similarly, from the late 1600s through to the mid 1900s, racism in America was embedded within the culture and minds of the people, and the laws of the land. It was displayed through overt acts of lynching, Jim Crow laws, and other legislation that divided the American people along racial and ethnic lines. However, with the progressive legislative action such as Anti-Discrimination Laws in housing, labor, and social sectors, legislation has *naturally selected* out overt forms of racism and racist mentalities. These selective legislative forces have not eradicated racism, but have simply driven it to camouflage in the modern era. With the emergence of a new wave of neo-Nazism and White Supremacy being exposed in law enforcement, public, and private sectors, it is becoming clear, that the long-stood legacy of racism in America has not been driven to extinction, but merely evolved to camouflage. Accordingly, the experiences of discrimination and adversity among Black men today, can be arguably different than those experiences in the past, and yet current survey tools have not accounted for these cultural evolutionary changes. Nevertheless, one theme, easily exhibited throughout the timeline of American history, and which can be so easily identified that one could argue that it has evolved in cis-opposite to that of the camouflage of American racism, is American – and African-American – resilience. The many ways in which racism has been able to display itself to those it preys upon has always had a force countering its negative effects on people. Given the nature of the body of research on Black livelihoods today, which so often take an overwhelmingly negative interpretation to Black health and well-being; it is imperative that researchers additionally turn their attention to the multifaceted ways that American Blacks have been resisting these deleterious factors. Resilience is a tool which

has always called upon an individual's ability to survive existential hardships and overcome trauma and adversity. It has always encompassed a person's capacity to resist deterioration from struggle, pursue development, and maintain integrity despite the hardships they're going through. Resilience has always been a counter-active force in the face of discrimination and adversity and yet seldom has research ever made attempts to acknowledge it. Future investigations of this work will need to keep historical legacies and contexts in mind, but adjust their vision and focus in order to better understand the realities of racism, as well as counter-cultures to it, in the modern era.