DISSERTATION

DISCRIMINATION, DISCRIMINATION DISTRESS, AND CHRONIC HEALTH CONDITIONS: AN INTERSECTIONAL EXAMINATION USING I-MAIHDA

Submitted by

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ABSTRACT

DISCRIMINATION, DISCRIMINATION DISTRESS, AND CHRONIC HEALTH CONDITIONS: AN INTERSECTIONAL EXAMINATION USING I-MAIHDA

The goal of this study was to understand the relation between discrimination and discrimination-related distress and risk for chronic health conditions among college students with marginalized racial, ethnic, gender identity and sexual orientation identities. Furthermore, I aimed to understand how prevalence of chronic health conditions among college students varies by these identities and whether, controlling for discrimination and discrimination distress, intersectional effects contribute to the variance in outcomes beyond the additive effect of each identity. Using the Intersectional Multi-level Analysis of Individual Heterogeneity and Discriminatory Accuracy (I-MAIHDA), I nested individuals (N = 291,805) within 54 identity strata. I conducted six stages of analysis, each consisting of multi-level regressions to assess for nine health outcomes: count of chronic conditions and endorsement of chronic pain/migraines, asthma, diabetes, endocrine disorders, sleep disorders, autoimmune disorders, cardiovascular and heart conditions, and digestive disorders. The first stage was a null model for all health outcomes, the second stage added discrimination experiences as a fixed effect, and the third stage controlled for discrimination experiences and fixed effects for race/ethnicity, gender identity, and sexual orientation. For stages four, five, and six, the sample was filtered to include only individuals who endorsed discrimination during the past 12-months (n = 60,140). The fourth stage was a null model for the reduced sample, the fifth stage added level of discrimination-related distress as a fixed effect, and the sixth stage controlled for discrimination-related distress

but added fixed effects for race/ethnicity, gender identity, and sexual orientation. Results indicated that discrimination experiences and discrimination-related distress were associated with significantly increased odds for all chronic health conditions and increased the incidence rate for number of chronic health conditions. After controlling for discrimination experiences, gender minorities reported the highest odds of any gender for chronic pain/migraines, asthma, diabetes, sleep disorders, autoimmune disorders, and digestive disorders. There was no association between gender minority identity and cardiovascular disorders after controlling for discrimination. Cisgender women reported higher rates than cisgender men for all chronic conditions except cardiovascular disorders, with the highest odds of any gender for endocrine disorders. Sexual orientation minorities reported higher odds than heterosexuals for chronic pain/migraines, asthma, diabetes, autoimmune disorders, sleep disorders cardiovascular disorders, and digestive disorders after controlling for discrimination experiences. American Indian/Native Alaskans reported the highest odds of any racial/ethnic group for chronic pain/migraines, endocrine disorders, autoimmune disorders, and cardiovascular disorders and higher rates than White/Europeans for diabetes, sleep disorders, and asthma after controlling for discrimination experiences. Black/African Americans, Latino/a/e and Hispanics, and Pacific Islanders showed higher odds than White/Europeans for diabetes after controlling for discrimination and discrimination-related distress. Multiracial individuals had the second highest odds of any racial group for asthma after controlling for discrimination-related distress. People of additional races and ethnicities had the highest average number of chronic conditions and the highest rates of digestive and sleep disorders. The variance partition coefficients (VPC) for each model and proportion of change in variance (PCV) between models showed that most (>99%) of the variance between strata could be explained by the effects of discrimination or discrimination

distress, and racial/ethnic, gender identity, and sexual orientation. Results suggest differences in outcomes can be attributed to the additive effects of intersecting identities as well as discrimination and discrimination distress related to holding intersecting marginalized identities.

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DEDICATION

This is dedicated to transgender, nonbinary, and gender diverse people everywhere.

You are loved.

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CHAPTER ONE – INTRODUCTION: LITERATURE REVIEW

Women, low-income individuals, and individuals with marginalized racial and ethnic identities have been found to be at higher risk for several stress-related health outcomes, including greater risk for a number of chronic health conditions (Thoits, 2010). From the perspective of health disparities researchers, systemic discrimination is at the root of these inequities by way of economic inequity, environmental inequity, residential racism, higher allostatic load due to everyday discrimination, and inequitable access to healthcare (Anderson, 2013; Bailey et al., 2017; Bourabain & Verhaeghe, 2021; Flentje et al., 2022; Mohottige et al., 2023). According to the minority stress model, discrimination creates biological and psychological stress that leads to several negative mental and physical health outcomes (Flentje et al., 2022; Meyer, 2003).

Chronic exposure to discrimination and unsafe or unwelcoming environments can provoke a harmful neurobiological response through several physiological pathways, one of the most essential of which is the body's hypothalamic-pituitary-adrenal (HPA) axis (Berger & Sarnyai, 2015; Busse et al., 2017; Parra & Hastings, 2018). The HPA axis regulates the body's production of Adrenocorticotropic hormone (ACTH) and corticosteroids, thus playing a role in several important bodily processes, including the reproductive, endocrine, immune, and digestive systems (DeMorrow, 2018) and the body's inflammatory response (Berger & Sarnyai, 2015). The HPA-axis activates the sympathetic nervous system when the brain perceives environmental threats and increases the production of stress hormones (such as ACTH and corticosteroids) for the duration needed to activate the brain and body's attention and response to the threat (Berger & Sarnyai, 2015; Parra & Hastings, 2018). Discrimination experiences over time are associated

with dysregulation of the HPA-axis, causing hormonal dysregulation and increasing the body's inflammatory responses (Berger & Sarnyai, 2015; Busse et al., 2017; Parra & Hastings, 2018). Thus, discrimination experiences have been associated with elevated diurnal cortisol levels in adolescents (Huynh et al., 2016), while structural stigma have been associated with dysregulated cortisol reactivity among sexual minority youth (Hatzenbuehler & McLaughlin, 2014). Because these stress hormones interact with several bodily functions and organs, dysregulation of the HPA axis increases the risk of a wide range of health problems (DeMorrow, 2018).

Psychological Distress and Chronic Health Conditions

Several categories of physical health conditions have been found to have a strong association with psychosocial stressors, either resulting in increased risk for developing the disorder or risk for exacerbating the severity of the disorder (McEwen & Stellar, 1993; Thoits, 2010). These include digestive disorders (Keskin, 2019; Qin et al., 2014), autoimmune disorders (Dube et al., 2009; Stojanovich & Marisavljevich, 2008), cancer (Dai et al., 2020), cardiovascular disorders (Vaccarino et al., 2013; Wirtz & von Känel, 2017), endocrine disorders (Ranabir & Reetu, 2011), reproductive disorders and pregnancy complications (Valsamakis et al., 2019), chronic pain (Van Uum et al., 2008) and migraines (Stubberud et al., 2021).

Numerous studies have found evidence that perceived discrimination increases risk for chronic health conditions, including chronic pain for U.S. Latinos (Carlisle, 2015) and African Americans (Edwards, 2008) and cardiovascular disease across racial and ethnic groups (Everson-Rose et al., 2015), as well as systemic markers that predispose individuals to higher risk for disease and worsened disease prognosis, such as systemic inflammation (Stepanikova et al., 2017), poor glycemic control (Dawson et al., 2015), and cortisol dysregulation (Huynh et al., 2016). Gaston and colleagues (2021) found while that "everyday discrimination" did not increase

risk for diabetes, "major discrimination events[1]" were associated with a 26% increased odds for diabetes among women across race and ethnicity. While most studies examining chronic health conditions consider only mid-life and older adult samples, the relation between discrimination and chronic health problems has also been found among children and adolescents, with Black/African American children who report experiencing discrimination encountering 78% higher odds for asthma compared to those who do not (Thakur et al., 2017). Multiple studies have shown that college students with marginalized racial and ethnic identities experience mental health and academic impacts related to experiencing discrimination (e.g., Bravo et al., 2023; Jochman et al., 2019), however no known studies have examined how this affects physical health outcomes such as risk for chronic medical conditions.

While distress related to discrimination is rarely directly examined as a physical health predictor, some studies have found higher rates of depression, trauma symptoms, and other negative mental health outcomes among individuals who report higher rates of distress following experiences of discrimination (Sellers et al., 2003; Torres-Harding & Turner, 2015; Williams et al., 2023). The majority of studies on discrimination distress do not directly ask participants to rate their distress related to discrimination. Rather, they ask about discrimination experiences and then separately ask about recent stress or mental health symptoms, and then examine the relation between these variables (e.g., Earnshaw et al., 2016; Sellers et al., 2003; Todorova et al., 2010). For example, in a sample of 1,122 Puerto Ricans ages 45-75, Todorova and colleagues (2010) found that depressive symptoms mediated the relationship between perceived discrimination and number of medical conditions. Similarly, in a study of 1,299 U.S. adults living in low-income urban areas, Earnshaw and colleagues (2016) found that stress and depressive symptoms

[1] Gaston and colleagues (2021) defined "major discrimination events" as unfair treatment or racial profiling by police, discrimination in access to housing, or discrimination in employment such as hiring, firing, and promotions.

mediated the relationships between everyday discrimination and poor self-rated health, frequent emergency room visits, and likelihood of having one or more chronic diseases.

I was able to find a few studies that directly assessed distress from discrimination and association with mental or physical health outcomes. Fisher and colleagues (2000) directly surveyed 177 adolescents regarding their community or school-based experiences of discrimination and their level of distress regarding these experiences. They found a negative association between discrimination distress and self-esteem. Williams and colleagues (2023) directly assessed trauma symptoms related to discrimination among 920 adults in a diverse sample, and found that discrimination-related trauma symptoms were associated with depression and anxiety symptoms. I found only one study that directly assessed discrimination distress as a predictor of physical health outcomes conducted by Anderson (2013), in which she assessed emotional stress related to perceived racism on health outcomes using data from the 2004 Behavioral Risk Factor Surveillance System. With a large and diverse sample (N = 32,585), Anderson found that higher racism-related stress predicted greater number of poor mental and physical health days, especially for Black participants.

Discrimination and LGBTQIA+ Physical Health

Amidst growing violence and rampant legislation against lesbian, gay, bisexual, transgender, queer, intersex, asexual, and other sexual orientation and gender minority individuals (LGBTQIA+)[2] in the United States, it is critical to examine the health consequences of systemic discrimination for this community (Wang et al., 2016). LGBTQIA+ individuals face greater risk of poor physical health and chronic health conditions when compared with cisgender heterosexuals, despite representing a younger population (Cochran & Mays, 2007; Conron et al.,

[2] The terms LGBTQIA+ and "sexual orientation and gender minorities" will be used interchangeably throughout this document.

2010; Mays et al., 2018; Meyer et al., 2017). In 2020, a nationally representative survey conducted by the Kaiser Foundation of 4,805 adults found that 23% of lesbian, gay, bisexual, transgender and other sexual orientation and Gender Minority individuals (LGBT+) [3] reported being in "fair/poor" health, compared to 14% of non-LGBT+ individuals (Dawson et al., 2021). The same study found that one-fifth of all LGBT+ people reported having a disability or chronic health condition that impacts their daily functioning at home, work, or school. Generally, research on specific rates of chronic medical health conditions among LGBTQIA+ communities has been limited, with some evidence for higher rates of asthma for some LGBTQIA+ subgroups (Tran et al., 2023), autoimmune disease (Logel et al., 2023), diabetes and cardiovascular disease (Downing & Przedworski, 2018), as well as some types of cancer – the latter of which has been attributed at least partially to lower early cancer screening rates due to fear of experiencing healthcare discrimination (Quin et al., 2015).

Transgender and gender expansive[4] individuals are at particular risk for physical health disparities (Association, 2015; James et al., 2016; Meyer et al., 2017; Seelman et al., 2017). According to data taken from the Center for Disease Control (CDC) from 2014 – 2016, the likelihood of having multiple chronic physical and mental health conditions is higher for gender-nonconforming people[5] (50%), transgender women (48%) and transgender men (47%) when compared to cisgender women (45%) and cisgender men (38%) (Downing & Przedworski,

[3] Wherever I use a term that differs from LGBTQIA+ or "sexual orientation and gender minorities" when citing a specific study, it will be indicative that I am using the terms used by the author(s) of the study.
[4] "Gender expansive" typically refers to individuals who define their gender identity outside the gender binary; this may include agender, bigender, genderfluid, genderqueer, gender nonbinary, gender nonconforming, and two-spirit individuals (Mangin, 2018).
[5] The term "gender nonconforming" is also sometimes used as an umbrella term to include all individuals who identify outside of the gender binary (e.g., Downing & Przedworski, 2018; Hendricks & Testa, 2012), although it has also been used to describe all individuals whose gender identity or expression differs from the gender they were assigned at birth (American Psychological Association, 2015).

2018). These disparities are particularly alarming given that the study's transgender and gender nonconforming samples were younger than their cisgender sample.

To date, the majority of studies examining discrimination and LGBTQIA+ health have focused on mental health symptoms and outcomes, such as depression, anxiety, post-traumatic symptoms, substance use, suicidal and self-injurious behavior, and risky sexual behaviors (e.g., de Lange et al., 2022; Hendricks & Testa, 2012; Institute of Medicine, 2011; Kelleher, 2009; Liu et al., 2019; Mereish, 2019; Meyer, 2003; Reisner et al., 2016; Salerno et al., 2020). Despite the risk the LGBTQIA+ community bears for poorer physical and mental health outcomes and the community's pervasive experiences with discrimination, only two known studies (Kassing et al., 2021 and Flentje et al., 2022) have directly examined the association between discrimination and physical health outcomes for LGBTQIA+ people.

Flentje and colleagues (2022) explored which aspects of minority stress most strongly impact physical health. With a sample of 5,299 sexual and/or gender minority (SGM) individuals, the sample was predominately White (91.7%)[6] and predominately cisgender sexual orientation minority individuals (64%)[7]. The examined predictor variables were discrimination, victimization, perceived acceptance and perceived safety in community of origin, perceived acceptance and perceived safety in current community environment, degree of "outness" or disclosure about SGM identities, degree of internalized homophobia and/or transphobia, and structural stigma based on the laws in participants' states. Physical health was measured using self-report measures from the Patient-Reported Outcome Measurement Information System

[6] Flentje and colleagues' sample was 2.7% American Indian or Alaskan Native, 4.6% Asian, 3% Black, African American or African, 6.2% Hispanic, Latino or Spanish, 1.4% Middle Eastern or North African, .4% Native Hawaiian or other Pacific Islander, and 1.7% identified with none of the racial or ethnic categories provided.
[7] Flentje and colleagues' sample was 29% cisgender Sexual Orientation Minority men, 35% cisgender Sexual Orientation Minority women, 23% gender-expansive people, 8% transmasculine people, and 5% transfeminine people.

(PROMIS) Global Physical Health Scale (HealthMeasures, 2018). Using dominance analysis, they found that prejudice and discrimination experiences were the strongest predictors of health outcomes for cisgender sexual orientation minority men; safe current environment was the strongest predictor for cisgender sexual orientation minority women, transmasculine individuals, American Indian and Alaskan Native, Asian, and White individuals; safe environment in community of origin was the strongest predictors for Black, African American, or African participants; safe environment in community of origin and safe current environment nearly tied as the strongest predictors for gender-expansive individuals; an accepting current environment was the strongest predictor for Hispanic, Latino or Spanish individuals[8]; and victimization experiences were the strongest predictor for transfeminine individuals. Although their study was the first known to examine which components of minority stress are strongest for different subsets of the LGBTQIA+ community by race, sexual orientation, and gender identity, they did not provide intersectional level data of within-group differences. Therefore, it was not clear how minority stressors might impact health differently for individuals of the same race/ethnicity but who hold different gender identities and/or sexual orientations.

Kassing and colleagues (2021) surveyed 385 LGBTQIA+ individuals living in the southern United States about their experiences of victimization and their health. Their sample was predominately cisgender[9], predominately gay or lesbian[10], and predominately White, and the average age was 34.8[11]. They surveyed participants about their experiences of interpersonal

[8] In referencing outside literature, I typically use the identity terms used by the author. For the current study, I use the term "Latino/a/e and Hispanic" to be inclusive to individuals of Latin American descent and/or identity of all genders and to honor that some prefer the term Hispanic. I chose to use Latine instead of Latinx to represent gender diverse individuals, as Latine is more consistent with the Spanish language gender-neutral ending of "e."
[9] Kassing and colleagues' sample was 43.6% cisgender men, 35.1% cisgender women, 7.8% transgender men, and 6% transgender women
[10] Kassing and colleagues' sample was 39.7% gay, 23.6% lesbian, 12.5% bisexual, 8.8% pansexual, 3.4% queer, 1.8% questioning, 4.7% straight (included if gender expansive or transgender), and 5.5% other
[11] Kassing and colleagues' sample was 66.5% White/Caucasian, 17.4% Black/African American, 6.8% Hispanic

victimization, including physical assault based on gender or sexual identity, physical assault by a partner, sexual assault by a partner or non-partner, and stalking. They measured health using number of poor physical health days, number of poor mental health days, and lifetime history of being diagnosed with specific mental or physical health conditions (i.e., anxiety, depression, bipolar, alcohol abuse, drug abuse, tobacco use, suicidal ideation, suicide attempts, cancer, diabetes, heart disease, high cholesterol, hypertension, obesity, HIV and hepatitis). Using a latent class analysis (LCA), they found that 3 distinct groups emerged based on patterns of trauma exposure. They found that individuals in the high varied trauma exposure group reported the highest number of poor physical health and mental health days compared to their peers. While they found that individuals in both the high trauma exposure class and the non-discriminatory violence class were at greater risk of depression, anxiety, substance use problems, and suicidality, they did not find any significant associations between level of trauma exposure and the likelihood of developing any of the eight specific health conditions assessed. However, they did not assess certain categories of physical health conditions that are commonly associated with psychosocial stress and are more common in younger adult populations – such as asthma (Thakur et al., 2017) and migraines (Stubberud et al., 2021).

Intersecting Identities and Health Disparities

While the connection between racism and poor health outcomes has been well established, health disparity scholars have called for more intersectional health research and in particular, more research on health outcomes for people with intersecting marginalized racial/ethnic, gender, and sexual orientation identities (Bauer, 2014; Bourabain & Verhaeghe, 2021; Bowleg, 2012; Lewis et al., 2015; Lett et al., 2020; Williams et al., 2019). Among a limited but growing body of research, studies have shown that holding multiple marginalized

identities appears to place LGBTQIA+ individuals of color at greater risk for negative physical health outcomes (Lett et al., 2020; Parra & Hastings, 2018; Seelman et al., 2017; Trinh et al., 2017).

To date, only a few studies have examined how risk for specific chronic health conditions varies for LGBTQ+ individuals with minoritized racial and ethnic identities. Lett and colleagues (2020) conducted a survey measuring health outcomes with 74,295 cisgender Black individuals, 427 Black gender minority individuals (including both transgender and gender expansive), and 2,724 White gender minority individuals. They found that Black gender minority individuals experienced higher odds for diabetes than White gender minority individuals, higher odds for having report two or more comorbid medical conditions than cisgender Black individuals and were more likely to report HIV risk factors compared to either group.

Using a nationally representative sample of 91,913 U.S. adults, Trinh and colleagues (2017) examined the rates of chronic health conditions among LGBTQIA+ people grouped by race and ethnicity and found several disparities in rates of chronic health conditions among LGBTQIA+ people of color when compared to their heterosexual peers of the same race or ethnicity. For example, they found that Black sexual orientation minority women were more than three times more likely than Black heterosexual women to have a stroke. They also found that Latino sexual orientation minority men were 71% more likely than Latino heterosexual men to report hypertension, despite having a lower prevalence of obesity.

Seelman and colleagues (2017) examined the physical health outcomes of 417 transgender and gender nonconforming people living in Colorado by race and income. The sample was predominately White (*n*=352), and thus their analyses and findings regarding racial disparities were limited due to the small number of transgender people sampled from any other

racial or ethnic group. However, the study did find that transgender people of color as a collective group were 2.46 times more likely than White transgender people to have been diagnosed with arthritis, gout, lupus, or fibromyalgia and 2.26 times more likely to report having asthma.

Intersectionality Theory

While the term "intersectional" has now become familiar throughout social and psychological sciences, the term "intersectionality" as it is now used was coined by legal scholar Kimberlé Crenshaw (1989). Crenshaw argued that legal reforms led by both male Black liberation activists and White second-wave feminists had excluded the interests of Black women, failing to consider the role of multiple concurrent forms of oppression in their lives. Intersectionality theory is rooted in decades of Black feminist thought by authors and activists such as Pauli Murray (1965), Frances Beal (1969), Toni Cade Bambara (1970), Angela Davis (1981), bell hooks (1981), and Audre Lorde (1984). Before Crenshaw, many attribute the first definition of intersectionality to the Combahee River Collective, a Black lesbian socialist organization founded in 1974 with a radical political agenda aimed at dismantling the multiple systems of economic, racial, gender, and heterosexist oppression facing queer women of color and, by extension, all marginalized communities. In their 1974 statement (published in 1977), the founders of the Combahee River Collective wrote:

> "The most general statement of our politics at the present time would be that we are actively committed to struggling against racial, sexual, heterosexual, and class oppression, and see as our particular task the development of integrated analysis and practice based upon the fact that the major systems of oppression are interlocking."

In contrast with the legal and social sciences, the field of public health has lagged behind in applying intersectionality as a lens to population health research. Bowleg (2012) argues that intersectionality provides an important framework for researching the factors that impact health by examining how multiple forms of oppression interact to affect health outcomes. Moreover, Bowleg and numerous other public health scholars have argued that intersectionality must be meaningfully applied to public health studies (e.g., Bauer, 2014; Else-Quest et al, 2016; Hancock, 2007; Harari & Lee, 2021; McCall, 2005; Warner, 2008). Proponents of intersectional public health research argue that researchers must take a careful and nuanced approach to gathering, reporting, and analyzing information about race, gender, class, and sexual orientation identity information in order to advance knowledge about how health protective factors and risks, behaviors, and outcomes differ based on intersecting identities and social positionality within complex systems of power and oppression.

Intersectional Mult-Level Modeling

The Intersectional Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (I-MAIHDA) is an intersectional multilevel model developed by public health researcher and social epidemiologist Clare R. Evans (Evans, 2015; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b). Developed specifically to address the role of intersecting cultural identities, experiences, and systems of oppression in public health, Evans' I-MAIHDA model nests individuals within their intersecting social strata. Generally speaking, multi-level modeling recognizes that individuals within a large sample share common factors with others nested within the same environment (e.g., a neighborhood, school, or cohort) which may be essential for understanding the variance in outcomes between groups. With intersectional multi-level modeling, a shared combination of

identities is conceptualized as a shared "environment" which may produce some common experiences or outcomes.

Prior to analysis, the I-MAIHDA model organizes individuals as nested (level 1) within their intersectional identity stratum (level 2) (Evans, 2015; Evans et al., 2018; Evans et al., 2024b). Thus within a multi-level model, individuals represent the level 1 of the sample *N*, but each unique constellation of intersecting identity categories (e.g., gender identity * sexual orientation * race/ethnicity) represent level 2 of the *strata N*. Throughout the rest of this manuscript, 'stratum' will be used to refer to any singular intersecting identity group used as a level 2 unit of analysis (e.g., all Latino/a/e and Hispanic heterosexual cisgender women represent a specific 'stratum'); 'strata' refers to all of the intersecting identity groups as a collective.

Just as with traditional multi-level modeling approaches, nesting individuals within their intersecting identity groups also recognizes that shared group membership will not explain all of the variance (Evans et al., 2024b). Thus, it is essential to consider within-group variance and explore other predictive factors such as common experiences or individual characteristics which may also contribute to the outcome. Compared with conventional fixed effect models, the I-MAIHDA approach does not require a large number of additive identity covariates but rather synthesizes multiple identity variables at once through the creation of intersectional strata (Evans, 2015; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b). This allows researchers to consider the context of multiple intersecting identities at once without using dummy variables, which are not ideal for intersectional research as they involve new interaction terms for each specific identity and do not fully address intersections between identities. Thus, I-MAIHDA is more efficient than standard approaches to categorizing identity when identity is considered a contributing factor to the outcome.

Another facet of the MAIHDA model is that it is designed to control for large differences between stratum sizes by calculating the precision-weighted grand means (PWGM) of the examined variables for each stratum rather than relying on unweighted means (Evans et al., 2020; Evans et al., 2024b). Essentially, the model gives more weight to strata with larger stratum sample sizes and presumes that smaller-sized strata are less reliable. Unfortunately, this also means that majority intersectional groups (e.g., cisgender, heterosexual white women) have more impact on the PWGM and that their stratum-level estimates will be more reliable as their stratum sizes tend to be much larger than minority intersectional groups (e.g., queer and transgender people of color).

Current Study

While the relationship between discrimination and chronic health conditions is well documented, no study to date has examined how discrimination-related distress increases risk for chronic health conditions across race, gender identity, and sexual orientation. Furthermore, no known studies have directly assessed how discrimination increases risk for migraines, chronic pain, digestive, autoimmune, endocrine, or sleep/wake disorders for LGBTQIA+ individuals. Finally, no known studies to this date have applied an intersectional multi-level modeling analysis to examine differences in chronic health conditions among people with intersecting racial/ethnic, gender identity, and sexual orientation identities.

The goal of this study was to understand how discrimination and discrimination-related distress affect risk for chronic medical health conditions among LGBTQIA+ college students and students with marginalized racial and ethnic identities. Furthermore, I aimed to understand how, controlling for discrimination, prevalence of chronic health conditions among college students varies by race/ethnicity, gender identity, and sexual orientation and whether intersectional effects

contribute to the variance in chronic health rates beyond the additive effect of these identities. The reasons for controlling for discrimination are to: (1) understand the degree to which everyday discrimination experiences and related distress directly contribute to health inequities for specific groups, and (2) aid in understanding the persisting impacts of structural discrimination after controlling for everyday discrimination experiences.

Through these efforts, I plan to add to the literature by: (1) identifying chronic conditions which disparately affect individuals based on their racial/ethnic, gender identity, and sexual orientation identities, (2) testing a more nuanced measure of discrimination impact (discrimination-related distress) in predicting physical health outcomes, and (3) testing the I-MAIHDA framework (Evans, 2015; Evans et al., 2024b) as a method for examining differences in health outcomes between groups when controlling for other social determinants of health (e.g., discrimination experiences).

Hypotheses

(H1) Endorsement of 12-month experiences of discrimination and/or microaggressions will be associated with a higher count of chronic health conditions and increased likelihood for each of the eight health condition categories.

(H2) Among individuals who report discrimination/microaggressions during the past 12 months, level of distress related to these experiences will be associated with a higher count of chronic health conditions and increased likelihood for each of the eight health condition categories.

(H3) Controlling for 12-month endorsement of discrimination/microaggression experiences, individuals with marginalized racial, gender, and sexual orientation

identities will report poorer health outcomes compared to those with privileged racial, gender, and sexual orientation identities.

(H4) Among individuals who report discrimination/microaggressions during the past 12 months and controlling for related distress level, individuals with marginalized racial, gender, and sexual orientation identities will report poorer health outcomes compared to those with privileged racial, gender, and sexual orientation identities.

(H5) Controlling for 12-month endorsement of discrimination/microaggression experiences, the intersection of identities will explain a significant proportion of the variance in health outcomes, beyond the additive effects of identities.

(H6) Among individuals who report discrimination/microaggressions during the past 12 months and controlling for related distress level, the intersection of identities will explain a significant proportion of the variance in health outcomes, beyond the additive effects of identities.

CHAPTER TWO – METHODS

Survey Instrument

This project involved secondary analysis of quantitative survey data collected through the National College Health Assessment III (NCHA-III) by the American College Health Association (ACHA) across six academic semesters from the Fall of 2019 through Spring of 2022. The ACHA is a national educational association that engages in research, education, and advocacy to support the physical and mental health of college students throughout the United States (ACHA, n.d.-a). The NCHA has been administered to colleges throughout the country since 2000 (ACHA, n.d.-b). A previous iteration available at the time this project began was the NCHA-III, which launched in 2019. The NCHA-III assesses several areas of college students' wellbeing, including physical health, mental health, suicidality, substance use, sexual health, health risk behaviors, social support, intimate partner violence, physical and sexual victimization, feelings of safety and belonging, campus involvement, access to healthcare, food insecurity, housing, experiences of discrimination, personal problems, academic performance, and an array of positive and negative experiences on campus.

The NCHA-III is administered via web survey to undergraduate and graduate students through participating universities (ACHA, 2024). At the time of this study, participating universities paid the ACHA a fee to access their survey to have customized institutional data regarding their students' health and wellbeing. The ACHA repeats the NCHA-III each academic semester, however the number of participating institutions changes each semester. The NCHA-III does not provide longitudinal data on individual participants.

Recruitment

According to the ACHA, participating universities recruited participants via on-campus and virtual campaigns by encouraging students to complete the survey (ACHA, 2024). Typically, the entire student body of a participating university was emailed invitations to complete the NCHA-III survey via email. Participants were each given a unique Qualtrics URL that was sent via email invitation to prevent participants from duplicating their responses. Participants were asked to provide their names; thus the data was not collected anonymously[12]. However, the data was automatically anonymized upon survey completion. Each participating university had the option to provide incentives or not to provide incentives. Institutions that chose to provide incentives either entered participants into a random drawing to win a prize, or they were individually rewarded a small incentive for their participation.

Participants

The participants for the current study were undergraduate and graduate students who attended a U.S. college or university and completed the NCHA-III survey between Fall 2019 and Spring of 2022. They represented a wide range of campus environments, campus sizes, and regions of the United States (See Tables 1 and 2). Participants were excluded if they were missing data required for the current study, including age, racial or ethnic identity, sexual orientation, gender identity, or questions regarding discrimination experiences or related distress. I also excluded individuals who wrote unclear or offensive comments in the write-in section for the required identity variables. The final sample size after preparation of data was $N = 291{,}805$. For Models 4A-4I, 5A-5I, and 6A-6I, analyses were run only on individuals who endorsed 12-month discrimination experiences, referred to as the discrimination distress sample ($n = 60{,}140$).

[12] As of 2024, the NCHA allowed for surveys to be administered anonymously.

Table 1. Campus characteristics[13]

	Fall 2019	*Spring 2020*	*Fall 2020*	*Spring 2021*	*Fall 2021*	*Spring 2022*
Public	29	52	15	104	26	77
Private	29	23	7	33	15	52
2-year	5	4	1	7	0	6
4-year or above	53	71	21	130	41	123
Religious Affiliation						
No affiliation	43	67	18	121	35	99
Catholic	7	4	2	6	2	17
Protestant or Other Christian	8	4	2	10	4	13
Postsecondary minority institution[14]						
No status as a minority-serving institution	46	66	20	103	33	114
Historically Black College or University (HBCU)	2	0	0	0	0	1
High Hispanic Enrollment	3	2	0	5	0	0
Hispanic-serving Institution (HSI)	8	5	2	28	7	9
Tribal College or University	0	0	0	1	0	0
Predominately Black Institution	0	0	0	0	0	0
Asian American and Native American Pacific Islander-serving	1	0	0	18	3	1
Alaska Native-serving or Native Hawaiian-serving Institution	1	0	0	2	1	2
Native American-serving Nontribal Institution	0	2	0	3	0	3
Total universities	**58**	**75**	**22**	**137**	**41**	**129**

[13] Data calculated from the ACHA reference group reports from Fall 2019 through Spring 2022, which as of June, 13, 2025 were available through open access to the public online (ACHA, n.d.-b)
[14] Institutions may hold more than one minority-serving status

Table 2. Campus size and location[15]

	Fall 2019	*Spring 2020*	*Fall 2020*	*Spring 2021*	*Fall 2021*	*Spring 2022*
Location of campus						
Northeast[16]	11	19	7	13	11	29
Midwest[17]	13	16	5	32	7	29
South[18]	25	23	9	18	17	52
West[19]	9	17	1	74	6	19
Campus size (number of students)						
< 2,500	12	9	6	32	6	39
2,500 – 4,999	11	16	2	12	5	23
5,000 – 9,999	14	13	3	24	7	14
10,000 – 19,999	9	15	5	28	7	21
20,000+	12	22	6	41	16	32
Campus Setting (by local population)						
Very large city (pop. 500,00+)	10	14	4	28	5	20
Large city (pop. 250,000-499,999)	4	7	1	14	2	11
Small city (pop. 50,000-249,999)	24	25	7	56	17	45
Large town (pop. 10,000-49,999)	16	24	8	24	14	31
Small town (pop. 2,500-9,999)	4	5	2	13	3	17
Rural community (pop. Less than 2,500)	0	0	0	2	0	5
Total universities	**58**	**75**	**22**	**137**	**41**	**129**

[15] Data calculated from the ACHA reference group reports from Fall 2019 through Spring 2022, which as of June, 13, 2025 were available through open access to the public online (ACHA, n.d.-b)
[16] (CT, ME, MA, NH, NJ, NY, PA, RI, VT)
[17] (IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI)
[18] (AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV)
[19] West (AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY)

Measures

Demographics

As of 2022, the NCHA-III asked participants to share their demographic information including race, ethnicity, sex assigned at birth, gender identity, sexual orientation, year in college, enrollment status, parental education level, relationship status, insurance status, employment status, living situation, whether they are a parent, and whether they have a student or work visa. At the time that the data for the present study was being collected (2019-2022), NCHA-III was not collecting demographic information about socioeconomic status, disability, veteran, or immigration status. The demographic categories which factored into the intersectional analysis for the current study were race, ethnicity, gender identity, and sexual orientation. Given that identity is central to the present study, an explanation will follow regarding how identity was collected and categorized for the purposes of this study. At the time the present data was collected, the NCHA-III allowed participants to select only one gender identity and one sexual orientation, whereas they can select any number of race and ethnicity variables. Participants could leave any of the identity questions blank and still move forward in the survey. A summary of how identity information was obtained in the NCHA-III survey is provided in Table 3.

Table 3. Demographic items on the NCHA-III survey

Demographic Category	Survey Questions and Response Options
Race/Ethnicity	*How do you usually describe yourself? Please select all that apply.* *- American Indian or Native Alaskan* *- Asian or Asian American* *- Black or African American* *- Hispanic or Latino/a/x* *- Middle Eastern/North African (MENA) or Arab Origin* *- Native Hawaiian or Other Pacific Islander Native* *- White* *- Biracial or Multiracial* *- Another Identity*

	Are you? (Please select ALL that apply) (only includes students that describe themselves as Hispanic or Latino/a/x) *- Mexican, Mexican American, Chicano* *- Puerto Rican* *- Cuban* *- Another Hispanic, Latino/a/x, or Spanish origin*
	Are you? (Please select ALL that apply) (only includes students that describe themselves as Asian or Asian American) *- Southeast Asian (for example: Cambodian, Vietnamese, Hmong, or Filipino)* *- South Asian (for example: Indian, Pakistani, Nepalese, or Sri Lankan)* *- Other Asian*
Sex assigned at birth	*What sex were you assigned at birth?* *- Female* *- Male* *- Intersex*
Gender identity	*Do you identify as transgender?* *- No* *- Yes*
	Which term do you use to describe your gender identity? *- Woman or female* *- Man or male* *- Trans woman* *- Trans man* *- Genderqueer* *- My identity is not listed* *- Agender* *- Genderfluid* *- Non-binary* *- Intersex*
Sexual orientation	*"What term best describes your sexual orientation?"* *- Asexual* *- Bisexual* *- Gay* *- Lesbian* *- Pansexual* *- Queer* *- Questioning* *- Straight/ Heterosexual* *- My identity is not listed above*

Definition of Discrimination Experiences and Discrimination Distress

This study examined discrimination and microaggressions and level of distress caused by these experiences as predictors of health outcomes among students from marginalized racial and ethnic backgrounds and LGBTQIA+ college students. Discrimination endorsement was defined as selecting "Yes" when asked whether the participant has experienced problems with discrimination and/or "Yes" to having experienced microaggressions during the past 12 months. These items were included in a scale within the NCHA-III that asked participants whether they have experienced specific problems in the past 12 months[20]. For each problem endorsed, participants were then asked to rate the level of distress they experienced due to each problem on a scale of 1-4. Because the NCHA-III asked participants to rate their level of distress related to microaggressions and discrimination, this allowed me to explore a more nuanced understanding of individual minority stress experiences that had not been included in previous research on intersectional health outcomes (e.g., Flentje et al., 2022; Kassing et al., 2021). For this study, I created a composite variable called "discrimination endorsement" which was marked as "yes" for participants who endorsed either microaggressions, or discrimination, or both. I then created a composite discrimination distress variable represented by the average between level of self-reported distress caused by microaggressions and level of self-reported distress caused by discrimination. Table 4 shows how these items appeared on the NCHA-III survey.

[20] The other problem categories that were listed in this scale on the NCHA-III but which will not be included in my study are Academics, Career, Finances, Procrastination, Faculty, Family, Intimate relationships, Roommate/housemate, Peers, Personal appearance, Bullying, Cyberbullying, Sexual Harassment, Health of someone close to me, and Death of a family member, friend, or someone close to me.

Table 4. NCHA-III Survey Items for 12-Month Discrimination and Related Distress Level

Predictor Variables	Survey Question and Response Options
	Within the last 12 months, have you had problems or challenges with any the following?
Microaggressions	*Microaggression (a subtle but offensive comment or action directed at a minority or other non-dominant group, whether intentional or unintentional, that reinforces a stereotype) (Yes/No)*
Discrimination	*Discrimination (the unjust or prejudicial treatment of a person based on the group, class, or category to which the person is perceived to belong) (Yes/No)*
Composite Minority Stressors	*Yes = "Yes" to either microaggressions or discrimination, or both* *No = "No" to both microaggressions and discrimination*
Modifying Variables	Survey Question and Response Options *Within the last 12 months, to what extent did the following issue(s) cause you distress?*
Level of distress caused by microaggressions	*Microaggressions* *-No Distress (1), Minimal Distress (2), Moderate Distress (3) High Distress (4)*
Level of distress caused by discrimination	*Discrimination* *-No Distress (1), Minimal Distress (2), Moderate Distress (3) High Distress (4)*

Initially, I attempted to include bullying, cyberbullying, and sexual harassment as predictors alongside minority stressors because previous research has suggested that LGBTQIA+ young people are often targeted as victims of bullying and sexual harassment (Earnshaw et al., 2020). However, I found that in this sample, endorsement of these three experiences was low across most groups (bullying = 5.76%, cyberbullying 3.05%, and sexual harassment 8.95%). With such proportionately low endorsement of these binary predictor variables, the analysis would not run and generated singularity errors across most of the health outcomes. To better explain these low endorsements, I considered the ways the questions were worded. For one, the survey required that these experiences took place in the past 12 months. This restricts the range of reported experiences, which may have been limiting especially for bullying and cyberbullying.

While these phenomena can happen in college, I imagine may be more common experiences in K-12 schools. To further speculate regarding the low endorsement of sexual harassment, I believe the phrase "sexual harassment" may be more commonly used in the working world and may not reflect the generational context of some college-aged participants when conceptualizing unwanted sexual or romantic attention.

Measurement of Chronic Health Outcomes

Physical health outcomes were measured in two ways: (1) number of chronic health conditions, and (2) likelihood of endorsing at least one disorder in each of eight categories of chronic physical health conditions. The NCHA-III assessed chronic physical health conditions by asking participants, "Have you ever been diagnosed by a healthcare or mental health professional with any of the following ongoing or chronic conditions?" to which participants could select "Yes" or "No" to each disorder (ACHA, 2022b). Initially, 39 common health disorders were presented. If participants selected the final response option on the list ("Other ongoing or chronic condition not listed above"), the survey logic then invited them to specify which out of 16 categories of other chronic health condition they have experienced (e.g., other endocrine disorder, other digestive disorder, and so forth). Depending on the category(ies) the participant selected, the survey logic then unlocked a list of specific disorders in that category to which participants could select "Yes" or "No." Altogether, the NCHA-III assessed for the lifetime presence of 108 specific chronic physical or mental health conditions across 16 categories.

For the current study, I examined the likelihood of developing at least one disorder in each of eight categories of chronic physical illness: migraines and chronic pain, asthma, diabetes, endocrine disorders, sleep disorders, autoimmune disorders, cardiovascular and heart conditions, and digestive disorders. The examined categories of chronic physical health disorders were

chosen because previous research suggests that stress may play a role in the onset and/or severity of each type of illness (Dai et al., 2020; Dube et al., 2009; Keskin, 2019; Qin et al., 2014; Ranabir & Reetu, 2011; Stojanovich & Marisavljevich, 2008; Stubberud et al., 2021; Vaccarino et al., 2013; Valsamakis et al., 2019; Van Uum et al., 2008; Wirtz & von Känel, 2017).

Table 5. Categories of Chronic Physical Health Issues and Included Conditions

Category of Chronic Physical Health Condition	Conditions Included
Migraines and Chronic pain	Migraines, Chronic Pain
Asthma	Not specified
Diabetes	Diabetes type 1[21] and type 2, Gestational diabetes
Endocrine disorders	Thyroid condition or disorder, Hirsutism, Other endocrine disorder
Autoimmune disorders	Rheumatoid arthritis, Scleroderma, Systemic Lupus Erythematosus, Alopecia, Psoriasis, Vitiligo, Other allergic or immunologic condition, Other autoimmune disorder not previously reported
Sleep/wake disorders	Insomnia, Hypersomnolence, Narcolepsy, Restless Leg Syndrome, Sleep Paralysis, Sleep Terrors (or night terrors), Sleepwalking, Other sleep-wake condition not previously reported
Cardiovascular disorders	High blood pressure, Cardiac Arrhythmia, Coronary Artery Disease, Congestive Heart Failure, Heart Murmur, Valvular Heart Disease (for example: Mitral valve prolapse), Other heart or vascular condition not previously reported [22]
Digestive disorders	Gastroesophageal reflux disease (GERD) or acid reflux, Irritable bowel syndrome (spastic colon or spastic bowel), Crohn's Disease, Diverticular Disease, Esophageal Disease, Gallbladder Disease, Ulcerative Colitis, Other digestive system condition not previously reported

[21] Note that diabetes type 1 is an autoimmune disorder. While it was included alongside diabetes type 2 on the NCHA-III and within this study, diabetes type 1 is understood as having a different etiology than diabetes type 2 (Ozougwu et al., 2013).

[22] Congenital heart conditions are also assessed within this category but will be excluded from my analysis as they are present at birth and are thus not considered a health outcome of stress.

Data Preparation

Preparing Demographic Data

I conducted my data preparation and cleaning in R-Studio (R Core Team, 2025) using the "haven" (Wickham et al., 2023b) package for converting raw data from SPSS and the "tidyverse," (Wickham et al., 2024) "dplyr," (Wickham et al., 2023a) and "sjmisc" (Lüdecke, 2018a) packages for my initial data cleaning, filtering, categorizing, organizing and obtaining descriptive results.

Given the design of the NCHA-III survey and the use of write-in options for identity, the raw data provided by the ACHA required both standard data cleaning and very comprehensive, interpretive preparation of the identity variables prior to the final analysis. For gender and sexual orientation respectively, participants could only select one option each or they could select "My identity is not listed" and then use the write-in option if they wished to specify further in their own words. For race and ethnicity, the NCHA-III allowed participants to select multiple race and ethnicity options. They could also select "Another identity" and use the write-in field to specify. An intersectional multi-level modeling analysis requires that a finite list of identity groups be established using categorical variables which can then be combined to create intersectional strata; the total number of strata is thus determined by the number of possible identity combinations (Evans et al., 2024b). While there is no standard limit to the number of strata that can be created within a given stratum, the more identity categories included, and the more options included within each one, the greater the number of strata. More aggregated identities (e.g., using "gender minorities" to represent all non-cisgender individuals) result in larger sample sizes per stratum, whereas more specific identities (e.g., "agender") generate smaller sample sizes per stratum.

Theoretical Approach to Identity Categorization. Using either predefined or aggregate identity categories in research necessarily involves theoretical choices about what constitutes meaningful groupings (McCall, 2005). How identity groups are categorized is often based on convenience or default/standardized groups, both of which may fail to reflect the lived experiences and nuances of the participants' positionality (Else-Quest et al., 2016; Hancock, 2007). Hancock (2007) and Else-Quest and colleagues (2016) both argue that when determining an approach to identity aggregation, researchers should take into consideration the relevant context of the groups under study as they relate to the purpose and topic being studied. Moreover, Warner (2008) supports an iterative process to identity categorization to determine which method best fits the data, with the aim of maximizing both statistical significance and visibility of smaller groups.

In determining when and how to aggregate identities, I drew from critical quantitative and intersectionality literature (Else-Quest et al, 2016; Hancock, 2007; McCall, 2005; Warner, 2008) by taking into consideration historical and social context, academic precedent, and statistical similarity within this particular dataset. Applying an iterative approach, I tested the model with several possible aggregation approaches ranging from highly specific to highly aggregated to see which best suited the data. The description of which groups were aggregated and why follow.

Handling Write-in Data. For all identity variables (race, gender, and sexual orientation) the NCHA-III allowed participants to write in their identity using free text. After filtering out participants who did not respond to the required questions, the data showed that 995 participants selected "My identity is not listed" for gender identity, 1,224 selected "My identity is not listed above" for sexual orientation, and 2,176 endorsed "Another identity" for race. Respectively for

these groups, 74% (n=733) of those who selected the other/not listed option also used the write-in text to further describe their gender identity, 50% (n=617) used the write-in to describe their sexual orientation, and 37% (n=803) wrote in to describe their race/ethnicity. During the data cleaning phase, I used R studio to generate a list of all the write-in responses for each identity category and then manually sorted through about half of the write-in responses in Excel. I then learned how to conduct the same process in R and repeated it again for all identity write-in responses, including re-sorting those I had already sorted.

For all identity categories, some participants used the write-in field to write derogatory, crude, or hateful comments, to express refusal to answer, or to make political statements about their disagreement with the constructs being captured. These individuals were removed from the study because their responses did not provide the required information and were therefore coded as missing data. All other participants who endorsed other/another/not listed but used the write-in options for identity variables were coded and organized into identity groups. A category called "additional races and ethnicities" was kept only for race.

Coding and Aggregation for Race and Ethnicity Variables. The original NCHA-III survey included the following racial identity categories: Black, White, Hispanic/Latino/a/x, Asian, Pacific Islander, American Indian and Native American, and Additional. Individuals could select multiple options, and the 2022 NCHA-III allowed participants with some identities to specify their race or ethnicity further. For this study, I did not include the more specific racial or ethnic groups collected by the NCHA-III and instead worked with aggregate racial/ethnic categories.[23] While disaggregating race and ethnicity is ideal, I chose to use aggregate groups to keep the sample sizes large enough to allow for an intersectional analysis that includes sexual

[23] See Table 3 on pp. 20 for a complete list of specific racial identities included by the NCHA-III.

orientation and gender identity. Moreover, the disaggregated racial and ethnic identities provided on the NCHA-III were only available for individuals who selected "Asian" and "Hispanic/Latino/a/x," and only included some groups within each of these aggregate identities.

For the purposes of intersectional strata creation, I was unable to find a way that participants endorsing multiple racial and/or ethnic identities could be counted under all of their racial or ethnic identities. For example, if a participant identified as both "Black" and "Asian", they could not be included in both groups under the single variable "race" without being counted twice in the study. I attempted to create new specific response options for multiracial individuals (e.g., a specific option under the variable "race/ethnicity" that includes all individuals who identify as both Black and Asian). However, this created a large proportion of very small sample sizes (e.g., several groups of n =1) once other intersecting identities (gender identity, sexual orientation) were applied to create nested groups. While Evans' intersectional method is robust enough to handle small sample sizes (Evans et al., 2018), I found that having too many sample sizes of n = 1 or n = 2 generated singularity errors which prevented the analysis from running.

Ultimately, I decided to include a racial identity group called "multiracial"; however, considering Hancock's (2007) guidelines for intersectional research, I decided to consider social and historical context when deciding who to include (or not include) in this category. For example, among the American Indian/Native Alaskan sample, more than half (56%) of the individuals who selected American Indian or Native Alaskan also selected "White" from the multiple-choice options. Considering this ratio and the historical context of indigenous people in North America, I chose to categorize individuals who self-identified as both American Indian or Native Alaskan (AINA) and "White" in the AINA group. Within the historical context of the United States and the history of colonization, many indigenous individuals may also have some

degree of White ancestry and yet define their indigenous identity by their cultural upbringing and community connections rather than their degree of indigenous ancestry (TallBear, 2013).

Similarly, I did not make "White" or "Black" mutually exclusive to "Southwest Asian/ North African (SWANA)", due to the racially and ethnically diverse makeup of this region. Historically, many ethnicities in what is sometimes known as the Middle East have been categorized as White by census instruments, regardless of whether they identify as White (Kindratt, 2024). In this sample, 44% of individuals who indicated SWANA identities in the multiple-choice race/ethnicity options also selected "White."

I chose to include individuals who self-identified as Afro-Latino/a/e under "Black" rather than as "Latino/a/e and Hispanic" or "Multiracial." My rationale was that anti-black racism significantly affects the experiences of Afro-Latino/a/e people both within Latino/a/e and Hispanic cultures and within mainstream White Euro-American culture (García, 2025). At the same time, I recognize that including Afro-Latino/a/e individuals within the specific identity of "Afro-Latino/a/e" would have been the best option as research suggests that this identity term captures the unique experience of this group better than any other single or aggregate identity marker or markers (Morgan et al., 2024). I acknowledge that my decision highlights the disadvantages of relying on and using aggregated identity data.

While the creation of a "multiracial" category solved the problem of small sample sizes, I also hold myself responsible for perpetuating a statistical method which effectively erases the specific constellation of racial and ethnic identities held by multiracial individuals and instead grouped most into an ambiguous category of "multiracial." I created an aggregate group called "people of additional races and ethnicities" for individuals who only selected "other" for race and ethnicity or who used write-in response options for which there is no clear precedent for

aggregation. This group included individuals who identified as Caribbean, Indigenous Caribbean, West Indian, Jewish, Siberian Inuit, Sámi, and other undisclosed racial or ethnic identities. For a list of racial and ethnic identities included within each category, see Table 6.

Table 6. Coding and Aggregation for Race/Ethnicity Identity Responses

Aggregate Identity	Write-in Only Responses[24]	Coding Explanation
Black/African/ African American	African, Afrikan, Afro-Caribbean, Afro-Latina/o/x, Bahamian, Black, Black American, Black South African, Black/Caribbean, Cape Verdean, Caribbean (Guyanese), Haitian, Jamaican, Kenyan, Nigerian, Somali, Sub-Saharan African, Trinidadian, Uganda, West African, Zimbabwe.	Persons identifying as Black who did not identify as Native American, White, Asian, or Pacific Islander. Includes Afro-Latinx individuals
White/ European	Albanian, Anglo-Saxon, British, Bulgarian, Caucasian, Danish, East European, English, European, Finnish, French, German, Greek, Irish, Italian, Norwegian, Polish, Portuguese, Russian, Scandinavian, Scottish, Slavic, Spanish, Swedish, Ukrainian, White European, White American.	Persons identifying as White who did not identify as Black, Native American, Asian, Latino/a/e and Hispanic, or Southwest Asian/ North African (SWANA)
Latino/a/e and Hispanic	American Hispanic, Argentine, Brazilian, Chicanx/o/a, Cuban, Dominican, Ecuadorian, Guatemalan, Hispanic, Mexican, Peruvian, Puerto Rican, Salvadoran, South American, Venezuelan, Indigenous to South America, South American and Spanish Descent.	Persons identifying as Latino/a/e and Hispanic who did not also identify as Asian, Black, Native American, SWANA, or Pacific Islander.
Asian	Afghan, Asian, Asian American, Asian Chinese, Bangladeshi, Chinese, East Asian, Filipina, Filipino, Indian, Indian American, Indian Asian, Japanese, Korean, Malay, Malaysian, Nepalese, Pakistani, Punjabi, South Asian, Sri Lankan, Taiwanese, Thai, Tibetan, Vietnamese.	Persons identifying as Asian who did not identify as Pacific Islander, Native American, White, Black, Latino/a/e and Hispanic, or SWANA

[24] Write-in responses were coded if participants chose not to use the predefined identity options. Note that this is not a full list of write-in options that were aggregated. Options with specific personal detail, offensive content, or potentially identifying information are not described in the aggregation lists for race, sexual orientation, or gender.

Pacific Islander	Hawaiian, Indo-Fijian, Micronesian, Native Hawaiian, Pacific Islander, Fiji Indian.	Persons identifying as Pacific Islander who did not also identify as Black, Native American, White, Latino/a/e and Hispanic, or SWANA.
American Indian/ Native Alaskan/ Indigenous North American	Amerindian, American Indian, Apache, Blackfoot, Cherokee, Choctaw, Cree, Iroquois, Lakota, Lumbee, Metis, Muscogee, Navajo, Native, Native American, Ojibwe, Pueblo, Sioux, Ute, Yup'ik.	Persons identifying as Native American who did not also identify as Asian, Black, Latino/a/e and Hispanic, SWANA, or Pacific Islander. Includes those who identified as both White and AINA (57%).
Southwest Asian/ North African (SWANA)	Arab, Armenian, Azerbaijani, Egyptian, Iranian, Israeli, Jewish Israeli, Kazakh, Lebanese, MENA, Middle Eastern, Moroccan, North African, Persian, SWANA, Syrian, Turkish, Uighur, Yemeni.	If a person identified as SWANA and did not also identify as Asian, Black, Native American, Latino/a/e and Hispanic, or Pacific Islander. Includes people who identified as both White and SWANA (44%).
Multiracial	2 or More Races, Asian and, Black and White, Chinese and White, Greek and Pakistani, Indian and White, Jamaican, Native American, African American, Japanese and White, Mixed, Multiracial, White and Asian, White and Black, White and Chinese, White and Filipino, White and Indian, White/Japanese/Armenian	If a person identified with two or more racial/ethnic categories (with some exceptions), they were categorized as Multiracial.
People of additional races/ ethnicities	Caribbean[25], Indigenous Caribbean, West Indian, Jewish, Jewish American, Siberian Inuit, Sámi, Additional/Other (undescribed)	Persons who only selected "Other" whose write-in response options which do not fit into any of the other categories.

[25] Individuals who identified as Caribbean or West Indian were only included under Additional Races and Ethnicities if they did not provide further detail. Those who identified as Caribbean and specified identifying as Afro-Latino/a/e/x, Black, Haitian, Jamaican, or Trinidadian were included under "Black/African American." Those who identified as Cuban, Dominican, or Puerto-Rican were included under "Latino/a/e and Hispanic."

Coding and Aggregation for Gender Identity Variables. For this study, I initially coded and aggregated participants into one of six gender identity groups: "cisgender woman", "cisgender man", "transgender woman", "transgender man", "gender expansive individuals" or "intersex individuals." This differs from the NCHA-III options, which are "woman or female", "man or male", "trans woman", "trans man", "genderqueer", "my identity is not listed", "agender", "genderfluid", "non-binary", "intersex", or a write-in option. I chose to specify "cisgender woman" and "cisgender man" for clarity and out of consideration that "man" and "woman" should not inherently exclude transgender individuals.

For individuals who fall outside the gender binary, I created an identity category called "gender expansive." This incredibly broad, diverse group included agender, nonbinary, genderqueer, transmasculine, transfeminine, unlabeled, and questioning individuals, two-spirit, hijra, other cultural third genders, as well as other who do not identify as cisgender but do not identify as transgender men or transgender women. This included both individuals who selected from one of the multiple-choice options and those who used the write-in option. This category also included participants who indicated they had a transgender history but were now presenting as cisgender. Individuals who indicated they primarily identify as transgender women or transgender men were included under those labels and not under "gender expansive."

While I would have preferred to create a separate group for individuals who are questioning their gender identity, the NCHA-III did not have a "questioning" category for gender identity, and thus it was a very small group who wrote "questioning" into the write-in option.

Individuals who used the write-in option to describe their gender identity in further detail were placed under one of the following categories based on my interpretation of their response: "cisgender woman", "cisgender man", "transgender woman", "transgender man", "gender

expansive" or "intersex." For gender identity, the write-in responses were usually fairly clear and did not require much interpretive judgment. Of note, only a small number of individuals in the final sample described their gender identity as intersex (n = 24). This was based only on the survey question of gender identity; sex assigned at birth was not taken into consideration in the coding logic for this category.

It was necessary to recode the gender variables because the default survey coding for the NCHA-III processed gender identity as "missing" for any individual who skips one or more of the three questions asked about gender identity or assigned sex at birth, even if their gender identity is clear from their responses to one or two of these questions (ACHA, 2022b). To avoid unnecessary erasure of transgender participants who did not answer all three questions, I created a new gender variable which did not require sex assigned at birth or the question "Do you identify as transgender?" to be answered if gender identity was otherwise already clear. Alternatively, if an individual indicated they identify as transgender but specified their gender identity as "woman" or "man" rather than as "trans woman" or "trans man", they were also included respectively as transgender women and transgender men within the study.

A full list of the coding rules and write-in options for gender can be found in Table 7.

Table 7. Coding and Aggregation for Gender Identity Responses

Descriptive Aggregate Category	Stratum Aggregate Category	Write-in Responses
Cisgender women	Cisgender women	Female[26], Girl, Am a Woman, Mom, She/Her, Straight, Woman, Woman (Not Female), Womxn
Cisgender men	Cisgender men	Bisexual Man, Guy, Male, Man, Dude
Transgender Men	Gender Minority	Guy, He/Him Lesbian, Male/Man/Transman, Man, Trans Guy, Trans Male, Trans Man, Trans-Male, Transgender Male, Transman, Woman to Male
Transgender Women	Gender Minority	Girl, Lesbian, Mom, She/Her, Trans Female, Trans Woman, Trans-Woman, Woman, Woman (Not Female), Womxn
Gender Expansive Individuals	Gender Minority	2 Spirit, AFAB (Assigned Female at Birth), Agender, All, Androgyne, Androgynous, Any, Beyond Gender, Bigender, Butch, Demi Boy, Demi-Female, Demiboy, Demigirl, Demi-woman, Expansive, Fem Aligned Nonbinary, Femme, Fluid, Gender Agnostic, Gender Apathetic, Gender Indifferent, Gender Neutral, Gender Non-Conforming, Genderfluid, Genderflux, Genderqueer, Greygender, Hijra, Indifferent, Label-Free, No Gender, No Preference, Nonbinary, Nonbinary Woman, Pangender, Queer, Questioning, She/They, Still Figuring It Out, They/Them, Trans Femme, Trans Masc, Trans Masculine, Transfeminine, Transfemme, Transmasculine, Two-Spirit, Uncomfortable with Gender Terms, Unlabeled, Unsure
Intersex Individuals	Gender Minority	*No write-in options provided*

[26] For write-in options that indicate gender identity but did not specify whether a person identifies as transgender or cisgender (e.g., “man”, “woman”, “girl”), other variables were used in the gender coding logic, specifically the questions, “Do you identify as transgender?” and the question regarding sex assigned at birth. Individuals who provided no indication that they identify as transgender were coded as cisgender.

Coding and Aggregation for Sexual Orientation Variables. For sexual orientation, I initially coded all responses as one of the following: "heterosexual/straight", "bi/pansexual plus", "gay or lesbian", "asexual", or "questioning." Similar to the "gender expansive" category, I included a wide range of identities under "bi/pansexual plus" which included bisexual, pansexual, queer, sexually fluid, gynesexual, androsexual, omnisexual, and polysexual individuals, and individuals who used the write-in option to specify more complex sexual attractions. For "asexual", I included all identities that fall within the asexual/aromantic spectrum such as asexual, aromantic, lithrosexual, aegosexual, antisexual, demisexual, gray sexual, and those with a combination of the preceding identities. While this was my best faith effort to accurately represent asexual identities, it is important to note that some demisexual individuals may not self-identify as being within the asexual spectrum. For "gay and lesbian", I included both "gay" and "lesbian" as well as other terms which indicate primarily same-sex, same-gender, or similar gender attraction, such as sapphic, trixic, uranic, same-sex attracted, same gender loving, and uranic (see Table 8).

Table 8. Coding and Aggregation for Sexual Orientation Identity Responses

Descriptive Aggregate Category	Stratum Aggregate Category	Write-in Only Responses
Heterosexual	Heterosexual	A Man That Has Intercourse With Women, Heterosexual, Kinsey Scale 2, Straight, Super Straight
Bisexual/ Pansexual +	Sexual Orientation Minority	Abrosexual, Androgynous, Androphilic, Androsexual, Bi, Biromantic, Bisexual, Finsexual, Fluid, Gynephilic, Gyneromantic, Gynesexual, Homoflexible, Non-conforming, Omnisexual, Pansexual, People Lover, Polyromantic, Polysexual, Pomosexual, Queer, Unlabeled

Gay/Lesbian	Sexual Orientation Minority	Gay, Homosexual, Lesbian, Same-Gender Loving, Same-Sex Attracted, Sapphic, Trixic, Uranic, Dyke
Questioning	Sexual Orientation Minority	Bicurious, Confused, Heteroflexible, I Don't Know, No Preference, No Specific Orientation, Not Sure, Open, Questioning, Undefined, Undetermined, Unsure
Asexual/ Aromantic+	Sexual Orientation Minority	Ace, Aegosexual, Ageosexual, Aro, Aroace, Aromantic, Asexual, Cupiosexual, Demiromantic, Demisexual, Graysexual, Lithrosexual, No Sexual Attraction, Not Interested, Not Sexually Active

Data Preparation: Creation of Strata

Once the data was cleaned and prepared for analysis, I regrouped the identity variables into final aggregate categories. Strata were defined as (*Race/Ethnicity * Gender Identity * Sexual Orientation*), with gender and sexual orientation identities organized into aggregate groups. Originally, I intended to use intersectional strata that differentiated between transgender women, transgender men, and gender expansive individuals as well as between bisexual/pansexual+, gay/lesbian, asexual/aromantic+, and questioning individuals. However, I tried and was not able to run the analyses with this level of specificity. Upon testing the model with highly specific groups, it became clear that the combination of small sample sizes with fairly rare outcome variables was generating singularity errors. This meant that too few strata had 0 or close to 0 odds, which made the models unstable and the results unreliable.

I tried several different options to reduce these errors without further aggregating the nested groups, such as increasing the maximum number of iterations, changing the optimizers, and even aggregating some of the health outcomes. However, as I had too many strata with no occurrences, none of these resolutions worked to resolve the underlying issue.

After multiple iterations, I reasoned that some identity groups who share characteristics or contexts but have important differences (e.g., transgender men and transgender women) might benefit from being grouped together if they have similar outcomes for the variables under study, if doing so allows for large enough sample sizes to produce significant results. Thus, I decided to run descriptive analysis to determine if health patterns were similar enough between some adjacent identity groups to allow for them to be aggregated. While there were some key differences in the prevalence for some conditions between these groups, the overall trends showed a consistent pattern of having higher rates when compared to the overall sample.

This is by no means the superior approach, but from my perspective, to prioritize specificity and then generate only nonsignificant results for the most marginalized groups would not be helpful in producing meaningful knowledge about health disparities. Descriptive information for bisexual+, gay/lesbian, asexual+ and questioning individuals as well as transgender women, transgender men, gender expansive and intersex individuals related to the discrimination variables and health outcomes is available throughout the results section.

After determining that transgender women, transgender men, and gender expansive individuals showed similar overall similar descriptive data for the discrimination and health outcome variables, I decided to aggregate these groups into a strata category called "gender minority individuals." For the same reasons, bisexual+, gay and lesbian, asexual+, and questioning individuals were grouped together as "sexual orientation minority individuals."

Strata were created based on nine possible racial/ethnic identities (White, Black/ African American, Latino/a/e and Hispanic, Asian, Pacific Islander, American Indian/Native Alaskan, Southwest Asian/North African, multiracial, and additional races and ethnicities), three gender identity groups (cisgender men, cisgender women, and gender minority individuals), and two

sexual orientation groups (heterosexual and sexual orientation minorities). These identity variables were saved as factors. I then created identity tables and checked to ensure that all participants were accounted for and that the regrouping had not unintentionally excluded or misplaced any participants.

Prior to creating a stratum variable, I created a numerical version for the identity variables of race/ethnicity, gender, and sexual orientation. This step was recommended and outlined in Evans and colleagues' tutorial for the I-MAIHDA (2024b). These numerical variables were maintained in addition to the original factor identity variables. I then checked the sample sizes of the numerical identity variables using the "table" function in dplyr against the corresponding factor identity variables to ensure the values matched. Then, as advised by Evans and colleagues (2024b), I created a new "stratum" variable which was defined as (race_numerical * 100) + (gender_numerical*10) + orientation_numerical *1). Once the new "stratum" variable was created, I saved it as a factor. This step is necessary in order for "stratum" to be used as a level 2 predictor within the multi-level modeling analysis.

Preparing Health Outcome Variables

As mentioned previously, the NCHA-III asked participants whether they have been diagnosed with each of 108 specific chronic physical or mental health conditions across 16 categories. Using skip logic, participants were first asked if they had ever been diagnosed with each of 39 common health conditions. If they selected "Other ongoing or chronic condition not listed above", the survey used skip logic to open another set of options, which allowed them to select from broad categories of other chronic health conditions. If they choose one of these categories, then they could select a specific disorder within that group.

Initially, I removed participants with missing data from the first group of 39 chronic health questions and then followed the survey logic to exclude participants who selected broad categories of health issues but then did not specify. However, this reduced by data set from 291,805 to 249,040, which represents about 1/6 of the data set. Compared with other required variables, this represented the greatest amount of data loss due to filtering out missing responses. Upon exploring further, I recognized that this was removing participants who had responded to some chronic health questions but not others. I reasoned that when filling out a very long survey, college students who are busy, tired, and surprised by the length of the survey might skip questions to which the answer is "no" rather than taking the time to select "no." I decided to code missing data as "0" or "no" rather than to omit such participants and then conducted the analysis again. I found that this made no substantial differences to the results but was helpful in reducing errors caused by small stratum sample sizes.

For this study, I organized health risk for categories of conditions rather than specific disorders (e.g., autoimmune disorders rather than lupus and rheumatoid arthritis separately). The exception was asthma. Due to low prevalence of most chronic health conditions among college students, using categories rather than specific health conditions allows for greater understanding of overall trends and reduces the problem of low prevalence with small sample sizes.

Initially, I tried to also include cancer, muscular disorders, hair, skin and nail disorders and reproductive disorders. However, once I ran preliminary distribution analyses, I learned that prevalence of cancer and muscular disorders were very low across all groups, with many intersectional groups having no incidents. This created singularity errors in the analysis which invalidated the results. Similarly, the reproductive disorders included in the NCHA-III nearly all refer to conditions which affect individuals assigned as female at birth (e.g., endometriosis),

which meant that my approach of including individuals with all genders and anatomies into every model did not fit this outcome variable. Furthermore, I realized that many of the hair, skin, and nail disorders included in the study were better categorized as other types of disorders (e.g., alopecia and vitiligo are both autoimmune disorders) and when standing alone, did not have high enough prevalence to be analyzed (See Table 5).

Moreover, I reorganized some of the chronic health conditions into different categories than those provided on the NCHA-III. For example, the NCHA-III groups hirsutism, psoriasis, and vitiligo with hair, skin, and nail disorders. Given that the underlying problem that causes hirsutism is an endocrine dysfunction, I included this with endocrine disorders. Similarly, I categorized psoriasis and vitiligo as autoimmune rather than as hair, skin, and nail disorders. Diabetes was maintained as its own category rather than as an endocrine disorder. This was done because diabetes also brings systemic physical health impacts across organs and requires intense and regular monitoring and treatment (Ozougwu et al., 2013), making diabetes worth analyzing separate from other endocrine disorders. It is also important to note that diabetes type 1 is also an autoimmune disorder and according to Ozougwu and colleagues, shares some similar biomarkers (such as elevated reactive antibodies) with other autoimmune disorders.

Initially, I intended to include self-rated health as an additional outcome variable. The NCHA-III survey assesses overall self-rated health by asking participants "How would you describe your overall health?" With the options on a 5-point scale of "Excellent", "Very good", "Good," "Fair", and "Poor" (ACHA, 2022b). However, this was not included in the analysis due to missing data which reduced the sample sizes to the extent that it generated errors in the analysis for other chronic health conditions. I chose to prioritize the chronic health condition variables as these have been understudied among LGBTQIA+ populations.

Analysis Plan

Intersectional Multi-Level Modeling

I applied the Intersectional Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (I-MAIHDA), an intersectional multilevel model developed by Clare R. Evans to nest individuals within their intersecting social strata (Alvarez & Evans, 2021; Borrell et al., 2025; Evans, 2015; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b). I conducted my analysis in R Studio (R Core Team, 2025) using the lme4 package for R Studio (Brooks et al., 2017) for logistic regressions and the glmmTMB package (Bates et al., 2015) for negative binomial regressions. Within R Studio, I also used the "haven" (Wickham et al., 2023a) package for converting raw data from SPSS; the "tidyverse," (Wickham et al., 2024) "dplyr," (Wickham et al., 2023b) and "sjmisc" (Lüdecke, 2018a) packages for most of my initial data cleaning, filtering, categorizing, creating tables, and many other data preparation and organization functions; the "broom.mixed" (Bolker & Robinson, 2024) package for organizing nested data after running the models but prior to further analysis; the "merTools" (Knowles & Frederick, 2024) and "ggeffects" (Lüdecke, 2018b) packages for predicting intervals and marginal effects within multi-level models; the "Metrics" (Hamner & Frasco, 2018) and "pROC" (Robin et al., 2011) packages to analyze ROC curves and calculate the area under the curve (AUC); the "performance" (Lüdecke et al., 2021) package for comparing models; and finally, the sjPlot (Lüdecke, 2023) and ggplot2 (Wickham, 2016) packages for data visualization[27]. A significant portion of the code for my analysis was adapted and modified from Clare Evan's and colleagues' code as provided in their I-MAIHDA tutorial (2024b).

[27] Note that this is an overview of the functions completed using each of these R packages and not a comprehensive list. Many code chunks used applied and combined multiple packages concurrently.

Reference Group Selection. For fixed effects models, I set the reference group for race as "White/European," for gender as "cisgender man," and sexual orientation as "heterosexual." This decision was not made lightly, as there has been justifiable criticism of research which sets dominant identities as the reference group (Mayhew & Simonoff, 2015; SHADAC, 2023), as this reinforces the idea that White/European, cisgender heterosexual men are the norm and that all other identities represent a deviation from the norm. Indeed, one of the advantages of the I-MAIHDA approach is that for the intercepts-only (null models), no reference group is needed, and each stratum is compared to the precision-weighted grand mean. For fixed effects models, Evans and colleagues argue that any group can be selected as the reference group (Evans et al., 2024b). My colleague Vanessa Joachin (2024) successfully showed how non-dominant groups can be positioned as the reference groups using I-MAIHDA when working with large data sets and complex approaches.

For the purposes of my study, I critically examined how my reference group selection fit the purpose and audience of my study. Given that one key aspect of my purpose is to highlight the impacts of systemic racism, homophobia, and transphobia on health outcomes and that my target audiences are medical personnel, medical administrators, and policymakers, I considered how best to convey such disparities to these groups. Following the example and reasoning of Tran and colleagues (2024), I ultimately chose to place White/European cisgender men as the reference group to highlight how those with marginalized identities experience health disparities in contrast to those with more systemic privilege. Keeping in mind that medical personnel, medical administrators, and policy makers may not have training in advanced statistical methods, I also chose this more traditional approach to reduce any risk of misinterpretation and to make my results clear to a wide range of professional and public audiences.

General Description of Analyses

For this study, I ran 54 different multi-level models across six stages of analyses with nine health outcome variables. Each of the six model stages contains one model for count of chronic health conditions and eight chronic health condition models (chronic pain/migraines, asthma, diabetes, endocrine disorders, sleep disorders, autoimmune disorders, digestive disorders, and cardiovascular conditions). The six model stages are broken into two sets: One "full sample" set (Models 1A-1I, 2A-2I, and 3A-3I), and one subsample set only for individuals who endorsed having experienced discrimination in the past year (Models 4A-4I, 5A-5I, and 6A-6I). Each model stage contains a null model, a discrimination fixed effect model, and a discrimination plus additive identity fixed effects model.

A total of 48 models successfully ran. I tried to run the null and fixed effects models for endocrine disorders and autoimmune disorders with the reduced sample, however these models generated errors caused by singularity in the data. In other words, endocrine and autoimmune disorders both had such low prevalence that when the sample size was reduced, several strata had 0 or close to 0 occurrences. Thus there are no Models 4E-6E or 4G-6G.

For all of the models assessing count of chronic health conditions (the "A" models), I calculated the precision-weighted grand mean (PWGM). This is the weighted mean of the stratum (intersectional group) means for count of chronic health conditions, where the "weights" are the inverse of the observed within-stratum variance (Evans et al., 2024b). Evans and colleagues recommend using the PWGM instead of a traditional sample mean as the baseline measure, as this allows strata with smaller sample size to be considered within the model, but accounting for how smaller sample sizes affect the reliability of the estimates.

For all models, I calculated the Variance Partition Coefficient (VPC). The VPC provides the proportion of total variance in a given outcome that can be attributed to between-stratum differences; in this case, this describes how much of the total sample variance is occurring between intersectional identity groups (Alvarez & Evans, 2021; Borrel et al., 2024; Evans et al., 2021; Evans et al., 2024b). It is calculated by (1) adding together the between-stratum variance and the within-stratum variance, (2) dividing this by the between-stratum variance, and then (3) multiplying this by 100 to convert to a percentage. For most of my models, I calculated the VPC's both manually and using the "glmmTMB" package (Brooks et al., 2017) for the negative binomial models (1A, 2A, 3A, 4A, 5A, and 6A) and the "lme4" package (Bates et al., 2015) for logistic multilevel models (1B-1I, 2B-2I, 3B-3I, 4B-4I, 5B-5I and 6B-6I).

From an I-MAIHDA framework, the VPC measure means different things depending on whether additive identity effects are included (Evans et al., 2018; Evans et al., 2024b). For all null models and discrimination fixed effects models (Models 1A-1I, 2A-2I, 4A-4I, and 5A-5I), the VPC represents the total amount of difference based on stratum *prior to* partitioning out additive identity effects[28]. For fixed effects models where identity categories are added as regression coefficients (Models 3A-3I and 6A-6I), the VPC represents the degree of variance attributed to stratum effects once additive identity effects are factored in. In other words, the VPC for additive identity effects models can be understood as a statistical measure that aims to quantify the degree of difference in outcomes based on the unique experiences of intersecting identity groups *in addition to* the combined effects of their identities together. Granted, this

[28] The VPC is similar to an intraclass correlation coefficient (ICC), but with some key differences. In a 2-level multi-level model with fixed effects only, the ICC and VPC may be the same but generally interpreted differently; with the VPC representing the degree of variance attributed to between-stratum effects, and the ICC usually being framed as the degree of similarity between individuals due to class/group membership. For the I-MAIHDA model, the emphasis of analysis is on explaining stratum effects and on discriminatory accuracy between intersectional and additive effects, and thus the VPC is a more favorable measure as it maps well onto these goals.

measure must be approached carefully, especially for small sample sizes and especially for low baseline incidence. Evans and colleagues have advised that VPC's in I-MAIHDA models are usually below 5% because of overlapping distributions (Borrell et al., 2024; Evans et al., 2024b).

Analysis for Models 1A-1I: The Full-Sample Null Models

For analyses using I-MAIHDA, the null model estimates the stratum random effects intercept and the between-stratum variance prior to conducting any regressions (i.e., prior to adding any fixed effects or random effects models) (Alvarez & Evans, 2021; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b). The null model allows researchers to obtain an overall picture of what Evans and colleagues call the "inequity" within the sample (2024b). In the I-MAIHDA tutorial, the null model is represented as a first step before building more complex models to test the hypotheses (Evans et al., 2024b).

The first stage of analysis (Models1A through 1I, or "Model Stage 1") assessed the null models for the full sample (N=291,805) with random intercepts only for chronic health count and each of the eight health condition categories (nine health outcome variables total). For Model 1A, I aimed to assess the stratum-level variance as an incidence rate ratio (IRR) for count of chronic health conditions. I first tested the model with a Poisson regression on count of chronic health conditions nested with a random intercept for stratum level and no fixed effects. Once the model was run, I then conducted an overdispersion test. This calculated the Pearson chi-square dispersion statistic by dividing the sum of squared Pearson residuals by the residual degrees of freedom. The overdispersion statistic for the Poisson regression version of Model 1A was 2.28, which exceeds the standard threshold of 1.5. This indicates that the variance was significantly greater than the mean. I switched to a negative binomial method which provides a more accurate standard error and is a common choice in health psychology research with tends to have highly

skewed count data for health outcome variables (Green, 2021). I retained the negative binomial method for all further models that included count of chronic health conditions as the outcome variable.

For Models 1B through 1I, I applied a multilevel logistic regression model for each of the eight chronic health categories with a random intercept at the stratum level and no fixed effects. Evans and colleagues (2024b) demonstrated the use of multilevel logistic regressions in R for categorical health outcome variables with I-MAIHDA in their tutorial article and published code, which I adapted by making syntax changes to fit the purpose and design of my study. For the current study, my eight logistic regression models examined how much the between-stratum variance explains the likelihood of migraines and/or chronic pain, asthma, diabetes, endocrine disorders, sleep disorders, autoimmune disorders, and heart conditions. Just as with Model 1A, the logistic Models 1B through 1I use random intercepts only without adjusting for additive identity effects.

Analysis for Models 2A-2I: The Discrimination Fixed Effects Models

For the Stage 2 models (Models 2A-2I), I maintained the original multi-level modeling structure as used in the null models, with only one change. This was the addition of a binomial discrimination variable as a fixed effect or "predictor" variable onto the same nine health outcomes. In this stage, I used the aggregate variable which indicated whether or not participants endorsed having experienced discrimination and/or microaggressions during the previous 12 months. As a fixed effect, the slope was not allowed to vary across strata but rather represented the average impact of discrimination/microaggressions across all strata in predicting odds for each of the nine health outcomes. The purpose of Models 2A-2I was to test Hypothesis 1[29].

[29] (H1) Endorsement of 12-month experiences of discrimination and/or microaggressions will be associated with a higher count of chronic health conditions and increased likelihood for each of the eight health condition categories.

Models 2A-2I: Between-Strata Variance Measures. As with the null models, I calculated VPC's for Models 2A-2I. Since these models control for the fixed effect of 12-month discrimination endorsement, the VPC's here represents the degree of variance in health outcomes due to differences between strata controlling only for discrimination experiences. I then calculated the Proportion of Change in Variance (PCV) for Models 2A-2I compared to the null model. For the discrimination-only fixed effects models (Models 2A-2I), the PCV represents the degree to which accounting for discrimination experiences reduce the variance between intersectional groups. I calculated the PCV's for Models 2A-2I by extracting the variance components from Models 1A-1I and Models 2A-2I and then dividing the difference by the values of models 1A-1I.

I followed the example of Evans and colleagues by calculating the Area under the Curve (AUC) of the Receiver Operating Characteristic (ROC) curve for Models 2A-2I (Evans et al., 2024b). This measure is useful in intersectional multi-level modeling as it helps to explain how much each fixed effect adds to the model's predictive power. Unlike ANOVA's or likelihood ratio tests (LRT's) which measure reductions in deviance as an estimation for model fit, the AUC specifies discriminatory accuracy, or how well each progressive model stage adds to the model's ability to predict individual outcomes.

Analysis for Models 3A-3I: Additive Identity Effects Models (Full Sample)

One key level of analysis in an I-MAIHDA approach is the fixed effects model where the additive effects of identities are incorporated (Evans et al., 2024b). This step involves including each identity category (e.g., race, gender, sexual orientation) as a regression covariate using additive terms. Evans specifies that because interaction effects are captured by the stratum random effects, interaction terms are not necessary at this stage of analysis.

I-MAIHDA studies generally structure a null model and then an additive identity effects model as the two main stages (e.g., Alvarez & Evans, 2021; Evans et al., 2024b). However, I deviated from this by creating a three-stage model building process to include an additional non-identity predictor variable into each set of models (discrimination experiences for the full sample and discrimination distress for the reduced sample). Rather than comparing the null model to the additive effects models to calculate the adjusted VPC, PCV, and AUC/ROC (as Evans does), I compared the discrimination-only fixed effects models with the discrimination plus additive identity fixed effects models to obtain these measures.

Thus, Model Stage 2 (Models 2A-2I) and Model Stage 3 (Models 3A-3I) were treated as a pair, with the Stage 2 models being treated as a proxy for the null model. For Models 3A-3I, I built onto Models 2A-2I by adding regression coefficients for each identity category (race/ethnicity, gender identity, and sexual orientation). I retained a negative binomial analysis to measure the incidence rate ratio for count of chronic health conditions and a logistic regression to calculate the odds ratios for each of the eight chronic health conditions.

Unlike the null models (Models 1A-1I) and the discrimination-only fixed effects models (Models 2A-2I), the additive identity plus discrimination experience fixed effects models (3A-3I) specify the degree of variance in outcomes explained by each additive identity (e.g., “Black”, “cisgender woman”, or “heterosexual”), controlling for the impacts of discrimination experiences on health. I was thus able to obtain a measure of how individuals with different marginalized and privileged identities differ in their average number of chronic health conditions and their likelihood for developing specific health conditions, controlling for the average statistical impact

of self-reported discrimination experiences across identity strata. Models 3A-3I were designed to test Hypotheses 3[30] and 5[31].

Models 3A-3I: Between-Strata Variance Measures. As with the null models, I calculated the VPC for Models 3A-3I. Since these models control for the additive fixed effects for specific identities, the VPC here represents the degree of variance in outcomes attributed to stratum-level effects (between group effects) controlling for identity effects. I then calculated the Proportion of Change in Variance (PCV) for Models 3A-3I. Within an I-MAIHDA framework, the PCV explains the proportion of between-stratum variance that can be attributed to additive identity effects (Alvarez & Evans, 2021; Borrell et al., 2025; Evans, 2015; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b). The lower the PCV, the more the between-stratum variance can be attributed to stratum-level effects that are not explained by adding together specific identities. The inverse of the PCV (*1 - PCV*) can be understood as a statistical representation of the degree of between-group differences can be explained by intersectional effects beyond additive identity effects. I calculated the PCV's for Models 3A-3I by extracting the variance components from Models 2A-2I and Models 3A-3I and then dividing the difference by the values of models 2A-2I.

The VPC and PCV for Models 3A-3I were used to conceptualize the "intersectional" effects for health outcomes. I also calculated the AUC for Models 3A-3I to determine whether these models better predicted individual outcomes compared to the discrimination-only fixed effects models. A summary of Model Stages 1-3 can be found in Table 9.

[30] (H3) Controlling for 12-month endorsement of discrimination/microaggression experiences, individuals with marginalized racial, gender, and sexual orientation identities will report poorer health outcomes compared to those with privileged racial, gender, and sexual orientation identities.
[31] (H5) Controlling for 12-month endorsement of discrimination/microaggression experiences, the intersection of identities will explain a significant proportion of the variance in health outcomes, beyond the additive effects of identities

Table 9. Models 1-3 Descriptions (Full Sample *N* = 291,805)

Model Stage	Model and Description	Analysis
Model 1A-1I Null Models – Full Sample	*Model 1A:* Estimates the incidence rate ratio (IRR) intercept for chronic conditions at the stratum level	Negative binomial regression within intersectional multi-level model (MLM)
	Models 1B-1I: Estimates odds ratios (OR) intercept for health conditions at the stratum level	Logistic regression within MLM
Models 2A-2I Discrimination Fixed Effects (FE)	*Model2A:* Estimates IRR for chronic conditions at stratum level, controlling for impact of discrimination	Negative binomial regression within MLM + binomial discrimination FE + race, gender, orientation FE
	Models 2B-2I: Estimates OR for each health condition at stratum level, controlling for impact of discrimination	Logistic regression within MLM + binomial discrimination FE + race, gender, orientation FE
Models 3A-3I Discrimination + Identity Fixed Effects (FE)	*Model3A:* Estimates IRR for chronic conditions at stratum level, controlling for impact of discrimination and additive identity effects	Negative binomial regression within MLM + binomial discrimination FE + race, gender, orientation FE
	Models 3B-3I: Estimates OR for each health condition at stratum level, controlling for impact of discrimination and additive identity effects	Logistic regression within MLM + binomial discrimination FE + race, gender, orientation FE

Models 4A-4I, 5A-5I, and 6A-6I: Discrimination Distress (Reduced Sample)

The goals of Model Stages 4-6 were to (1) assess the impacts of discrimination-related distress onto same the nine key health outcomes[32] as the earlier models, (2) to examine how these health outcomes vary by identity, and (3) to assess whether intersectional effects help to

[32] These nine health outcomes were: average number of chronic health conditions and odds for migraines/chronic pain, asthma, diabetes, endocrine disorders, sleep disorders, autoimmune disorders, cardiovascular disorders, and digestive disorders.

explain the stratum-level variance in health outcomes when controlling for discrimination distress level. Model Stages 4-6 repeat the steps described for Model Stages 1-3 in sequential and parallel order, but with a few key differences.

First, Model Stages 4-6 used a subsample of the data filtered to include only individuals who reported discrimination-related events (n = 60,140). Besides using the filtered sample, the key difference in model design was that the binary discrimination/microaggression endorsement variable from Models 2A-2I and 3A-3I was replaced with a new ordinal variable measuring distress-level related to discrimination and/or microaggressions[33]. For Models 5A-5I and 6A-6I, the new ordinal discrimination distress level variable has four levels between 0-4 measuring distress level (0 = "none", 1 = "some distress", 2 = "moderate distress" and 3 = "high distress"). For these models, the intercept values assume a baseline discrimination distress level of 0 or "none."

Due to singularity in the data with the reduced sample[34], models could not be conducted for endocrine or autoimmune disorders; thus only 21 models ran as there are no Models 4E, 5E, or 6E or 4G, 5G or 6G.

Models 4A-4I represent the null model for the subsample (n = 60,140). They are identical to Models 1A-1I, but with the sample restricted only to individuals who have reported discrimination or microaggressions during the past 12 months. Models 5A-5I build onto the reduced sample null model but include as a fixed effect the level of reported distress from discrimination or microaggressions. Because discrimination distress includes four levels, the coefficient for this variable represents the degree of predicted change in health outcomes per

[33] For convenience, this will be referred to as the "discrimination distress" variable.
[34] See Page 42

one-unit increase in discrimination/microaggression-related distress. Models 5A-5I were designed to test Hypothesis 2.

Finally, Models 6A-6I build onto Models 5A-5I by adding fixed effect coefficients for each identity group within race/ethnicity, gender identity, and sexual orientation, while controlling for discrimination-related distress within the reduced sample. Models 6A-5I were designed to test Hypotheses 4 and 6. A summary of Models 4-6 is available in Table 10.

Table 10. Models 4-6 Descriptions (Subsample Reporting Discrimination, *n* = 60,140)

Model Stage	Model and Description	Analysis
Model 4A-4I Null Models – Subsample only	*Model 4A:* Estimates the incidence rate ratio (IRR) intercept for chronic conditions at the stratum level	Negative binomial regression within intersectional multi-level model (MLM)
	Models 4B-4I: Estimates odds ratios (OR) intercept for health condition at the stratum level	Logistic regression within MLM
Models 5A-2I Discrimination Distress Fixed Effects (FE) (subsample only)	*Model5A:* Estimates IRR for chronic conditions at stratum level, controlling for impact of discrimination distress	Negative binomial regression within MLM + discrimination distress level FE
	Models 5B-5I: Estimates OR for each health condition at stratum level, controlling for impact of discrimination distress	Logistic regression within MLM + discrimination distress level FE
Models 6A-6I Discrimination Distress + Identity Fixed Effects (FE) (subsample only)	*Model6A:* Estimates IRR for chronic conditions at stratum level, controlling for impact of discrimination distress and additive identity effects	Negative binomial regression within MLM + discrimination distress level FE + race, gender, orientation FE
	Models 6B-6I: Estimates OR for each health condition at stratum level, controlling for impact of discrimination distress and additive identity effects	Logistic regression within MLM + discrimination distress level FE + race, gender, orientation FE

CHAPTER THREE – RESULTS

Descriptive Statistics

Demographics

For the full sample (N = 291,805), the majority of participants identified as White/European (57.7%), heterosexual (76.8%), cisgender women (64.8%) between the ages of 18-24 (76.2%). All participants were either college undergraduate or graduate students over the age of 18. The sample included 41,561 Asian (14.2%), 40,783 Hispanic and Latino/a/e (14%), 15,932 Black/African American (5.5%), 15,345 multiracial (5.3%), 4,641 Southwest Asian/North African (SWANA), 4,185 (1.43%) American Indian/Native Alaskan (AINA), and 854 Pacific Islander (0.29%) individuals, plus 273 (0.029%) individuals of additional races and ethnicities[35]. Although the majority identified either as cisgender women or cisgender men (30.9% for cisgender men), this study included 2,022 transgender women (0.69%), 1,877 transgender men (0.64%), and 8,813 (2.02%) gender expansive (nonbinary, agender, genderqueer, gender questioning, two-spirit, and others identifying outside the gender binary) individuals. Roughly 23% of the sample identified as non-heterosexual, with 44,853 (15.37%) bisexual + students (defined as bisexual, pansexual, omnisexual, queer, or other non-monosexual identities), 12,019 (4.12%) gay or lesbian monosexual, 3,119 (1.07%) asexual+ (defined as asexual, aromantic, demisexual, demiromantic, or otherwise on the asexual/aromantic spectrum), and 7,528 (2.58%) individuals currently questioning their sexual orientation (see Table 11).

[35] As described in Methods, write-in responses for this group suggest that this group may include a significant proportion of Jewish, Caribbean, and some indigenous European individuals. However, because only a small proportion of individuals selecting "Other" wrote in their identity, the proportion is uncertain.

Table 11. Sample Demographics

Identities	Count	% of Sample	Identities	Count	% of Sample
Race and Ethnicity			*Sexual Orientation*		
White/European	168,231	57.65%	Heterosexual	224,195	76.83%
Black/African American	15,932	5.46%	Bisexual, Pansexual, Queer+	44,852	15.37%
Latino/a/e and Hispanic	40,783	13.98%	Gay/Lesbian	12,019	4.12%
Asian	41,561	14.24%	Asexual+	3,119	1.07%
Pacific Islander	854	0.29%	Questioning	7,528	2.58%
American Indian/ Native Alaskan	4,185	1.43%			
Southwest Asian/North African	4,641	1.59%			
Multiracial	15,345	5.26%			
Additional Races and Ethnicities	273	0.09%			
Gender Identity			*Age Group*		
Cisgender Man	90,068	30.87%	18-24	222,343	76.2%
Cisgender Woman	189,001	64.77%	25-34	50,675	17.37%
Transgender Man	1,877	0.64%	35-44	10,964	3.76%
Transgender Woman	2,022	0.69%	45-54	4,508	1.54%
Gender Expansive	8,813	3.02%	55-64	1,475	0.51%
Intersex	24	0.01%	65+	386	0.13%
Total Sample	291,805	100%	**Total Sample**	291,805	100%

The *strata N,* or total number of strata, was 54. The stratum *n* (stratum size) ranged from 2-82,819. The majority of the strata were larger than *n* = 100 individuals (81.4%), with almost half of the strata (strata *n* = 25; 46.3% of the sample *N*) consisting of 1,000+ individuals. Four strata were smaller than *n* = 20, representing 7.4% of all participants (See Table 12). Generally speaking, intersectional strata representing individuals with multiple privileged identities ranged

on the larger end of the range, while strata comprised of individuals with multiple intersecting marginalized identities were much smaller. The five largest strata were White/European heterosexual cisgender women (n = 82,819), White/European heterosexual cisgender men (n = 43,139), White/European cisgender sexual orientation minority women (n = 27,000), Latina cisgender heterosexual women (n = 20,699), and Asian cisgender heterosexual women (n = 20,135). Sexual orientation and/or gender minorities with marginalized racial and ethnic identities typically made up the smallest strata (See Table 13).

Table 12. Distribution of Stratum Size

Stratum Size	% of Sample	No. of Strata
1-10	3.7%	2
10-20	3.7%	2
20-50	9.3%	5
50-100	1.9%	1
100-500	25.9%	14
500-1,000	9.3%	5
1,000+	46.3%	25

Table 13. Strata by Size and Composition

Race	Gender	Orientation	Stratum n	Race	Gender	Orientation	Stratum n
White	CW[36]	Het.	82,819	Multi	CM	S/O Min.	787
White	CM	Het.	43,139	AAINA	CW	S/O Min.	628
White	CW	S/O Min.	27,000	SWANA	CW	S/O Min.	516
Lat.	CW	Het.	20,699	Black	CM	S/O Min.	487
Asian	CW	Het.	20,135	PI	CW	Het.	449
Asian	CM	Het.	14,161	Black	GM	S/O Min.	412
Lat/Hisp.	CM	Het.	10,312	Asian	GM	Het.	380
Black	CW	Het.	9,015	Lat/Hisp.	GM	Het.	291

[36] Abbreviations: CW = Cisgender Women; CM = Cisgender Men; GM = Gender Minorities (Transgender Women, Transgender Men, and Gender Expansive Individuals); Het = Heterosexual/ Straight; S/O Min. = Sexual Orientation Minorities (Bisexual+, Gay/Lesbian, Asexual+, and Questioning); Lat = Hispanic/Latine; Multi = Multiracial; AAINA = American Indian/Native Alaskan ; SWANA = Southwest Asian/ North African; PI = Pacific Islander; Add = Additional Races and Ethnicities.

White	CM	S/O Min.	7,217	PI	CM	Het.	208
White	GM	S/O Min.	7,015	AAINA	GM	S/O Min.	193
Multi	CW	Het.	6,834	SWANA	CM	S/O Min.	179
Lat/Hisp.	CW	S/O Min.	6,266	AAINA	CM	S/O Min.	161
Asian	CW	S/O Min.	4,574	SWANA	GM	S/O Min.	137
Multi	CM	Het.	3,650	PI	CW	S/O Min.	123
Black	CM	Het.	3,618	Add	CW	Het.	119
Multi	CW	S/O Min.	3,115	Black	GM	Het.	111
SWANA	CW	Het.	2,298	Multi	GM	Het.	104
Black	CW	S/O Min.	2,289	Add	CM	Het.	87
AAINA	CW	Het.	2,085	AAINA	GM	Het.	44
Lat/Hisp.	CM	S/O Min.	1,981	PI	CM	S/O Min.	41
SWANA	CM	Het.	1,484	Add	CW	S/O Min.	37
Asian	CM	S/O Min.	1,471	SWANA	GM	Het.	27
Lat/Hisp.	GM	S/O Min.	1,234	PI	GM	S/O Min.	24
AAINA	CM	Het.	1,074	Add	GM	S/O Min.	17
White	GM	Het.	1,041	Add	CM	S/O Min.	11
Multi	GM	S/O Min.	855	PI	GM	Het.	9
Asian	GM	S/O Min.	840	Add	GM	Het.	2

Descriptive Results: Discrimination Experiences

Across identities, a total of 20.6% (n = 60,140) of all participants reported having experienced either discrimination, microaggressions, or both during the past 12 months. Individuals with historically marginalized racial and ethnic identities were more likely than White/European individuals (14.4%) to report having experienced discrimination and/or microaggressions. Among the full sample, 40.4% of Black/African Americans, 23.7% of Latino/a/e and Hispanics, 27.9% of Asians, 32.7% of Pacific Islanders, 24.1% of American Indian/ Native Alaskans, 28.6% of Southwest Asian/North Africans, 35.2% of multiracial individuals, and 40.7% of people of additional races/ethnicities reported at least one experience

of discrimination or microaggressions during the past 12 months. Based on gender, rates were highest for gender expansive individuals, with of 53.7% gender expansive individuals, 46.9% of transgender men, 32.8% of transgender women, and 25% of intersex individuals reporting at least one experience of discrimination or microaggression during the 12 months. Cisgender women reported lower rates than gender minority individuals but higher rates of discrimination (21.5%) when compared to cisgender men (14.7%). Compared with heterosexuals (16.2%), past-year experiences of discrimination and/or microaggressions were reported among 35.7% of bisexual+ individuals, 39.7% of gay/lesbian individuals, 30.9% of asexual individuals, and 27.4% of individuals questioning their sexual orientation/identity (See Table 14).

Table 14. Discrimination Experiences by Identity (12-month)

Identity	Sample Size	Count endorsing discrimination	% endorsing discrimination
Race/Ethnicity			
White/ European	16,8231	24,305	14.4%
Black/African American	15,932	6,441	40.4%
Latino/a/e and Hispanic	40,783	9,652	23.7%
Asian	41,561	11,614	27.9%
Pacific Islander	854	279	32.7%
American Indian/Native Alaskan	4,185	1,010	24.1%
Southwest Asian/ North African	4,641	1,327	28.6%
Multiracial	15,345	5,401	35.2%
Additional Races/Ethnicities	273	111	40.7%
Gender Identity			
Cisgender Men	90,068	13,208	14.7%
Cisgender Women	189,001	40,647	21.5%
Transgender Men	1,877	880	46.9%
Transgender Women	2,022	663	32.8%
Gender Expansive	8,813	47,36	53.7%

Intersex	24	6	25.0%
Sexual Orientation			
Heterosexual	224,195	36310	16.2%
Bisexual +	44,944	16031	35.7%
Gay/Lesbian	12,019	4770	39.7%
Asexual+	3,119	964	30.9%
Questioning	7,528	2065	27.4%
Total	291,805	60,140	20.6%

Among individuals who endorsed having experienced discrimination (n = 60,140), the mean distress level was 1.42 (SD = 0.79). Most (47.9%) reported their associated distress level as "1" or "Minimal Distress." About one-fourth of those reporting discrimination reported "2" or "Moderate Distress." Roughly one-tenth (9.5%) reported "High Distress." (see Table 15).

Table 15. Subsample Distribution of Discrimination Distress Level

Distress level	0	0.5	1	1.5	2	2.5	3
Count	5,252	500	28,816	2,787	15,483	1,585	5,717
Proportion	8.7%	0.8%	47.9%	4.6%	25.7%	2.6%	9.5%

Described by identity, the mean discrimination distress level among individuals who experienced discrimination during the past 12 months was slightly higher for people with marginalized racial, gender, and sexual orientation identities. Mean discrimination distress for was 1.36 (SD = 0.77) for White/Europeans, 1.53 (SD = 0.83) for Black/African Americans, 1.43 (SD = 0.81) for Latino/a/e and Hispanics, 1.43 (SD = 0.78) for Asians, 1.54 (SD = 0.84) for Pacific Islanders, 1.53 (SD = 0.82) for American Indian/ Native Alaskans, 1.46 (SD = 0.82) for Southwest Asian/ North Africans, 1.45 (SD = 0.78) for multiracial individuals, and 1.67 (SD = 0.78) for people of additional races and ethnicities. By gender identity, mean distress level associated with discrimination experiences was 1.28 (SD = 0.81) for cisgender men, 1.44 (SD =

0.78) for cisgender women, 1.57 (SD = 0.76) for gender expansive individuals, 1.59 (SD = 0.76) for transgender women, 1.57 (SD = 0.75) for transgender men, and 1.42 (SD = 1.28) for intersex individuals. Based on sexual orientation, mean discrimination distress for heterosexuals was 1.39 (SD = 0.80), 1.48 (SD = 0.77) for bisexual+, 1.43 (SD= 0.74) for gay/lesbian, 1.44 (SD = 0.75) for asexual+, and 1.43 (SD = 0.76) for questioning individuals (See Table 16).

Table 16. Subsample Discrimination Distress Level by Identity

Identity	Count	Mean	(SD)	Median
Race				
White/European	24,305	1.36	0.77	1
Black/African American	6,441	1.53	0.83	1
Latino/a/e and Hispanic	9,652	1.43	0.81	1
Asian	11,614	1.43	0.78	1
Pacific Islander	279	1.54	0.84	1
American Indian/Native Alaskan	1,010	1.53	0.82	1.5
Southwest Asian/ North African	1,327	1.46	0.82	1
Multiracial	5,401	1.45	0.78	1
Additional Races/Ethnicities	111	1.67	0.78	2
Gender				
Cisgender Men	13,208	1.28	0.81	1
Cisgender Women	40,647	1.44	0.78	1
Transgender Men	880	1.57	0.75	1.5
Transgender Women	663	1.59	0.76	1.5
Gender Expansive	4,736	1.57	0.76	1.5
Intersex	6	1.42	1.28	1.5
Sexual Orientation				
Heterosexual	36,310	1.39	0.80	1
Bisexual +	16,031	1.48	0.77	1
Gay/Lesbian	4,770	1.43	0.74	1
Asexual+	964	1.44	0.75	1
Questioning	2,065	1.43	0.76	1
Total (reduced sample)	**60,040**	**1.42**	**0.79**	**1**

Descriptive Results: Health Outcomes

Count of Chronic Conditions. The sample mean for count of chronic health conditions across all identities was 0.8 (SD = 1.4), with a range of 0-25 conditions (See Figure 1). The observed stratum mean, or "grand mean" was 1.04 (SD = 0.56) (See Figure 2).

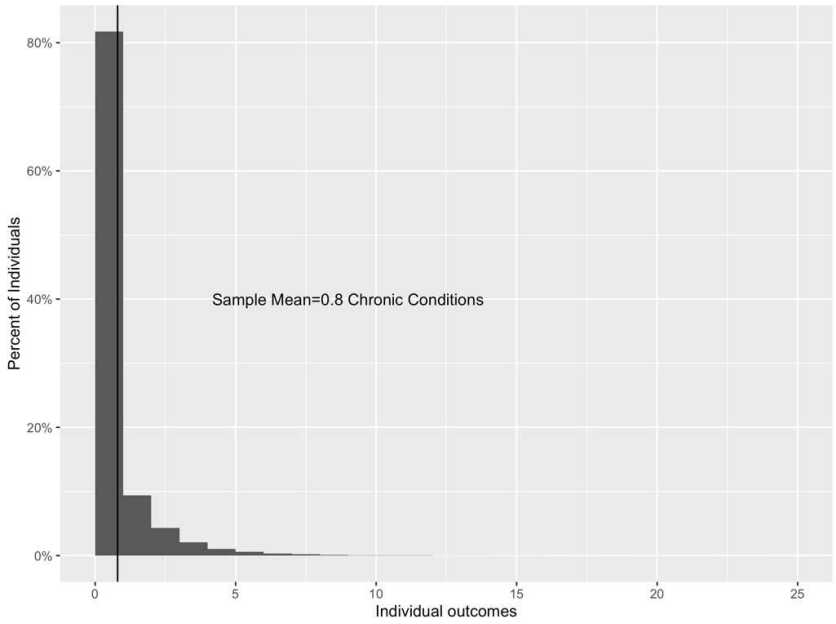

Figure 1. Sample Distribution of Count of Chronic Conditions

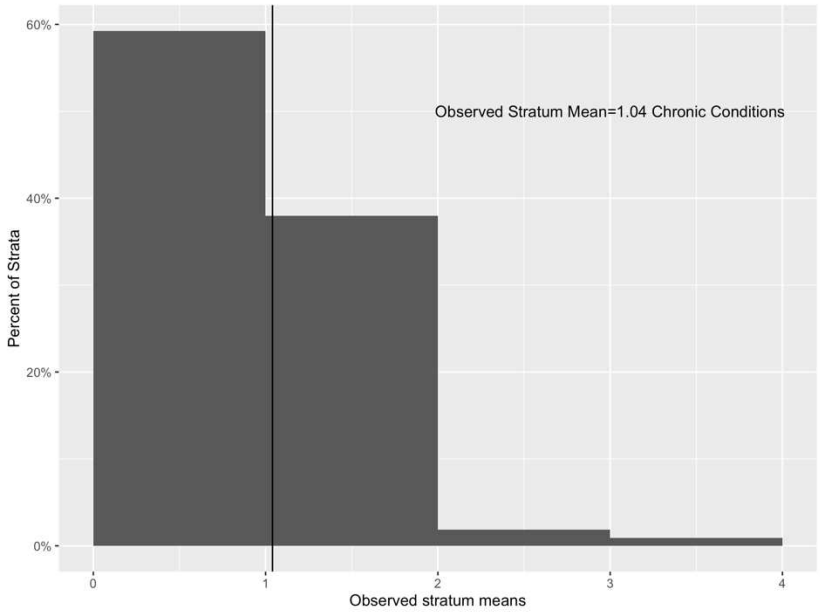

Figure 2. Strata Distribution of Count of Chronic Conditions

Across racial identities, individuals with additional races and ethnicities reported the highest average number of chronic health conditions (1.34, SD = 1.92), followed by American Indian/Native Alaskan (1.2, SD = 1.98), White/ European (0.89, SD = 1.45), multiracial (0.88, SD = 1.52), Pacific Islander (0.87, SD = 1.51), Black/African American (0.77, SD = 1.36), Southwest Asian/ North African (0.77, SD = 1.35), Latino/a/e and Hispanic (0.74, SD = 1.30), and Asian individuals (0.44, SD = 1.01). For gender identity, intersex individuals[37] reported the highest average number of chronic health conditions (1.88, SD = 3.14), followed by gender expansive individuals (1.36, SD = 1.96), transgender men (1.26, SD = 1.92), transgender women (1.02, SD = 1.85), cisgender women (0.89, SD = 1.45), with lowest incidence among cisgender men (0.53, SD = 1.09). In contrast with race and gender identity, average number of chronic health conditions varied less widely by sexual orientation. Still, rates were highest for bisexual+ individuals (1.1, SD = 1.68), followed by gay/lesbian (1.0, SD = 1.60), asexual+ (1.0, SD = 1.57), and questioning individuals (0.8, SD = 1.34). For the range of means for count of chronic conditions grouped by identity, see Table 17.

Table 17. Count of Chronic Conditions by Identity

Identity	Sample Size	Chronic Conditions $\bar{x}$	SD	Range
Race/ Ethnicity				
White/European	168,231	0.89	1.45	0 – 24
Black/African American	15,932	0.77	1.36	0 – 20
Latino/a/e and Hispanic	40,783	0.74	1.30	0 – 20
Asian	41,561	0.44	1.01	0 – 24
Pacific Islander	854	0.87	1.51	0 – 17

[37] Intersex individuals represented a very low sample size (n = 24) compared to all other gender identities, and thus higher prevalence rates within this group should be interpreted with caution.

American Indian/ Native Alaskan	4,185	1.20	1.98	0 – 21
Southwest Asian/ North African	4,641	0.77	1.35	0 – 15
Multiracial	15,345	0.88	1.52	0 – 25
Additional Races/ Ethnicities	273	1.34	1.92	0 – 10
Gender				
Cisgender Men	90,068	0.53	1.09	0 – 24
Cisgender Women	189,001	0.89	1.45	0 – 25
Transgender Men	1877	1.26	1.92	0 – 24
Transgender Women	2022	1.02	1.85	0 – 21
Gender Expansive	8813	1.36	1.96	0 – 22
Intersex	24	1.88	3.14	0 – 14
Sexual Orientation				
Heterosexual	224,195	0.72	1.30	0 – 25
Bisexual +	44944	1.1	1.68	0 – 24
Gay/Lesbian	12019	1.0	1.60	0 – 24
Asexual+	3119	1.0	1.57	0 – 15
Questioning	7528	0.8	1.34	0 – 19
Total (sample mean)	**291,805**	**0.8**	**1.39**	0 – 25

By strata, the five strata with the highest mean for count of chronic health conditions were American Indian/Native Alaskan sexual and gender minority individuals (n = 193, $\bar{x}$ = 2.56, SD = 3.53), American Indian/Native Alaskan heterosexual gender minority individuals (n = 44, $\bar{x}$ = 1.84, SD = 3.29), sexual minority cisgender women of additional races and ethnicities (n = 37, $\bar{x}$ = 1.81, SD = 2.46), American Indian/Native Alaskan sexual minority cisgender women (n = 628, $\bar{x}$ = 1.64, SD = 2.27), and sexual and gender minority individuals of additional races and ethnicities (n = 17, $\bar{x}$ = 1.53, SD = 2.53). The 16 highest-ranking strata for number of chronic

health conditions by prevalence were all individuals with intersecting marginalized identities[38] and of these, 12 strata consisted of LGBTQIA+ people with marginalized racial/ethnic identities (See Appendix Table A.1).

Prevalence of Chronic Conditions. For the entire sample, the most commonly reported health conditions for all participants were asthma (16.4%), migraines (11.5%), and digestive disorders (9%), followed by cardiovascular conditions (7.4%), sleep disorders (7.2%), and chronic pain (6.9%). Among the more rarely reported conditions were endocrine disorders (3.4%), diabetes (2.4%), and autoimmune disorders (2.2%) (See Tables 18 and 19).

For chronic pain[39] by race/ethnicity, people of additional races and ethnicities reported the highest prevalence rate (12.8%), followed by American Indian/Native Alaskan (11.0%), White/European (8%), Pacific Islander (7.7%), Multiracial (7.6%), Southwest Asian/North African (7.3%), Black/African American (5.8%), Latino/a/e and Hispanic (5.6%), and Asian (3.3%) individuals. By gender, chronic pain was highest among intersex (20.8%) and gender expansive individuals (15.1%), and transgender men (13.8%). Chronic pain rates were similar between transgender women (8.3%) and cisgender women (7.7%), and lowest for cisgender men (4.2%). By sexual orientation, chronic pain prevalence was highest among bisexual+ (10.9%) and asexual+ (10.4%) individuals, followed by gay/lesbian (8.7%), questioning (6.4%), and heterosexual individuals (5.9%) (see Table 18).

Migraines were reported most often by American Indian/Native Alaskans (16.5%) compared to other racial and ethnic groups, followed by people of additional races and

[38] Intersecting marginalized identities included heterosexual cisgender women with minority racial/ethnic identities, White/European individuals with both sexual and gender minority identities, cisgender women of any racial identity who are sexual minorities, and individuals who simultaneously hold minoritized sexual, gender, and racial/ethnic identities (i.e., queer gender diverse people of color).
[39] Chronic pain and migraines were combined in the multi-level modeling analysis due to singularity in the data. However, they are divided in the descriptive results to illustrate key differences in prevalence.

ethnicities (13.9%), White/Europeans (13.5%), multiracial (11.7%), Southwest Asian/North African (10.8%), Pacific Islander (10.4%), Latino/a/e and Hispanic (10.0%), Black/African American (9.3%) and Asian (5.0%) individuals. By gender, the rate of migraine frequency was highest among intersex individuals (20.8%) and gender expansive individuals (18.3%). Migraine prevalence was similar among transgender men (14.8%), transgender women (14.2%) and cisgender women (14.0%), and lowest for cisgender men (5.3%). For sexual orientation, the rate of migraine prevalence was highest among bisexual+ (16.8%) individuals, followed by asexual+ (13.4%), gay/lesbian (12.5%), questioning (11%), and heterosexual individuals (10.3%) (see Table 18).

Described by strata, the five highest-ranking strata for chronic pain/migraine prevalence rates were Pacific Islander heterosexual gender minority individuals (*n* = 9, PR = 44.4%), American Indian/Native Alaskan sexual and gender minority individuals (n = 193, PR = 40.4%), sexual minority cisgender men of additional races and ethnicities (*n* = 11, PR = 36.4%), sexual minority cisgender women of additional races and ethnicities (*n* = 37, PR = 35.1%), and American Indian/Native Alaskan sexual minority cisgender women (n = 628, PR = 32%). The 20 highest-ranking strata for number of chronic health conditions by prevalence were all individuals with intersecting marginalized identities and of these, 15 strata consisted of LGBTQIA+ people with marginalized racial/ethnic identities (See Appendix Table A.2).

For asthma by race and ethnicity, multiracial individuals reported the highest prevalence rate (21.0%), followed by American Indian/Native Alaskans (19.9%), people of Additional Races/Ethnicities (19.4%), Black/African Americans (18.7%), and Pacific Islanders (18.5%). Asthma rates for White/Europeans was 17.5% and 15.6% for Hispanic and Latino/a/e individuals, with lowest rates among Southwest Asian/North Africans (12.9%) and Asians

(10.2%). Gender expansive individuals reported the highest prevalence rate of asthma by gender (22.9%), followed by transgender men (19.7%), transgender women (18.4%), cisgender women (16.9%), intersex individuals (16.7%) and cisgender men (14.7%). Asthma was most prevalent among bisexual+ (20.7%) individuals, followed by gay/lesbian (18.9%), asexual+ (18.3%), questioning (17.6%) and heterosexual individuals (15.4%) (see Table 18).

Described by strata, the five highest-ranking strata for asthma prevalence rates were American Indian/Native Alaskan sexual and gender minority individuals (*n* = 193, PR = 32.1%), multiracial sexual and gender minority individuals (*n* = 855, PR = 27.4%), sexual minority cisgender men of additional races and ethnicities (*n* = 11, PR = 27.3%), American Indian/Native Alaskan sexual minority cisgender women (*n* = 628, PR = 26.4%), and Black/African American gender and sexual minority individuals (*n* = 412, PR = 25.5%). The 17 highest-ranking strata for number of chronic health conditions by prevalence were all individuals with intersecting marginalized identities and of these, 15 strata consisted of LGBTQIA+ individuals with minority racial/ethnic identities (See Appendix Table A.3).

Diabetes was seen to disproportionately impact Pacific Islanders (5.4%), American Indian/Native Alaskans (4.4%), people of additional races and ethnicities (4.4%), Black/ African/African American (4.3%), Latino/a/e and Hispanic (3.5%), Multiracial (2.6%), and Southwest Asian/ North African individuals (2.4%) compared to White/European (2.1%) and Asian individuals (1.7%). By gender, diabetes frequency rates were highest among transgender men (3.8%), followed by transgender women (3.4%), gender expansive individuals (3.2%), cisgender women (2.6%) and cisgender men (1.9%). Diabetes showed less variation by sexual orientation, with similar rates for bisexual (3%), gay/lesbian (3%) and asexual+ individuals (2.9%), followed by questioning (2.6%) and heterosexual individuals (2.3%) (See Table 18).

Explained by intersectional strata, the five highest-ranking strata for diabetes prevalence rates were American Indian/Native Alaskan sexual and gender minority individuals (*n* = 193, PR = 8.3%), Pacific Islander sexual minority cisgender men (*n* = 41, PR = 7.3%), American Indian/Native Alaskan heterosexual gender minority individuals (*n* = 44, PR = 6.8%), Black/African American gender and sexual minority individuals (*n* = 412, PR = 6.8%), and Pacific Islander heterosexual cisgender women (*n* = 449, PR = 6.7%). The 31 highest-ranking strata for number of chronic health conditions by prevalence were all individuals with systemically marginalized racial or ethnic identities. Of these, 22 of the 30 highest-ranking strata for diabetes prevalence consisted of LGBTQIA+ individuals with marginalized racial/ethnic identities (See Appendix Table A.4).

Prevalence rates for endocrine disorders by race and ethnicity showed the highest impact for people who indicated Additional Races/Ethnicities (5.9%) and American Indian/Native Alaskan (5.8%), followed by Southwest Asian/North Africans (4.0%), White/Europeans (3.9%), Hispanic and Latino/a/e (3.1%), Multiracial (3.0%), Pacific Islander (2.8%), Asian (2.3%) and Black/African/ African American individuals (2.1%). By gender, endocrine disorders were notably higher among intersex individuals (12.5%). Rates were similar for transgender men (4.9%), transgender women (4.5%), gender expansive individuals (4.5%), and cisgender women (4.4%), and lowest for cisgender men (1.2%). By sexual orientation, prevalence rates of endocrine disorders were highest among asexual+ (4.6%) and bisexual+ individuals (4.3%) and similar for questioning (3.2%), heterosexual (3.2%) and gay/lesbian individuals (3.1%) (see Table 18).

By strata, the seven[40] highest-ranking strata for endocrine disorder prevalence rates were American Indian/Native Alaskan sexual and gender minority individuals (*n* = 193, PR = 9.3%), American Indian/Native Alaskan heterosexual gender minority individuals (*n* = 44, PR = 9.1%), Pacific Islander sexual minority cisgender women (*n* = 123, PR = 8.9%), heterosexual cisgender women of additional races and ethnicities (*n* = 119, PR = 8.4%), cisgender sexual minority women of additional races and ethnicities (n = 37. PR = 8.1%), Southwest Asian/North African sexual and gender minority individuals (n = 137, PR = 8.0%), and American Indian/Native Alaskan sexual minority cisgender women (*n* = 628, PR = 8.0%). The 14 highest-ranking strata consisted of people with multiple intersecting marginalized identities and of these, 11 included LGBTQIA+ individuals with marginalized racial/ethnic identities (See Appendix Table A.5).

For sleep disorders, people of additional races and ethnicities reported nearly twice the sample mean (16.5% vs. 7.2%), followed by American Indian/Native Alaskan (12.1%), Multiracial (8.5%), White/European (8.0%), Pacific Islander (7.7%), Southwest Asian/North African (6.9%), Latino/a/e and Hispanic (6.5%), Black/African American (6.5%), and Asian individuals (3.9%). Sleep disorder prevalence varied widely by gender, with intersex individuals reporting the highest prevalence of sleep disorders by gender (29.2%), followed by gender expansive individuals (17.9%), transgender men (17.5%), transgender women (9.9%), cisgender women (7.5%), and cisgender men (5.4%). Sleep disorder rates were similar for bisexual+ (13.2%), asexual+ (11.6%), and gay/lesbian individuals (11.5%) and lower for questioning (7.9%) and heterosexual individuals (5.7%) (See Table 19).

Described by strata, the six highest-ranking strata for endocrine disorder prevalence rates were American Indian/Native Alaskan sexual and gender minority individuals (*n* = 193, PR =

[40] Where more than the top five strata for any condition are reported, the rationale is that the prevalence for the sixth or seventh-highest strata is very close to the fifth.

31.1%), cisgender sexual minority women of additional races and ethnicities (n = 37. PR = 29.7%), sexual and gender minority individuals of additional races and ethnicities (*n* = 17, PR = 29.4%), sexual minority cisgender men of additional races and ethnicities (*n* = 11, PR = 27.3%), Southwest Asian/North African sexual and gender minority individuals (n = 137, PR = 22.6%), and Pacific Islander heterosexual gender minority individuals (*n* = 9, PR = 22.2%). The 13 highest-ranking strata for sleep disorders consisted of LGBTQIA+ individuals with marginalized racial/ethnic identities (See Appendix Table A.6).

Prevalence rates for autoimmune disorders by race/ethnicity were highest in people of additional races and ethnicities (3.7%) and American Indian/Native Alaskan (3.6%) individuals, followed by and White/European (2.8%), multiracial (2.2%), Southwest Asian/North African (2.0%), Latino/a/e and Hispanic (1.5%), Pacific Islander (1.5%), Black/African American (1.2%) and Asian individuals (0.8%). Intersex individuals reported the highest proportion of autoimmune disorders by gender (8.3%), followed by gender expansive individuals (4.2%), transgender men (3.7%), transgender women (3.3%), cisgender women (2.6%) and cisgender men (1.1%). Autoimmune disorders were reported at a similar rate by bisexual+ (3.3%) and asexual+ (3.2%) individuals, followed by gay/lesbian (2.6%), questioning (2.3%) and heterosexual individuals (2.0%) (See Table 19).

For autoimmune disorders, the five highest-ranking strata for prevalence rates were sexual and gender minority individuals of additional races and ethnicities (*n* = 17, PR = 11.8%), sexual minority cisgender women of additional races and ethnicities (*n* = 37, PR = 10.8%), sexual minority cisgender men of additional races and ethnicities (*n* = 11, PR = 9.1%), American Indian/Native Alaskan heterosexual gender minority individuals (*n* = 44, PR = 9.1%), and American Indian/Native Alaskan sexual and gender minority individuals (n = 193, PR = 8.8%).

The 15 highest-ranking strata for autoimmune disorder prevalence were all individuals with intersecting marginalized identities and of these, 14 strata consisted of LGBTQIA+ people with minority racial/ethnic identities (See Appendix Table A.7).

Cardiovascular conditions were most prevalent among people of additional races and ethnicities (11.7%), American Indian/Native Alaskan (10.4%), Pacific Islander (9.8%), and Black/African American (8.3%) individuals when reported by race/ethnicity. Prevalence rates for cardiovascular conditions were similar for Southwest Asian/North African (7.8%), White/European (7.7%), and Latino/a/e and Hispanic (7.6%) individuals, followed by multiracial (7.4%) and Asian (5.2%) individuals. For gender, cardiovascular conditions were reported at higher rates by intersex individuals (12.5%), followed by transgender men (10.7%), gender expansive individuals (9.3%), transgender women (8.5%), cisgender men (7.5%) and cisgender women (7.2%). Gay/lesbian individuals reported the highest prevalence rate of cardiovascular conditions (9.9%), followed by bisexual+ (8.4%), asexual (7.6%), heterosexual (7.1%), and questioning individuals (6.7%) (See Table 19).

By strata, the six highest-ranking strata for cardiovascular disorder prevalence rates were Pacific Islander sexual minority cisgender men (n = 41, PR = 22%), American Indian/Native Alaskan heterosexual gender minority individuals (n = 44, PR = 20.5%), American Indian/Native Alaskan sexual and gender minority individuals (n = 193, PR = 18.7%), Pacific Islander sexual and gender minority individuals (n = 24, PR = 16.7%), American Indian/Native Alaskan sexual minority cisgender men (n = 161, PR = 16.1%), and Southwest Asian/North African sexual minority cisgender men (n = 179, PR = 14.5%). The 21 highest ranking strata for cardiovascular disorders consisted of racial and ethnic minority individuals, and of these 9 strata consisted of

cisgender men and 9 were gender minority individuals (See Appendix Table A.8). Additionally, 14 of the 21 highest ranking strata consisted of sexual minority individuals.

Finally, digestive disorder prevalence was highest among people of additional races and ethnicities (16.5%), followed by American Indian/Native Alaskan (11.8%), White/European (11.0%), Southwest Asian/North African (10.0%), multiracial (8.8%), Latino/a/e and Hispanic (7.2%), Black/African American (6.2%), Pacific Islander (6.0%) and Asian individuals (3.9%). By gender, digestive disorders were most prevalent for gender expansive (14.5%) individuals and transgender men (13.3%), followed by transgender women (10.8%), cisgender women (10.5%), intersex individuals (8.3%), and cisgender men (5.4%). For sexual orientation, digestive disorders were more frequent among bisexual+ individuals (12.9%), followed by gay/lesbian (11.7%), asexual+ (10.4%), questioning (9.2%) and heterosexual individuals (8.1%) (See Table 19).

By intersectional strata, the six highest-ranking strata for digestive disorder prevalence rates were sexual and gender minority individuals of additional races and ethnicities (*n* = 17, PR = 23.5%), Southwest Asian/North African sexual and gender minority individuals (*n* = 137, PR = 19.7%), American Indian/Native Alaskan sexual and gender minority individuals (*n* = 193, PR = 19.2%), sexual minority cisgender women of additional races and ethnicities (*n* = 37, PR = 18.9%), sexual minority cisgender men of additional races and ethnicities (*n* = 11, PR = 18.2%) and cisgender heterosexual women of additional races and ethnicities (n = 119, PR = 17.6%). The 14 highest-ranking strata for digestive disorder prevalence were all individuals with intersecting marginalized identities and of these, 11 strata consisted of LGBTQIA+ people with marginalized racial/ethnic identities (See Appendix Table A.9).

Table 18. Asthma, Chronic Pain, Migraines, Diabetes and Endocrine Disorders by Identity

Identity	Total	% with chronic pain	% with migraines	% with asthma	% with diabetes	% with endocrine disorders
White	168,231	8.0%	13.5%	17.5%	2.1%	3.9%
Multiracial	15,345	7.6%	11.7%	21.0%	2.6%	3.0%
Black/African American	15,932	5.8%	9.3%	18.7%	4.3%	2.1%
Asian	41,561	3.3%	5.0%	10.2%	1.7%	2.3%
Latino/a/e and Hispanic	40,783	5.6%	10.0%	15.6%	3.5%	3.1%
Southwest Asian/ North African	4,641	7.3%	10.8%	12.9%	2.4%	4.0%
American Indian/Native Alaskan	4,185	11.0%	16.5%	19.9%	4.4%	5.8%
Pacific Islander	854	7.7%	10.4%	18.5%	5.4%	2.8%
Additional Races/Ethnicities	273	12.8%	13.9%	19.4%	4.4%	5.9%
Cisgender Men	90,068	4.2%	5.3%	14.7%	1.9%	1.2%
Cisgender Women	189,001	7.7%	14.0%	16.9%	2.6%	4.4%
Transgender Men	1,877	13.8%	14.8%	19.7%	3.8%	4.9%
Transgender Women	2,022	8.3%	14.2%	18.4%	3.4%	4.5%
Gender Expansive	8,813	15.1%	18.3%	22.9%	3.2%	4.5%
Intersex	24	20.8%	20.8%	16.7%	0%	12.5%
Heterosexual	224,195	5.9%	10.3%	15.4%	2.3%	3.2%
Bisexual +	44,852	10.9%	16.8%	20.7%	3%	4.3%
Gay/Lesbian	12,019	8.7%	12.5%	18.9%	3%	3.1%
Asexual+	3,119	10.4%	13.4%	18.3%	2.9%	4.6%
Questioning	7,528	6.4%	11%	17.6%	2.6%	3.2%
Total	**291,805**	**6.9%**	**11.5%**	**16.4%**	**2.4%**	**3.4%**

Table 19. Sleep, Autoimmune, cardiovascular, and Digestive Disorders by Identity

Identity	Sample Size	% with sleep disorders	% with autoimmune disorders	% with cardiovascular conditions	% with digestive disorders
Race/Ethnicity					
White	168,231	8.0%	2.8%	7.7%	11.0%
Multiracial	15,345	8.5%	2.2%	7.4%	8.8%
Black/African American	15,932	6.5%	1.2%	8.3%	6.2%
Asian	41,561	3.9%	0.8%	5.2%	3.9%
Latino/a/e and Hispanic	40,783	6.5%	1.5%	7.6%	7.2%
Southwest Asian/ North African	4,641	6.9%	2.0%	7.8%	10.0%
American Indian/Native Alaskan	4,185	12.1%	3.6%	10.4%	11.8%
Pacific Islander	854	7.7%	1.5%	9.8%	6.0%
Additional Races/Ethnicities	273	16.5%	3.7%	11.7%	16.5%
Gender Identity					
Cisgender Men	90,068	5.4%	1.1%	7.5%	5.4%
Cisgender Women	189,001	7.5%	2.6%	7.2%	10.5%
Transgender Men	1,877	17.5%	3.7%	10.7%	13.3%
Transgender Women	2,022	9.9%	3.3%	8.5%	10.8%
Gender Expansive	8,813	17.9%	4.2%	9.3%	14.5%
Intersex	24	29.2%	8.3%	12.5%	8.3%
Sexual Orientation					
Heterosexual	224,195	5.7%	2.0%	7.1%	8.1%
Bisexual +	44,852	13.2%	3.3%	8.4%	12.9%
Gay/Lesbian	12,019	11.5%	2.6%	9.9%	11.7%
Asexual+	3,119	11.6%	3.2%	7.6%	10.4%
Questioning	7,528	7.9%	2.3%	6.7%	9.2%
Total	**291,805**	**7.2%**	**2.20%**	**7.40%**	**9.00%**

Inferential Analysis

Results for Models 1A-1I: Null Models (Full Sample)

For all of the full-sample models (Models 1A-1I, 2A-2I, and 3A-3I), the sample size was $N = 291{,}805$ and there were 54 intersectional strata (strata N). Model 1A, the null model for count of chronic health conditions, yielded a precision-weighted grand mean of 0.89 (95% CI [0.80 – 1.00], * $p<0.05$), with a residual variance of $\sigma^2 = 1.19$. For count of chronic conditions, 11.7% of the variance in outcomes between strata was explained by between-stratum differences (VPC= 0.117) (See Table 20).

For Model 1B, the baseline odds for chronic pain and migraines was 0.18 (OR = 0.18, 95% CI [0.16 – 0.21], $p<.001$), meaning that across strata the likelihood of having chronic pain and/or migraines was 18% prior to the addition of fixed effects. The residual variance was $\sigma^2 = 3.29$, which was the same for all logistic health outcomes for models 1B-1I, 2B-2I, and 3B-3I. For chronic pain and migraines, the VPC was 0.092, indicating that prior to adding fixed effects, 9.2% of the outcome variance was explained by between-stratum differences. The null model for asthma (Model 1C) had an odds of 21% across strata (OR = 0.21, 95% CI [0.19 – 0.23], $p<.001$), with 2.9% of the variance due to between-stratum effects (VPC = 0.029). For diabetes (Model 1D), the null model odds were 3% (95% CI [0.03 – 0.04], $p<.001$) and 4.8% of the variance was explained by between-stratum differences (VPC =0.048). For Model 1E, the null model odds for endocrine disorders were also 3% (OR = 0.03, 95% CI [0.02 – 0.04], $p<.001$) and the between-stratum variance was 12% (VPC = 0.120). For sleep disorders (Model 1F), the odds for the null model was 10% (OR = 0.10, 95% CI [0.09 – 0.12], $p<.001$) and 9.9% of the variance was due to between-stratum effects (VPC = .099). Autoimmune disorders (Model 1G) showed an odds of 2% across strata (OR = 0.02, 95% CI [0.02 – 0.02], $p<.001$), with 11% of the variance attributed

to between-stratum differences (VPC = 0.109). For cardiovascular disorders (Model IH), the null model odds were 9% (OR = 0.09, 95% CI [0.09 – 0.10], *p<.001*), with 2.2% of the variance occurring between strata (VPC = 0.022). Finally, for digestive disorders (Model 1I), the null model odds were 8% (OR = .08, 95% CI [0.08 – 0.11], *p<.001*), with 8% of the variance explained by between-stratum differences (VPC = 0.080).

Results for Models 2A-2I: Discrimination Endorsement and Health Outcomes

For Models 2A-2I, a fixed effect coefficient was added for the variable indicating endorsement of discrimination experiences. Participants who endorsed discrimination during the past 12 months had, on average, a 61% higher incidence rate of chronic health conditions compared to those who did not (IRR = 1.61, 95% CI [1.59 – 1.63] *p<.001*). Adding a fixed effect for discrimination endorsement reduced the intercept for chronic health conditions from the PWGM of 0.89 in the null model down to 0.73 (95% CI [0.66 – 0.81], *p<.001*). For Model 2A, the VPC was 0.097, meaning that adding discrimination as a fixed effect reduced the variance due to between-strata effects down to 9.7% of the total sample variance.

Endorsement of discrimination during the past 12 months was associated with a statistically significant increase in risk for all chronic health conditions. For migraines and chronic pain (Model 2B), discrimination was associated with an 80% increased likelihood of reporting chronic pain and/or migraines (OR = 1.80, 95% CI [1.76 – 1.85], *p<.001*). Controlling for discrimination experiences reduced the between-stratum variance for number of conditions to 8.2% of the total variance (VPC = 0.082). For asthma (Model 2C), discrimination endorsement was associated with a 36% increase in likelihood (OR = 1.36, 95% CI [1.33 – 1.40], *p<.001*) and reduced the between-stratum variance to 2.5% of the total variance (VPC = 0.025). Discrimination was associated with a 53% increase in odds for diabetes (OR = 1.53, 95% CI

[1.45 – 1.61], *p<.001*) (Model 2D) and between-stratum variance went down to 4% of the total variance (VPC = 0.040). For endocrine disorders, discrimination endorsement was associated with a 49% increase in odds (OR = 1.49, 95% CI [1.42 – 1.56], *p<.001*), with a decline in between-stratum variance down to 11.2% of the total variance (VPC = 0.112).

Endorsement of discrimination experiences was associated with more than double the likelihood of developing sleep conditions (OR = 2.11, 95% CI [2.05 – 2.18], *p<.001*), and remaining variance due to between-stratum effects was reduced to 7.7% of the total variance (VPC = 0.077). For autoimmune disorders (Model2G), the added fixed effect for discrimination experiences was 69% (OR = 1.69, 95% CI [1.60 – 1.79], *p<.001*), with between-stratum variance reduced to 9.8% (VPC = 0.098). For cardiovascular conditions (Model2H), discrimination endorsement was associated with a 62% increase in odds (OR = 1.62, 95% CI [1.56 – 1.67], *p<.001*), with the VPC reduced to 1.9% of the total variance (VPC = 0.019). Finally, for digestive disorders (Model2I) discrimination experiences added a 64% increase in odds (OR = 1.64, 95% CI [1.59 – 1.69], *p<.001*) and reduced the VPC to 7.1% of the total variance (VPC = 0.071) (See Tables 20-24).

Discrimination Endorsement and Stratum-Level Variance. For Models 2A-2I, the PCV represents the proportion of change in unexplained stratum-level variance between the null models (1A-1I) and the models where binary endorsement of 12-month discrimination experiences were added as a fixed effect (2A-2I). In other words, the PCV's for Models 2A-2I capture the degree to which controlling for discrimination experiences reduces the unexplained variance between intersectional groups (strata) in the models. For count of chronic health conditions (Models 1A and 2A), adding discrimination experiences reduced the stratum-level variance by 20.1% (PCV = 0.201). Adding the fixed effect for discrimination experiences

reduced the unexplained variance between strata by 12% for migraines and chronic pain (Models 1B and 2B), by 15.7% for asthma (Models 1C and 2C), by 17.7% for diabetes (Models 1D and 2D), by 7.5% for endocrine disorders, by 23.5% for sleep disorders, by 11.2% for autoimmune disorders, by 13.2% for cardiovascular conditions, and by 11.6% for digestive disorders (See Table 25).

Results for Models 3A-3I: Additive Identity Effects and Health Outcomes

For the next series of models (Models 3A-3I), covariates for race, gender identity, and sexual orientation were added as fixed effects in addition to the binary discrimination endorsement covariate. With fixed effects for identity added to the models, the intercepts for Models 3A-3I represents the predicted outcomes for White/European heterosexual cisgender men (the reference group) controlling for endorsement of discrimination experiences during the past 12 months.

For Model 3A, the predicted average number of chronic conditions for White/European heterosexual cisgender men was 0.55 after controlling for discrimination experiences (95% CI [0.52 – 0.59] $p<.001$). Compared to White/European individuals and controlling for 12-month discrimination experiences, American Indian/Native Alaskans had a 36% higher predicted mean for chronic health conditions (IRR = 1.36, 95% CI [1.24 – 1.48] $p<.001$) and people of additional races and ethnicities had a 46% higher predicted mean (IRR = 1.46, 95% CI [1.21 – 1.76] $p<.001$). The predicted mean of chronic health conditions for Black/African Americans was 20% lower (IRR = 0.80, 95% CI [0.74 – 0.87] $p<.001$), for Latino/a/e and Hispanics it was 16% lower (IRR = 0.84, 95% CI [0.78 – 0.90] $p<.001$), for Asians it was 48% lower (IRR = 0.52, 95% CI [0.48 – 0.56] $p<.001$), for Southwest Asians/North Africans it was 13% lower (IRR = 0.87, 95% CI [0.79 – 0.95] $p<.01$), and for multiracial individuals it was 9% lower than

for White/European individuals (IRR = 0.91, 95% CI [0.84 – 0.99] *p<.05*). The result for Pacific Islanders was close to the intercept but was not statistically significant. Gender minorities had a 63% higher predicted mean for chronic health conditions (IRR = 1.63, 95% CI [1.53 – 1.74] *p<.001*) compared to cisgender men, and cisgender women had a 42% higher predicted mean (IRR = 1.42, 95% CI [1.35 – 1.49] *p<.001*). Sexual orientation minorities had a 25% higher predicted mean for chronic health conditions compared to their heterosexual peers (IRR = 1.25, 95% CI [1.19 – 1.31] *p<.001*) (See Table 20).

The distribution of count of chronic conditions by stratum after controlling for discrimination experiences (Figure 3) showed a notable curve at the right end of the distribution, indicating that some strata showed substantially higher average number of chronic health conditions when compared to most other strata.

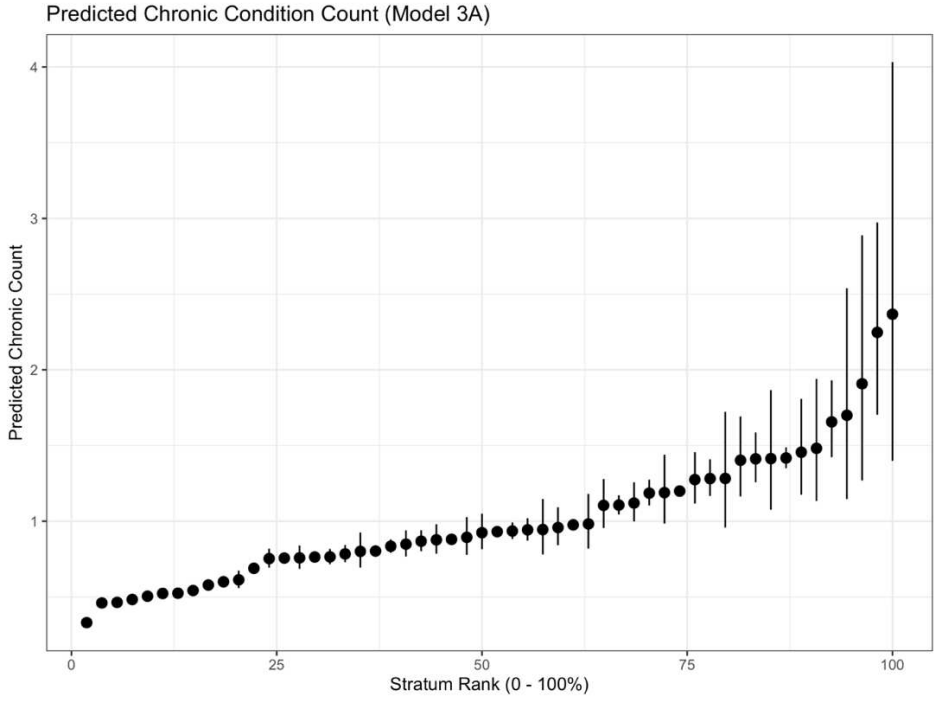

Figure 3. Discrimination-Controlled Distribution of Chronic Count by Stratum

The error bars (Figure 3) increase as the IRR increases, suggesting that strata with higher average number of chronic health conditions also had significantly more within-group variation.

For Model 3B, White/European heterosexual cisgender men had an odds of 11% for either migraines, chronic pain, or both (OR = 0.11, 95% CI [0.10 – 0.12] *p<.001*). Controlling for 12-month discrimination experiences, American Indian/Native Alaskans had a 26% higher predicted odds for chronic pain and/or migraines (OR = 1.26, 95% CI [1.24 – 1.48] *p<.001*). The predicted odds were also higher for people of additional races and ethnicities, but this result was not statistically significant. Controlling for discrimination, predicted odds for chronic pain/migraine were 43% less for Black/African Americans (OR = 0.57, 95% CI [0.52 – 0.63] *p<.001*), 32% less for Latino/a/e and Hispanics (OR = 0.68, 95% CI [0.63 – 0.75] *p<.001*), 65% less for Asians (OR = 0.35, 95% CI [0.32 – 0.38] *p<.001*), 23% less for Pacific Islanders (OR = 0.77, 95% CI [0.63 – 0.96] *p<.05*), 20% less for Southwest Asian/North Africans (OR = 0.80, 95% CI [0.71 – 0.91] *p<.001*), and 24% less for multiracial individuals (OR = 0.76, 95% CI [0.69 – 0.84] *p<.001*).

Compared to cisgender men, the predicted odds of having chronic pain and/or migraines was 127% higher for gender minorities (OR = 2.27, 95% CI [2.07 – 2.48] *p<.001*) and 110% higher for cisgender women (OR = 2.10, 95% CI [1.98 – 2.24] *p<.001*). Sexual orientation minorities had a 19% higher predicted odds for chronic pain/migraines compared to their heterosexual peers (OR = 1.19, 95% CI [1.12 – 1.27] *p<.001*) (See Table 20). By strata, migraines and chronic pain showed a notably steep increase across the distribution, ranging from 0%-40% odds, with a spike in predicted odds for highest-risk strata (see Figure 4). The error bar for chronic pain/migraine was relatively small for most strata (compared to error bars for other chronic conditions within this study), with a few strata showing high variation.

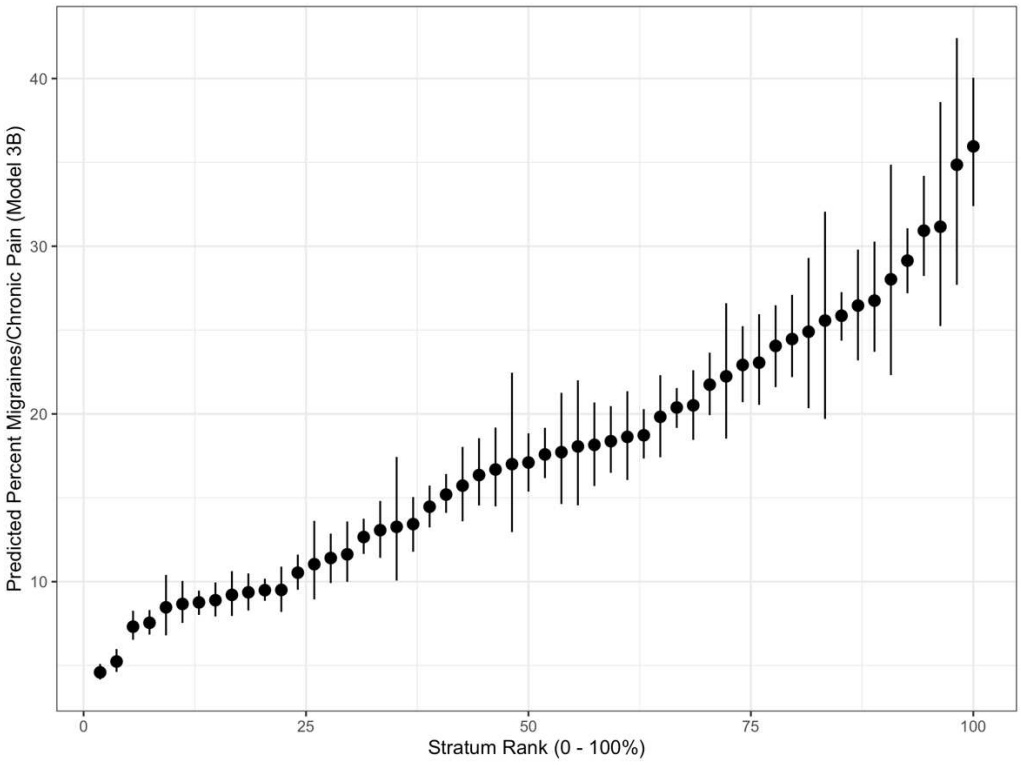

Figure 4. Discrimination-Controlled Distribution of Chronic pain/Migraines by Stratum

For Model 3C, White/European heterosexual cisgender men had a 17% predicted odds of having asthma (OR = 0.17, 95% CI [0.16 – 0.18] *p<.001*). Controlling for discrimination experiences, predicted odds for asthma were 19% higher for both American Indian/Native Alaskans (OR = 1.19, 95% CI [1.08 – 1.32] *p<.001*) and multiracial individuals (OR = 1.19, 95% CI [1.11 – 1.29] *p<.001*) when compared to their White peers and controlling for discrimination. Predicted odds were also higher for Black/African Americans, Pacific Islanders, and people of additional races and ethnicities, but these results were not statistically significant. The predicted odds of having asthma were 10% lower for Latino/a/e and Hispanics (OR = 0.90, 95% CI [0.84 – 0.97] *p<.01*), 46% lower for Asians (OR = 0.56, 95% CI [0.52 – 0.61] *p<.001*), and 29% lower for Southwest Asian/North Africans (OR = 0.71, 95% CI [0.64 – 0.80] *p<.01*). Gender minorities were predicted to be 20% more likely to have asthma (OR = 1.20, 95% CI

[1.11 – 1.29], *p<.001*) and cisgender women were predicted to be 8% more likely (OR = 1.08, 95% CI [1.03 – 1.14], *p<.001*) compared to cisgender men. Sexual orientation minorities had a 26% higher predicted odds for asthma compared to heterosexuals (OR = 1.26, 95% CI [1.20 – 1.32], *p<.001*) (See Table 21). The distribution curve for asthma shows a steep but consistent incline across the range, from about 8% to about 26% predicted percent stratum-level odds (Figure 5). The error bars for asthma showed less variation within lower-ranking strata and gradually larger variation within higher-ranking strata.

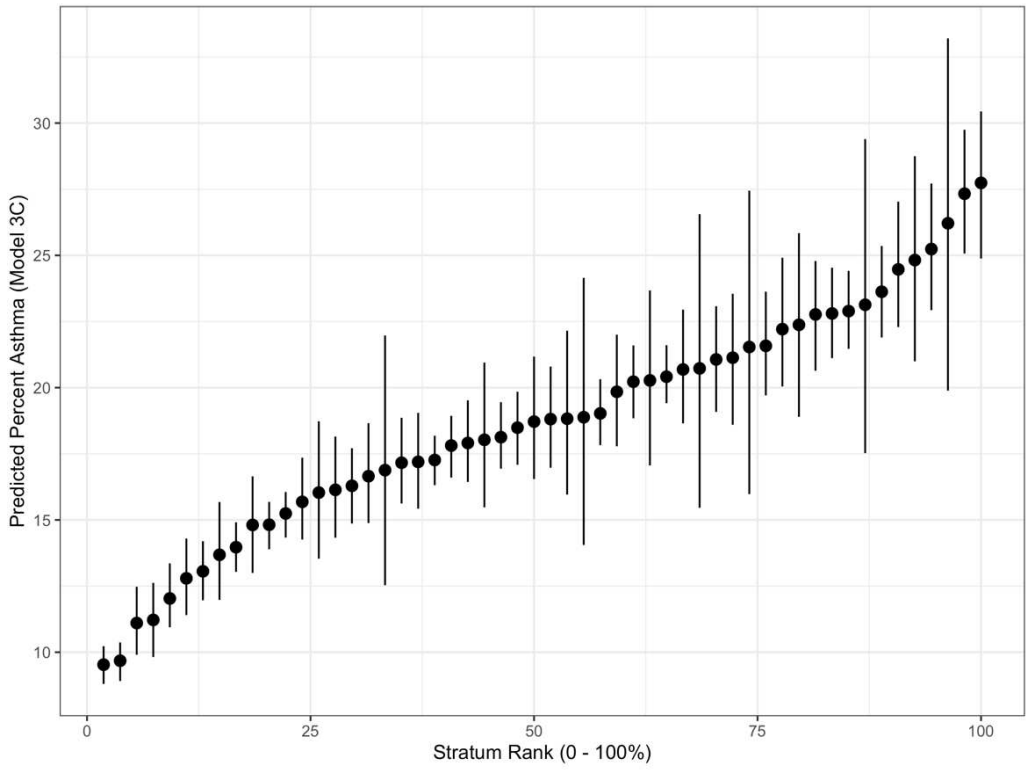

Figure 5. Discrimination-Controlled Distribution of Asthma by Stratum

For Model 3D, White/European heterosexual cisgender men had a 2% predicted odds of diabetes (OR = 0.02, 95% CI [0.01 – 0.02] *p<.001*). Compared to White participants and controlling for endorsement of discrimination experiences in the past 12 months, predicted odds were 89% higher for Black/African Americans (OR = 1.89, 95% CI [1.69 – 2.11] *p<.001*), 62%

higher for Latino/a/e and Hispanics (OR = 1.62, 95% CI [1.48 – 1.78] *p<.001*), 148% higher for Pacific Islanders (OR = 2.48, 95% CI [1.82 – 3.37] *p<.001*), 110% higher for American Indian/Native Alaskan s (OR = 2.10, 95% CI [1.78 – 2.48] *p<.001*), and 95% higher for people of additional races/ethnicities (OR = 1.95, 95% CI [1.09 – 3.50] *p<.05*). Compared to White/Europeans, predicted odds for diabetes were 18% lower for Asians (OR = 0.82, 95% CI [1.74 – 0.92] *p<.001*). Predicted odds were higher for Southwest Asian/North Africans and multiracial individuals, but these results were not statistically significant.

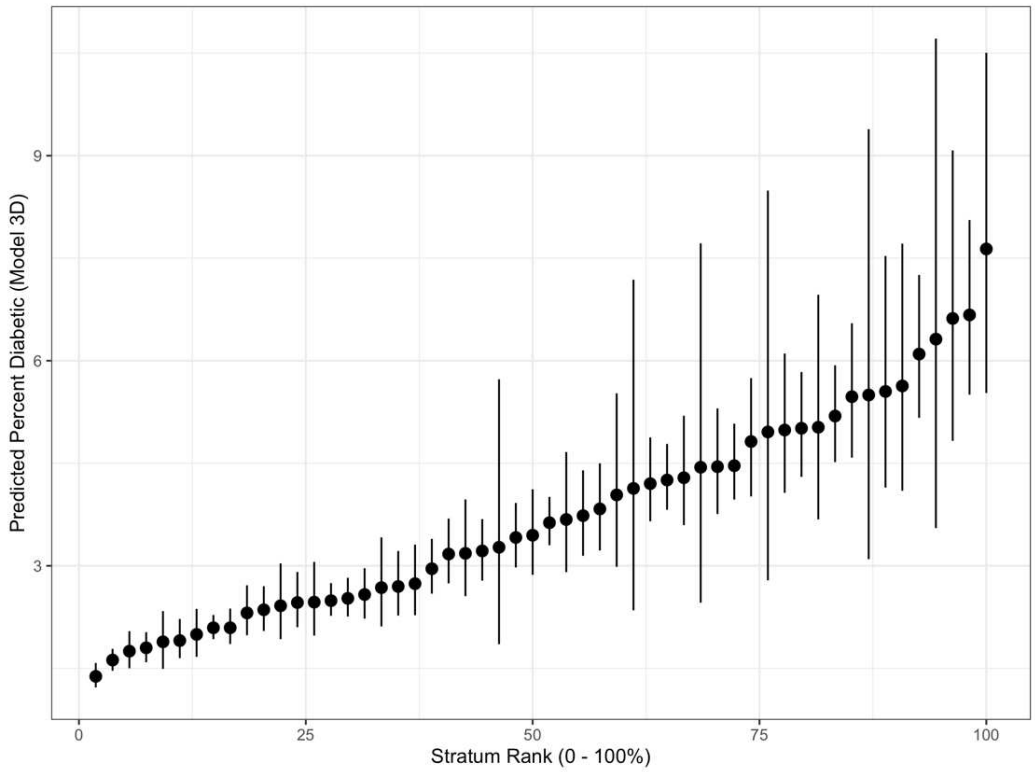

Figure 6. Discrimination-Controlled Distribution of Diabetes by Stratum

Gender minorities had a 38% greater predicted odds for diabetes (OR = 1.38, 95% CI [1.21 – 1.58], *p<.001*), while cisgender women were predicted to be 27% more likely to have diabetes (OR = 1.27, 95% CI [1.18– 1.37], *p<.001*) compared to cisgender men. Sexual orientation minorities had a 16% higher predicted odds for diabetes compared to heterosexual

individuals (OR = 1.16, 95% CI [1.08 – 1.26], *p<.001*). (See Table 21). The distribution curve for diabetes by stratum controlling for discrimination showed a flatter incline compared to many other conditions in this study, with a range of between 0%-7.5% for predicted prevalence (Figure 6). The error bars showed a gradual increase in within-group variation as stratum-level odds for diabetes increased, with substantial within-group variation for many strata in the upper 25th percentile of the range.

For Model 2E, the predicted odds of having endocrine disorders for White/European heterosexual cisgender men were 1% (OR = 0.01, 95% CI [0.01 – 0.02] *p<.001*). Compared to their White/European peers and controlling for 12-month discrimination experiences, predicted odds for endocrine disorders were 52% higher for American Indian/Native Alaskans (OR = 1.52, 95% CI [1.29 – 1.79] *p<.001*) and 53% lower for Black/African Americans (OR = 0.47, 95% CI [0.40 – 0.55] *p<.001*), 21% lower for Latino/a/e and Hispanics (OR = 0.79, 95% CI [0.70 – 0.88] *p<.001*), 41% lower for Asians (OR = 0.59, 95% CI [0.53 – 0.67] *p<.001*), and 28% lower for multiracial individuals (OR = 0.72, 95% CI [0.63 – 0.82] *p<.001*). Predicted odds for endocrine disorders were higher for Southwest Asian/North Africans and people of additional races/ethnicities and lower for Pacific Islanders, but these were not statistically significant. Compared to cisgender men, cisgender women had a 232% higher predicted odds (OR = 3.32, 95% CI [2.98 – 3.69] p<.001) and gender minorities had a 212% higher predicted odds for endocrine disorders (OR = 3.12, 95%CI [2.70 – 3.60] p<.001). The result for sexual orientation minority individuals was close to the intercept and was not statistically significant for endocrine disorders (See Table 22). The distribution of predicted odds for endocrine disorders by stratum showed a very gradual increase across strata until about the 75th percentile of the range. Across the upper 25th percentile of strata, there is a steep incline between the 5% and 8% odds marks,

showing that only a few strata have between 5%-8% predicted odds (Figure 7). The error bar showed low-to-moderate variation for most strata, with a few strata in the upper right end of the range predicted to have a very high degree of within-group variation.

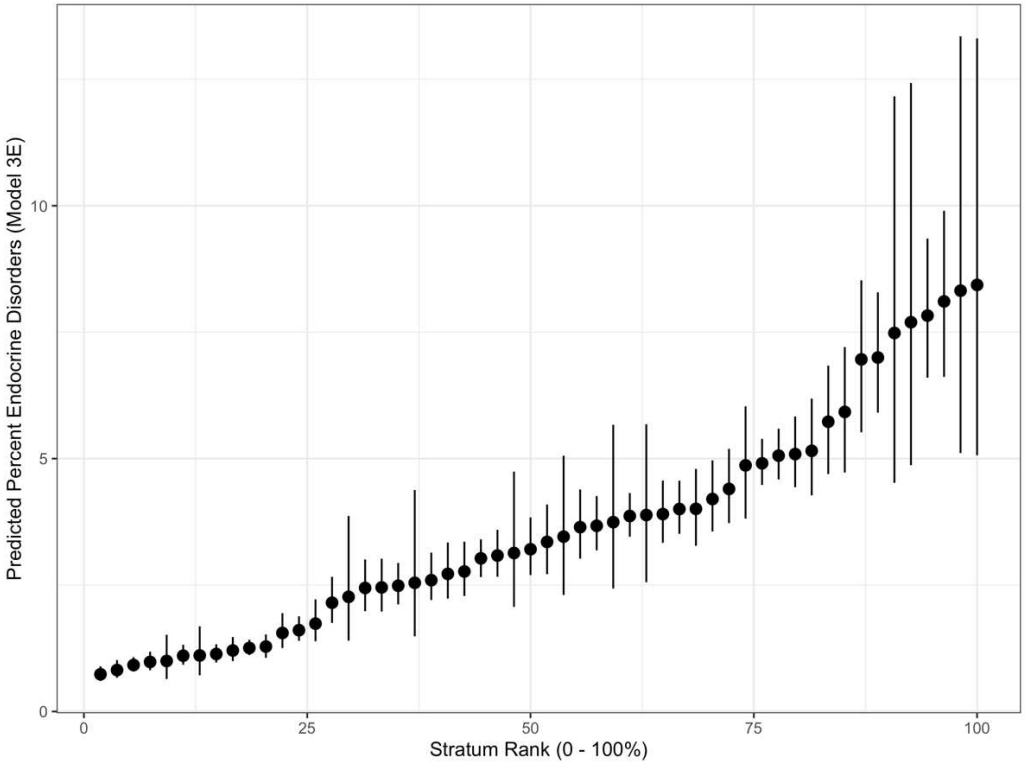

Figure 7. Discrimination-Controlled Distribution of Endocrine Disorders by Stratum

For Model 2F, among White/European heterosexual cisgender men the predicted odds for sleep disorders were 5% (OR = 0.05, 95% CI [0.05 – 0.06] *p<.001*). In contrast with White/Europeans and accounting for endorsement of discrimination during the past 12 months, predicted odds for sleep disorders were 51% higher for American Indian/Native Alaskans (OR = 1.51, 95% CI [1.33 – 1.71] *p<.001*) and 90% higher for people of additional races/ethnicities (OR = 1.90, 95% CI [1.36 – 2.67] *p<.001*). Predicted odds for sleep disorders were 33% lower for Black/African Americans (OR = 0.67, 95% CI [0.60 – 0.74] *p<.001*), 23% lower for Latino/a/e and Hispanics (OR = 0.77, 95% CI [0.71-0.83] *p<.001*), 55% lower for Asians (OR =

0.45, 95% CI [0.41 – 0.50] *p<.001*), and 13% lower for multiracial individuals (OR = 0.87, 95% CI [0.79 – 0.95] *p<.001*) compared to White/Europeans. Odds were also predicted to be lower for Pacific Islanders; however this was not statistically significant. Gender minorities had a 71% greater predicted odds for sleep disorders (OR = 1.71, 95% CI [1.56 – 1.88], *p<.001*) and cisgender women had 20% higher predicted odds (OR = 1.20, 95% CI [1.12– 1.27], *p<.001*) over cisgender men. Compared to heterosexuals, sexual orientation minorities had 70% higher predicted odds for sleep disorders (OR = 1.70, 95% CI [1.60 – 1.81], *p<.001*) (See Table 22).

The distribution of predicted odds by strata for sleep disorders showed a very gradual incline until the 75th percentile (the 15% odds level), and then the upper 25th percentile of strata shows a sharp spike between 15%-35% odds (See Figure 8). There was relatively little within-group variation for sleep disorders for most strata, except for the top five strata which showed large error bars.

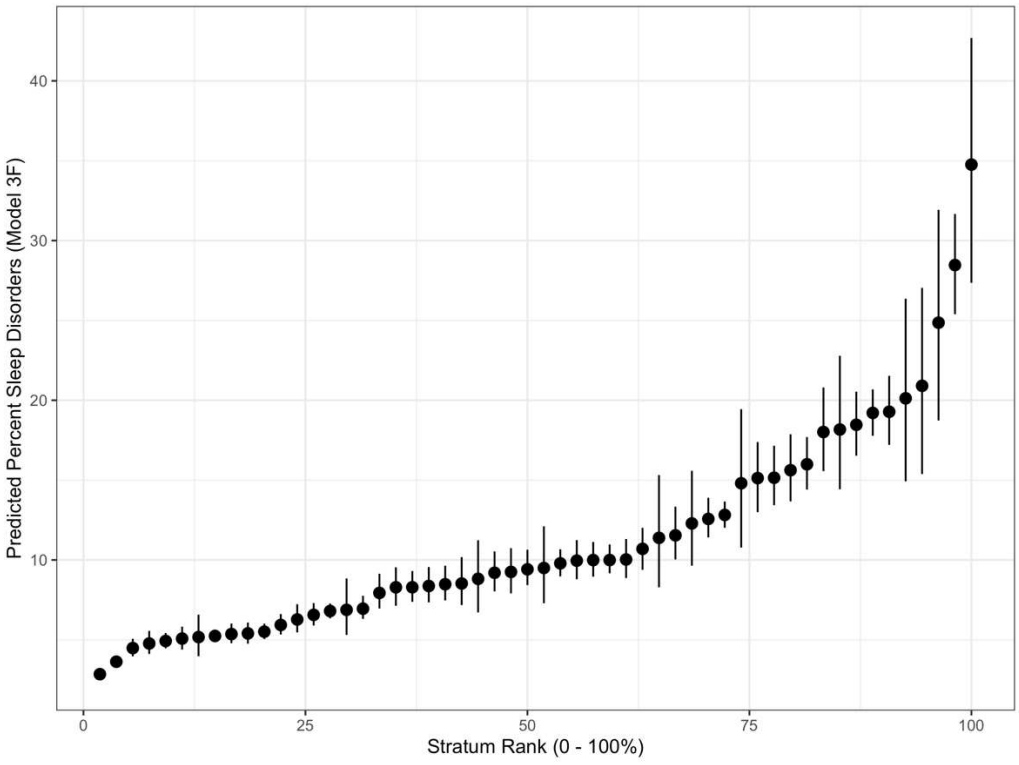

Figure 8. Discrimination-Controlled Distribution of Sleep Disorders by Stratum

For Model 2G, the predicted odds for autoimmune disorders among White/European heterosexual cisgender men were 1% (OR = 0.01, 95% CI [0.01 – 0.01] *p<.001*). Controlling for endorsement of 12-month discrimination experience, predicted odds for autoimmune disorders were 52% higher among American Indian/Native Alaskans (OR = 1.52, 95% CI [1.07 – 1.68] *p<.001*), 58% lower for Black/African Americans (OR = 0.42, 95% CI [0.33 – 0.52] *p<.001*), 42% lower for Latino/a/e and Hispanics (OR = 0.58, 95% CI [0.49 – 0.69] *p<.001*), 68% lower for Asians (OR = 0.32, 95% CI [0.26 – 0.38] *p<.001*), 46% lower for Pacific Islanders (OR = 0.54, 95% CI [0.30 – 0.96] *p<.05*), 25% lower for Southwest Asian/North Africans (OR = 0.75, 95% CI [0.58 – 0.97] *p<.05*), and 26% lower for multiracial individuals (OR = 0.74, 95% CI [0.62 – 0.88] *p<.001*) in contrast with White/Europeans. Predicted odds for autoimmune conditions were higher for people of additional races and ethnicities, but this was not statistically significant.

Compared to cisgender men, predicted odds for autoimmune disorders were 154% higher among gender minorities (OR = 2.54, CI [2.12 – 3.04] p<.001) and 97% higher for cisgender women (OR = 1.97, CI [1.72 – 2.25] p<.001). Sexual orientation minorities were predicted to be 24% more likely to report autoimmune conditions (OR = 1.24, CI [1.10 – 1.40] p<.001). (See Table 23). The distribution curve of predicted odds for autoimmune disorders by strata showed a relatively gradual incline but a significantly widening error bar as stratum odds increase, indicating that strata with higher odds are also expected to have substantial within-group variation (see Figure 9).

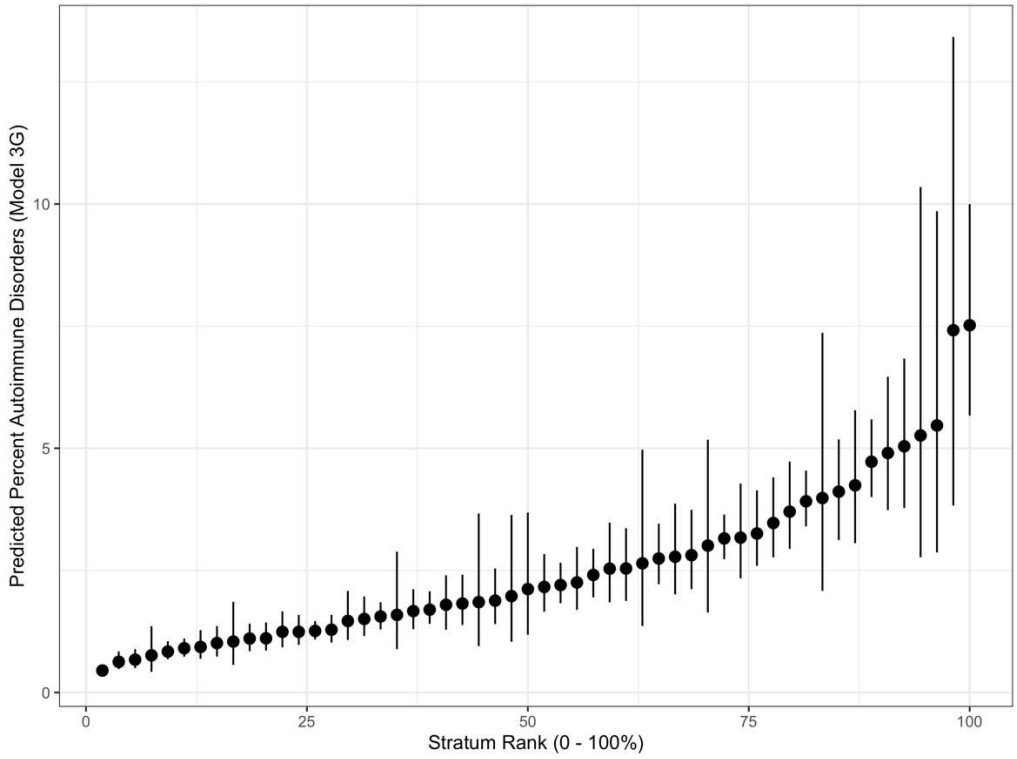

Figure 9. Discrimination-Controlled Distribution of Autoimmune Disorders by Stratum

For Model 3H, White/European heterosexual cisgender men had an 8% predicted odds for cardiovascular conditions (OR = 0.08, 95% CI [0.08 – 0.09] *p<.001*). Compared to White/Europeans and controlling for discrimination during the past 12-months, predicted odds were 40% higher for American Indian/Native Alaskans (OR = 1.40, 95% CI [1.21 – 1.62] *p<.001*) 34% lower for Asians (OR = 0.66, 95% CI [0.59 – 0.73] *p<.001*) and 11% lower for multiracial individuals (OR = 0.89, 95% CI [0.79 – 1.00] *p<.05*). Predicted odds for cardiovascular conditions were higher for Pacific Islanders and people of additional races and ethnicities, but these results were not statistically significant. Predicted odds for Black/African Americans, Latine/ Hispanics, Southwest Asian/North Africans, and gender minorities were all close to the intercept, but these results were also not significant. Cisgender women had a 19% lower predicted odds for cardiovascular conditions (OR = 0.81, 95% CI [0.75 – 0.88], *p<.001*) compared to cisgender men. Sexual orientation minorities had a 13% higher predicted odds for

cardiovascular disorders compared to heterosexual individuals (OR = 1.13, 95% CI [1.05 – 1.21], *p<.001*) (See Table 23). The distribution curve for predicted odds of cardiovascular disorders by stratum showed a fairly gradual increase until the 90th percentile, and then the upper 10th percentile showed a slightly steep increase. Similar to many of the other chronic conditions, the error bar showed wider within-group variation for the highest-ranking strata.

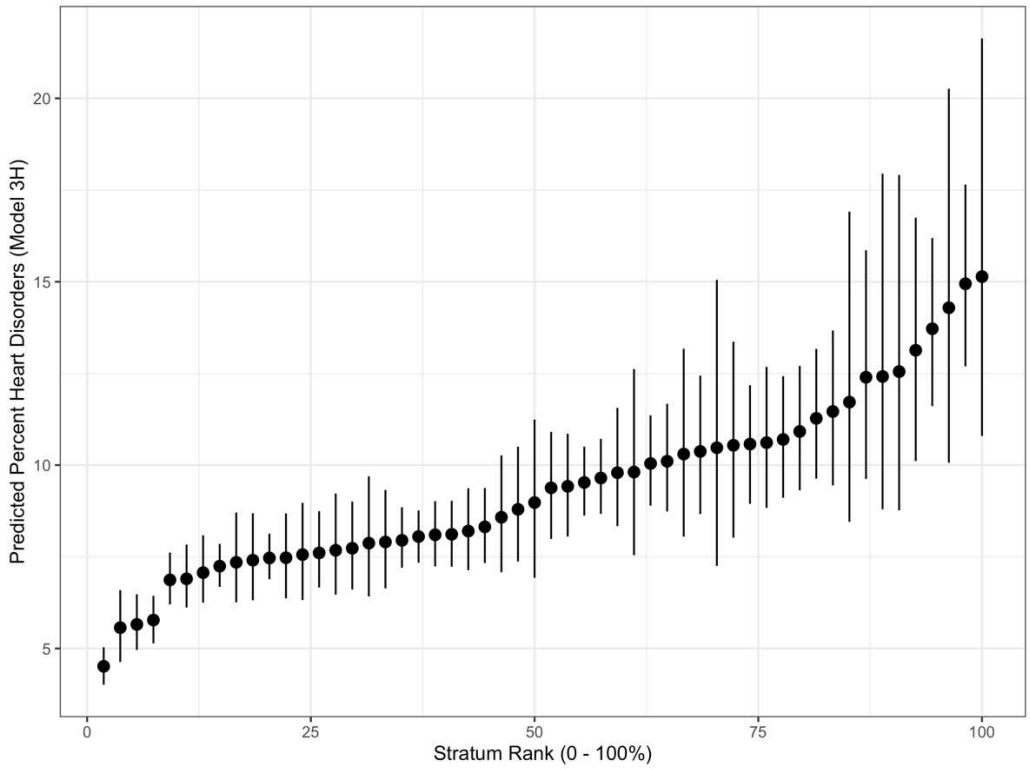

Figure 10. Discrimination-Controlled Distribution of Cardiovascular Disorders by Stratum

Finally, for Model 2I, the predicted odds for digestive disorders among White/European heterosexual cisgender men were 7% (OR = 0.07, 95% CI [0.06 – 0.07] *p<.001*). In contrast with White/Europeans and controlling for 12-month discrimination experiences, predicted odds for digestive disorders were 49% higher for people of additional races and ethnicities (OR = 1.49, 95% CI [1.06 – 2.11] *p<.05*) and 54% lower for Black/African Americans (OR = 0.46, 95% CI [0.40 – 0.53] *p<.001*), 38% lower for Latine/ Hispanics (OR = 0.58, 95% CI [0.55 – 0.70]

p<.001), 65% lower for Asians (OR = 0.32, 95% CI [0.30 – 0.39] *p<.001*), 51% lower for Pacific Islanders (OR = 0.54, 95% CI [0.36 – 0.67] *p<.05*), and 29% lower for multiracial individuals (OR = 0.71, 95% CI [0.63 – 0.81] *p<.001*). Odds for American Indians/Native Americans were predicted to be close to the intercept and odds for Southwest Asian/North Africans were slightly lower, but these results were not statistically significant. (See Table 24).

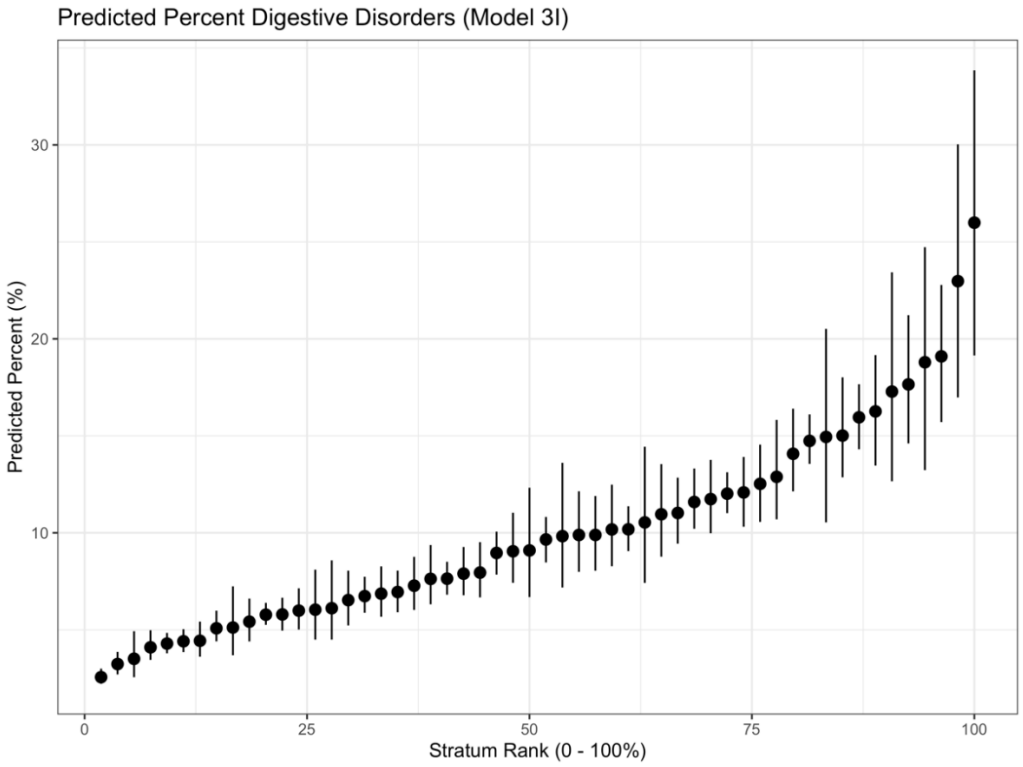

Figure 11. Discrimination-Controlled Distribution of Digestive Disorders by Stratum

Compared to cisgender men, predicted odds for digestive disorders were 74% higher among gender minorities (OR = 1.74, CI [1.55 – 1.96] p<.001) and 66% higher for cisgender women (OR = 1.66, CI [1.52 – 1.80] p<.001). Sexual orientation minorities were predicted to be 35% more likely to have digestive conditions (OR = 1.35, CI [1.25 – 1.47] p<.001) (See Table 24). For digestive disorders, the distribution of predicted across strata is fairly gradual across strata,

with two outlier strata at the upper end of the distribution. Notably, those outliers also showed significant within-group variation (Figure 11).

Additive Identity Effects (Full Sample) and Stratum-Level Variance. For Models 3A-3I, the variance partition coefficient (VPC) represents the remaining unexplained variance between strata after accounting for additive identity effects for race/ethnicity, gender identity, and sexual orientation, as well as the fixed effects of discrimination experiences. Compared to Models 2A-2I, the VPC's dropped close or equal to 0.00 once identity fixed effects were added for Models 3A-3I. The VPC's for Models 3A (count of chronic conditions), 3B (chronic pain/migraines), 3C (Asthma), 3D (diabetes), 3E (endocrine disorders), and 3F (sleep disorders) all reduced to 0.001, or 0.1%. For Model 3H (cardiovascular conditions) and Model 3I (Digestive disorders), the VPC reduced to 0.002, or 0.2%. For Model 3G (autoimmune conditions), the between-stratum variance was 0.3% (VPC = 0.003) (See Tables 20-24).

The estimates for proportion of change in variance (PCV) for Models 3A-3I represent the proportion of change in unexplained between-stratum variance between Models 2A-2I and 3A-3I for the full sample (N = 291,805). Adding fixed identity effects reduced the remaining unexplained stratum-level variance by 97.2% for number of chronic conditions (Models 2A and 3A). There was a 98.6% decrease in between-stratum variance for chronic pain/migraines (Models 2B and 3B), 97.2% decrease for asthma (Models 2C and 3C), 98.4% decrease for diabetes (Models 2D and 3D), 99.1% decrease for endocrine disorders (Models 2E and 3E), 99% decrease for sleep disorders (Models 2F and 3F), 97.2% decrease for autoimmune conditions (Models 2G and 3G), 91.8% decrease for cardiovascular conditions (Models 2H and 3H), and a 96.9% decrease for digestive conditions (Models 2I and 3I) (See Table 25).

Table 20. Chronic Count (Models 1-3A) & Chronic Pain (Models1-3B)

	Model1A	**Model2A**	**Model3A**	**Model 1B**	**Model 2B**	**Model 3B**
Predictors	*Incidence Rate Ratios (95% CI)*			*Odds Ratios (95% CI)*		
(Intercept)	0.89 * (0.80-1.00)	0.73 *** (0.66-0.81)	0.55 *** (0.52-0.59)	0.18 *** (0.16-0.21)	0.14 ***	0.11 ***
Discrim. Experiences		1.61 *** (1.59-1.63)	1.61 *** (1.59- 1.63)		1.80 ***	1.80 ***
Race						
White (ref)			-			-
Black			0.80 *** (0.74- 0.87)			0.57 ***
Lat./Hisp.			0.84 *** (0.78- 0.90)			0.68 ***
Asian			0.52 *** (0.48- 0.56)			0.35 ***
PI			0.96 (0.84- 1.10)			0.77 *
AINA			1.36 *** (1.24-1.48)			1.27 ***
SWANA			0.87 ** (0.79-0.95)			0.80 ***
Multi			0.91 * (0.84-0.99)			0.76 ***
Add			1.46 *** (1.21-1.76)			1.19
Gender						
CM (ref)			-			-
CW			1.42 *** (1.35-1.49)			2.10 ***
GM			1.63 *** (1.53-1.74)			2.27 ***
Sexual Orientation						
Het. (ref)			-			-
S/O Min.			1.25 *** (1.19-1.31)			1.19 ***
VPC / σ^2	0.117/ 1.07	0.097/ 1.06	0.001/ 1.06	0.09 /3.29	0.082/ 3.29	0.001/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 21. Asthma (Models 1C, 2C, 3C) and Diabetes (Models 1D, 2D, 3D) Results

	Model 1C	Model 2C	Model 3C	Model 1D	Model 2D	Model 3D
Predictors	*Odds Ratios (95% CI)*			*Odds Ratios (95% CI)*		
(Intercept)	0.21 *** (0.19 - 0.23)	0.19 *** (0.18 - 0.21)	0.17 *** (0.16-0.18)	0.03 *** (0.03 - 0.04)	0.03 *** (0.02 - 0.03)	0.02 *** (0.01 - 0.02)
Discrim. Experiences		1.36 *** (1.33 - 1.40)	1.36 *** (1.33-1.39)		1.53 *** (1.45-1.61)	1.52 *** (1.44-1.60)
Race						
White (ref)			-			-
Black			1.05 (0.97 - 1.14)			1.89 *** (1.69-2.11)
Lat./Hisp.			0.90 ** (0.84 - 0.97)			1.62 *** (1.68 - 1.78)
Asian			0.56 *** (0.52 - 0.61)			0.82 *** (0.74 - 0.92)
PI			1.06 (0.88 - 1.28)			2.48 *** (1.82 - 3.37)
AINA			1.19 *** (1.08 - 1.32)			2.10 *** (1.78 - 2.48)
SWANA			0.71 *** (0.64 - 0.80)			1.12 (0.91 - 1.37)
Multi			1.19 *** (1.11 - 1.29)			1.13 (1.00 - 1.29)
Add			1.09 (0.80 - 1.49)			1.95 * (1.09 - 3.50)
Gender Identity						
CM (ref)						
CW			1.08 ** (1.03 - 1.14)			1.27 *** (1.18 - 1.37)
GM			1.20 *** (1.11 - 1.29)			1.38 *** (1.21 - 1.58)
Sexual Orientation						
Het. (ref)			-			-
S/O Min.			1.26 *** (1.20 - 1.32)			1.16 *** (1.08 - 1.26)
VPC / σ^2	0.029/ 3.29	0.025/ 3.29	0.001/ 3.29	0.048/ 3.29	0.040/ 3.29	0.001/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 22. Endocrine (Models 1E, 2E, 3E) and Sleep Disorders (1F, 2F, 3F)

	Model 1E	Model 2E	Model 3E	Model 1F	Model 2F	Model 3F
Predictors	*Odds Ratios (95% CI)*			*Odds Ratios (95% CI)*		
(Intercept)	0.03 *** (0.02 – 0.04)	0.03 *** (0.02 – 0.03)	0.01 *** (0.01 – 0.02)	0.10 *** (0.09 - 0.12)	0.07 *** (0.06 – 0.08)	0.05 *** (0.05 – 0.06)
Discrim. Experience		1.49 *** (1.42 – 1.56)	1.49 *** (1.42 – 1.56)		2.11 *** (2.05 – 2.18)	2.11 *** (2.04 – 2.18)
Race						
White (ref)			-			-
Black			0.47 *** (0.40 – 0.55)			0.67 *** (0.60 – 0.74)
Lat./Hisp.			0.79 *** (0.70 – 0.88)			0.77 *** (0.71 – 0.83)
Asian			0.59 *** (0.53 – 0.67)			0.45 *** (0.41 – 0.50)
PI			0.68 (0.45 – 1.04)			0.86 (0.66 – 1.12)
AINA			1.52 *** (1.29 – 1.79)			1.51 *** (1.33 – 1.71)
SWANA			1.06 (0.88 – 1.27)			0.80 ** (0.70 – 0.92)
Multi			0.72 *** (0.63 – 0.82)			0.87 ** (0.79 – 0.95)
Add			1.51 (0.90 – 2.54)			1.90 *** (1.36 – 2.67)
Gender						
CM (ref)			-			-
CW			3.32 *** (2.98 – 3.69)			1.20 *** (1.12 – 1.27)
GM			3.12 *** (2.70 – 3.60)			1.71 *** (1.56 – 1.88)
Sexual Orientation						
Het. (ref)			-			-
S/O Min.			1.02 (0.94 – 1.11)			1.70 *** (1.60 – 1.81)
VPC / σ^2	0.120/ 3.29	0.112/ 3.29	0.001/ 3.29	0.099/ 3.29	0.077/ 3.29	0.001/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 23. Autoimmune (Models 1G, 2G, 3G) and Heart Disorders (1H, 2H, 3H) Results

	Model 1G	Model 2G	Model 3G	Model 1H	Model 2H	Model 3H
Predictors	*Odds Ratios (95% CI)*			*Odds Ratios (95% CI)*		
(Intercept)	0.02 *** (0.02 – 0.02)	0.02 *** (0.01 – 0.02)	0.01 *** (0.01 – 0.01)	0.09 *** (0.09 – 0.10)	0.08 *** (0.07 – 0.08)	0.08 *** (0.08 – 0.09)
Discrim. Experience		1.69 *** (1.60 – 1.79)	1.68 *** (1.59 – 1.78)		1.62 *** (1.56 – 1.67)	1.61 *** (1.56 – 1.67)
Race						
White (ref)			-			-
Black			0.42 *** (0.33 – 0.52)			0.98 (0.87 – 1.10)
Lat./Hisp.			0.58 *** (0.49 – 0.69)			0.98 (0.89 – 1.09)
Asian			0.32 *** (0.26 – 0.38)			0.66 *** (0.59 – 0.73)
PI			0.54 * (0.30 – 0.96)			1.26 (0.98 – 1.61)
AINA			1.34 ** (1.07 – 1.68)			1.40 *** (1.21 – 1.62)
SWANA			0.75 * (0.58 – 0.97)			0.97 (0.84 – 1.13)
Multi			0.74 *** (0.62 – 0.88)			0.89 * (0.79 – 1.00)
Add			1.29 (0.67 – 2.47)			1.43 (0.97 – 2.10)
Gender						
CM (ref)			-			-
CW			1.97 *** (1.72 – 2.25)			0.81 *** (0.75 – 0.88)
GM			2.54 *** (2.12 – 3.04)			0.94 (0.84 – 1.05)
Sexual Orientation						
Het (ref)			-			-
S/O Min.			1.24 *** (1.10 – 1.40)			1.13 *** (1.05 – 1.21)
VPC / σ^2	0.109/ 3.29	0.098/ 3.29	0.003/ 3.29	0.022/ 3.29	0.019/ 3.29	0.002/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 24. Digestive Disorder Results (Models 1I, 2I, 3I)

	Model 1I	Model 2I	Model 2I
Predictors	*Odds Ratios (95% CI)*		
(Intercept)	0.09 *** (0.08 – 0.10)	0.08 *** (0.07 – 0.09)	0.07 *** (0.06 – 0.07)
Discrim. Experience		1.64 *** (1.59 – 1.69)	1.64 *** (1.59 – 1.69)
Race			
White (ref)			-
Black			0.46 *** (0.40 – 0.53)
Lat./Hisp.			0.62 *** (0.55 – 0.70)
Asian			0.35 *** (0.30 – 0.39)
PI			0.49 *** (0.36 – 0.67)
AINA			1.04 (0.89 – 1.22)
SWANA			0.91 (0.78 – 1.07)
Multi			0.71 *** (0.63 – 0.81)
Add			1.49 * (1.06 – 2.11)
Gender Identity			
CM (ref)			-
CW			1.66 *** (1.52 – 1.80)
GM			1.74 *** (1.55 – 1.96)
Sexual Orientation			
Het. (ref)			-
S/O Min.			1.35 *** (1.25 – 1.47)
VPC / σ^2	0.080 / 3.29	0.071 / 3.29	0.002 / 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 25. Proportion of Change in Variance (PCV) for Models 1A-1I, 2A-2I and 3A-3I

Outcome Measures	Models Compared	PCV	Models Compared	PCV
Chronic Count	1A to 2A	0.201	2A to 3A	0.972
Chronic Pain/Migraines	1B to 2B	0.120	2B to 3B	0.986
Asthma	1C to 2C	0.157	2C to 3C	0.972
Diabetes	1D to 2D	0.177	2D to 3D	0.984
Endocrine Disorders	1E to 2E	0.075	2E to 3E	0.991
Sleep Disorders	2F to 3F	0.235	2F to 3F	0.990
Autoimmune Disorders	1G to 2G	0.112	2G to 3G	0.972
Heart/Vasc. Disorders	1H to 2H	0.132	2H to 3H	0.918
Digestive Disorders	1I to 2I	0.116	2I to 3I	0.969

Additive Identity Effects and Discriminatory Accuracy (Full Sample). The AUC results between Models 2A-2I and Models 3A-3I showed either negligible or no change in model discrimination accuracy after adding fixed effects for identity variables. The AUC estimates for Models 2B (chronic pain/migraines), 2D (diabetes), 2F (sleep disorders), 2G (autoimmune disorders), 2H (cardiovascular disorders), 2I (digestive disorders), 3B (asthma), and 3E (endocrine disorders) all showed a model fit difference of AUC = 0.000 – 0.002 (See Table 22).

Table 26. Area Under Curve (AUC) for Models 2B-2I and 3B-3I

Model	AUC	Model	AUC
Model2A	-	Model3A	-
Model2B	0.655	Model3B	0.654
Model2C	0.576	Model3C	0.576
Model2D	0.609	Model3D	0.607
Model2E	0.650	Model3E	0.650
Model2F	0.654	Model3F	0.653
Model2G	0.665	Model3G	0.664
Model2H	0.567	Model3H	0.567
Model2I	0.644	Model3I	0.643

Results for Models 4A-4I: Null Models (Discrimination Distress Sample)

For the second set of analyses (Models 4A-4I, 5A-5I, and 6A-6I), the sample was filtered to include only participants who endorsed having experienced discrimination during the past 12 months in order to further examine the relationship between discrimination distress and seven of the original chronic health outcomes: number of chronic health conditions, chronic pain/ migraines, asthma, diabetes, sleep disorders, cardiovascular disorders, and digestive disorders. The sample for Models 4A-4I, 5A-5I, and 6A-6I will be referred to as the "discrimination distress sample" or the "reduced sample" to clarify that all participants in this sample were filtered based on having endorsed discrimination in the past 12 months. The number of intersectional groups (strata *N*) remained 54, however the total sample size reduced to n = 60,140. As previously noted in "Chapter Two: Methods," there will be no results provided for models 4E, 5E, 6E or 4G, 5G, 6G. While these models were attempted, they could not be run due to singularity errors caused by very low occurrences of endocrine disorders (the "E" models) and autoimmune disorders (the "G" models) within several strata in the reduced sample.[41]

Model 4A generated a precision-weighted grand mean of 1.17 chronic conditions across strata (CI [1.06 – 1.29], $p<0.01$) for the discrimination distress sample null model, with a residual variance of $\sigma^2 = 1.07$. For chronic pain and migraines for the discrimination sample (Model 4B), the predicted odds across strata for chronic pain and migraines without fixed effects were 25% (OR = 0.25, 95% CI [0.22 – 0.30], $p<.001$) with 7.6% of the total estimated variance attributed to between-strata differences (VPC = 0.076). For asthma in the discrimination distress sample (Model 4C), the null model predicted odds were 26% (OR = 0.26, 95% CI [0.24- 0.29], $p<.001$), with 2.2% of the total variance explained by differences between strata (VPC = 0.022).

[41] Note that while there are no results provided for the attempted models 4E, 5E, 6E and 4G, 5G, 6G, these sets of models and their results will be referred to as Models 4A-4I, 5A-5I and 6A-6I for simplicity and consistency.

For diabetes (Model 4D), the null model predicted odds were 4% (OR = 0.04, 95% CI [0.04 – 0.05], *p<.001*) with 3.6% of the total variance attributed to between-stratum differences (VPC = 0.036). For sleep disorders (Model 4F), predicted null model odds were 15% (OR= 0.15, 95% CI [0.13 – 0.18], *p<.001*), with 6.7% of the total variance owed to between-stratum differences (VPC = 0.067). The null model predicted odds for cardiovascular disorders (Model 4H) was 12% (OR = 0.12, 95% CI [0.11 – 0.13], *p<.001*) with 1.5% of the total variance explained by differences between strata (VPC = 0.015). Finally, for digestive disorders in the discrimination sample (Model 4I), the null model predicted odds across strata were 13% (OR = 0.13, 95% CI [0.11 – 0.15], *p<.001*), with 6.3% of the total variance occurring due to stratum-level differences (VPC = 0.063). Residual variance was $\sigma^2 = 3.29$ for all logistic health outcome variables.

Results for Models 5A-5I: Discrimination Distress and Health Outcomes

Models 5A-5I examined the association between discrimination distress level and seven of the chronic health outcomes among the 60,140 participants who endorsed discrimination during the past 12 months. Models 5A-5I estimated the role of discrimination distress level across all strata prior to controlling for any specific identity effects.

For each one-unit increase in self-reported level of distress from discrimination, the average predicted increase in number of chronic health conditions was 18% (IRR = 1.18, 95% CI [1.17 – 1.20] *p<.001*). The residual variance remained the same from the null model ($\sigma^2 = 1.07$).

Among those who reported discrimination experiences in the past year, self-reported distress level from these experiences was associated with a statistically significant increase in risk for all chronic health conditions under study. For each one-unit increase in discrimination distress level, there was an additional 21% increase in predicted odds for chronic pain/migraines

(Model 5B) (OR = 1.21, 95% CI [(1.18 – 1.24)], *p<.001*), 10% increase in predicted odds for asthma (Model 5C) (OR = 1.10, 95% CI [1.07 – 1.13], *p<.001*), 26% increase for diabetes (Model 5D) (OR = 1.26, 95% CI [1.20 – 1.33], p<.001), 36% increase for sleep disorders (Model 5F) (OR = 1.36, 95% CI [1.30 – 1.39] *p<.001*), 15% increase for cardiovascular disorders (Model 5H) (OR = 1.15, 95% CI [1.11 – 1.19] *p<.001*), and a 17% increase for digestive disorders (Model 5I) (OR = 1.17, 95% CI [1.13 – 1.20] *p<.001*).

Discrimination Distress Level and Stratum-Level Variance. Adding discrimination distress level as a fixed effect to Models 5A-5I did not substantially change the degree of variance due to differences between intersectional groups compared to the reduced sample null models (Models 4A-4I). The stratum-level variance for number of chronic health conditions after adding discrimination distress level reduced from 9.9% in the null model to 9.1% (Model 5A), reducing the stratum-level variance by 8.1% (PCV = 0.081). Stratum-level variance for chronic pain/migraines (Model 5B) reduced from 7.6% to 7.3% (PCV = 0.044), for asthma (Model 5C) from 2.2% to 2.1% (PVC = 0.042), for diabetes (Model 5D) from 3.6% to 3.2% (PCV = 0.105), for sleep disorders (Model 5F) from 6.7% to 6.2% (PCV = 0.074), and for digestive disorders (Model 5H) from 6.3% to 6.1% (PCV = 0.037). For cardiovascular conditions, the degree of variance between strata increased marginally from 1.5% to 1.6% (PCV = -0.029).

Results for Models 6A-6I: Additive Identity Effects and Health Outcomes (Discrimination Distress Sample)

Models 6A-6I represented the final model series. Again filtering only participants who had endorsed 12-month discrimination experiences (*n* = 60,140), seven of the health outcomes were measured again with fixed effects added for race/ethnicity, gender identity, and sexual orientation in addition to a fixed effect for discrimination distress level. The intercepts for

Models 6A-6I represent the mean outcomes for White/European, heterosexual cisgender men (the reference groups) who have reported discrimination during the past 12 months but whose discrimination distress level was reported as 0 or "none."

Among individuals who have experienced discrimination and controlling for discrimination distress level, the mean predicted number of chronic conditions (Model 4A) for White/European, heterosexual cisgender men (the intercept) was 0.78 (95% CI [0.72 – 0.84] *p<.001*). Compared with White/Europeans in the discrimination distress sample, the predicted mean for chronic health conditions was 32% higher for American Indian/Native Alaskans (IRR = 1.32, 95% CI [1.17 – 1.48] *p<.001*), 28% lower for Black/African Americans, (IRR = 0.72, 95% CI [0.66 – 0.79] *p<.001*), 19% lower for Latino/a/e and Hispanics (IRR = 0.81, 95% CI [0.75 – 0.89] *p<.001*), 46% lower for Asians (IRR = 0.54, 95% CI [0.49 – 0.59] *p<.001*), and for multiracial individuals it was 11% lower (IRR = 0.89, 95% CI [0.81 – 0.97] *p<.05*). The means for number of chronic conditions were predicted to be lower for Pacific Islanders and Southwest Asians/North Africans and higher for people of additional races and ethnicities compared to the reference group, but these results were not statistically significant. Gender minorities were predicted to have a 55% higher rate of chronic health conditions (IRR = 1.55, 95% CI [1.43 – 1.68] *p<.001*) and cisgender women were predicted to have a 29% higher rate (IRR = 1.42, 95% CI [1.21 – 1.37] *p<.001*). Sexual orientation minorities were predicted to have a 17% higher rate of chronic health conditions compared to their heterosexual peers in the discrimination distress sample (IRR = 1.17, 95% CI [1.10 – 1.23] *p<.001*) (See Table 27).

The predicted odds for reporting either migraines, chronic pain, or both (Model 6B) were 25% among White/European heterosexual cisgender men who have experienced discrimination and controlling for discrimination distress level (OR = 0.25, 95% CI [0.22 – 0.30] *p<.001*).

Among racial and ethnic minorities who experienced discrimination and controlling for discrimination distress level, predicted odds for reporting chronic pain/migraines were 47% lower for Black/African Americans (OR = 0.53, 95% CI [0.47 – 0.59] *p<.001*), 32% lower for Latino/a/e and Hispanics (OR = 0.68, 95% CI [0.60 – 0.74] *p<.001*), 66% lower for Asians (OR = 0.34, 95% CI [0.30 – 0.38] *p<.001*), 33% less for Pacific Islanders (OR = 0.67, 95% CI [0.49 – 0.91] *p<.05*), 15% lower for Southwest Asian/North Africans (OR = 0.85, 95% CI [0.72 – 0.99] *p<.001*), and 28% lower for multiracial individuals (OR = 0.72, 95% CI [0.65 – 0.80] *p<.001*) when compared to White/Europeans. Predicted odds were higher for American Indian/Native Americans and lower for people of additional races and ethnicities compared to the reference group, but these results were not statistically significant. Compared to cisgender men who have experience discrimination and controlling for related distress, predicted odds for chronic pain/ migraines were 119% higher for gender minorities (OR = 2.19, 95% CI [1.97 – 2.45] *p<.001*) and 92% higher for cisgender women (OR = 1.92, 95% CI [1.77 – 2.07] *p<.001*). Compared to heterosexual individuals, sexual orientation minorities had 13% higher predicted odds of reporting chronic pain/migraines (OR = 1.13, 95% CI [1.06 – 1.22] *p<.001*) (See Table 27).

Predicted odds for asthma (Model 6C) among White/European heterosexual cisgender men who have experienced discrimination were 21%, controlling for discrimination distress level (OR = 0.21, 95% CI [0.19 – 0.23] *p<.001*). Controlling for discrimination distress level, predicted odds for asthma were 40% higher for American Indian/Native Alaskans (OR = 1.40, 95% CI [1.19 – 1.64] *p<.001*), 25% higher for multiracial individuals (OR = 1.25, 95% CI [1.13 – 1.38] *p<.001*) 11% lower for Latino/a/e and Hispanics (OR = 0.89, 95% CI [0.81 – 0.98] *p<.05*), 38% lower for Asians (OR = 0.62, 95% CI [0.56 – 0.69] *p<.001*), and 21% lower for Southwest Asian/North Africans (OR = 0.79, 95% CI [0.66 – 0.93] *p<.01*). Odds for asthma

were predicted to be higher for Black/African Americans, lower for Pacific Islanders, and close to the intercept for people of additional races and ethnicities compared to the reference group, but these results were not statistically significant. Compared to cisgender men, predicted odds for asthma among gender minorities were 19% higher (OR = 1.19, 95% CI [1.07 – 1.32], $p<.01$); the result for cisgender women was close the intercept but not statistically significant. Sexual orientation minorities had an 18% higher predicted odds for asthma compared to heterosexual individuals (OR = 1.18, 95% CI [1.10 – 1.26], $p<.001$) (See Table 28).

Among people who have experienced discrimination, White/European heterosexual cisgender men had a 2% predicted odds for diabetes (OR = 0.02, 95% CI [0.02 – 0.02] $p<.001$) controlling for discrimination distress level (Model 6D). Compared to White/European participants, predicted odds for diabetes were 65% higher for Black/African Americans (OR = 1.65, 95% CI [1.43 – 1.91] $p<.001$), 62% higher for Latino/a/e and Hispanics (OR = 1.62, 95% CI [1.43 – 1.85] $p<.001$), 132% higher for American Indian/Native Alaskans (OR = 2.32, 95% CI [1.79 – 3.00] $p<.001$), 88% higher for Pacific Islanders (OR = 1.88, 95% CI [1.12 – 3.14] $p<.05$), 21% higher for multiracial participants (OR = 1.21, 95% CI [1.03 – 1.43] $p<.05$), and 17% lower for Asians (OR = 0.83, 95% CI [0.71 – 0.96] $p<.05$). Predicted odds were higher for people of additional races and ethnicities and close to the intercept for Southwest Asian/North Africans but were not statistically significant. Gender minorities had 24% higher predicted odds for diabetes than cisgender men (OR = 1.24, 95% CI [1.04 – 1.48], $p<.05$). The predicted odds for cisgender women and sexual orientation minorities were both slightly higher than the reference groups but were not statistically significant (See Table 28).

For sleep disorders (Model 6F), predicted odds were 9% for White/European heterosexual cisgender men who have experienced discrimination and controlling for

discrimination distress level (OR = 0.09, 95% CI [0.08 – 0.10] *p<.001*). Among American Indian/Native Alaskans, predicted odds for sleep disorders were 40% higher (OR = 1.40, 95% CI [1.17 – 1.68] *p<.001*) controlling for discrimination distress level. Within the discrimination distress sample, odds for reported sleep disorders were 42% lower for Black/African Americans (OR = 0.58, 95% CI [0.51 – 0.66] *p<.001*), 28% lower for Latino/a/e and Hispanics (OR = 0.72, 95% CI [0.64 – 0.81] *p<.001*), 55% lower for Asians (OR = 0.45, 95% CI [0.40 – 0.51] *p<.001*), and 18% lower for multiracial individuals (OR = 0.82, 95% CI [0.73 – 0.93] *p<.01*) compared to White/Europeans. Within this sample, predicted odds for sleep disorders were higher for people of additional races and ethnicities and lower for Pacific Islanders and Southwest Asian/North Africans; however these were not statistically significant. Gender minorities had a 60% greater predicted odds for sleep disorders (OR = 1.60, 95% CI [1.41 – 1.80], *p<.001*) compared to cisgender men. Compared to heterosexuals, sexual orientation minorities had 50% higher predicted odds for sleep disorders (OR = 1.50, 95% CI [1.38 – 1.63], *p<.001*). The predicted odds for cisgender women was close to the intercept but were not significant (See Table 29).

For cardiovascular disorders, White/European heterosexual cisgender men who have experienced discrimination had a 13% odds for cardiovascular conditions, controlling for discrimination distress level (OR = 0.13, 95% CI [0.11 – 0.14] *p<.001*). For individuals of other races and ethnicities controlling for discrimination distress, odds for cardiovascular conditions were predicted to be 31% higher for American Indian/Native Alaskans (OR = 1.31, 95% CI [(1.06 – 1.61)] *p<.001*), 14% lower for Black/African Americans (OR = 0.86, 95% CI [0.75 – 0.99] *p<.05*), 35% lower for Asians (OR = 0.65, 95% CI [0.56 – 0.74] *p<.001*) and 20% lower for multiracial individuals (OR = 0.80, 95% CI [0.69 – 0.92] *p<.01*). Predicted odds for cardiovascular conditions were higher for Pacific Islanders and people of additional races and

ethnicities and lower for Latino/a/e and Hispanic individuals and Southwest Asian/North Africans but were not statistically significant. Compared to cisgender men, gender minorities were predicted to have 17% lower odds for cardiovascular conditions (OR = 0.83, 95% CI [0.72 – 0.96], *p<.01*) and cisgender women were predicted to have 26% lower odds (OR = 0.74, 95% CI [0.67 – 0.81], *p<.001*). The predicted odds for sexual orientation minorities was slightly higher than the reference group but was not statistically significant in the discrimination distress sample (See Table 29).

The predicted odds for digestive disorders among White/European heterosexual cisgender men who have experienced discrimination was 10%, controlling for discrimination distress (OR = 0.10, 95% CI [0.09 – 0.11] *p<.001*). In contrast with White/Europeans within this sample and controlling for discrimination distress level, predicted odds for digestive disorders were 56% lower for Black/African Americans (OR = 0.44, 95% CI [0.38 – 0.51] *p<.001*), 38% lower for Latine/ Hispanics (OR = 0.62, 95% CI [0.55 – 0.70] *p<.001*), 64% lower for Asians (OR = 0.36, 95% CI [0.32 – 0.41] *p<.001*), 39% lower for Pacific Islanders (OR = 0.61, 95% CI [0.41 – 0.91] *p<.05*), and 31% lower for multiracial individuals (OR = 0.69, 95% CI [0.61 – 0.79] *p<.001*). Predicted odds for people of additional races and ethnicities were higher and for American Indians/Native Americans and Southwest Asian/ North Africans were lower but were not statistically significant. Predicted odds for digestive disorders were 61% higher among gender minorities (OR = 1.61, CI [1.40 – 1.84] p<.001) and 49% higher for cisgender women (OR = 1.66, CI [1.35 – 1.65] p<.001) when compared to cisgender men. Sexual orientation minorities were predicted to be 24% more likely to have digestive conditions than heterosexuals (OR = 1.24, CI [1.14 – 1.36] p<.001) (See Table 30).

Additive Identity Effects (Discrimination Sample) and Stratum-Level Variance.

Similar to Models 3A-3I, the VPC's in Models 6A-6I represent the remaining unexplained variance between strata after accounting for the "additive" fixed effect of identities and for discrimination distress level. The VPC for Model 6D (diabetes) reduced to 0.000, or 0% variance. The VPC for Models 6B (chronic pain/migraines), 6C (Asthma), and 6F (sleep disorders) all reduced to 0.001, or 0.1%. For Model 6H (cardiovascular conditions) and Model 6I (digestive disorders), the VPC reduced to 0.002, or 0.2%. For 6A (count of chronic conditions), the between-stratum variance was 0.4% (VPC = 0.004) (See Tables 27-30).

Table 27. Subsample Chronic Count (Models 4A, 5A, 6A) and Chronic Pain (4B, 5B, 6B)

	Model 4A	Model 5A	Model 6A	Model 4B	Model 5B	Model 6B
Predictors	*Incidence Rate Ratios (95% CI)*			*Odds Ratios (95% CI)*		
(Intercept)	1.17 ** (1.06 – 1.29)	0.90 * (0.82 – 0.99)	0.78 *** (0.72 – 0.84)	0.25 *** (0.22 – 0.30)	0.19 *** (0.16 – 0.22)	0.17 *** (0.15 – 0.18)
Discrim. Distress		1.18 *** (1.17 – 1.20)	1.18 *** (1.17 – 1.20)		1.21 *** (1.18 – 1.24)	1.21 *** (1.18 – 1.24)
Race						
White (ref)			-			-
Black			0.72 *** (0.66 – 0.79)			0.53 *** (0.47 – 0.59)
Lat./Hisp.			0.81 *** (0.75 – 0.89)			0.67 *** (0.60 – 0.74)
Asian			0.54 *** (0.49 – 0.59)			0.34 *** (0.30 – 0.38)
PI			0.92 (0.76 – 1.11)			0.67* (0.49 – 0.91)
AINA			1.32 *** (1.17 – 1.48)			1.18 (1.00 – 1.38)
SWANA			0.89 (0.80 – 1.00)			0.85* (0.72 – 0.99)
Multi			0.89 ** (0.81 – 0.97)			0.72 *** (0.65 – 0.80)
Add			1.24 (0.96 – 1.61)			0.75 (0.48 – 1 .18)
Gender						
CM (ref)			-			-
CW			1.29 *** (1.21 – 1.37)			1.92 *** (1.77 – 2.07)
GM			1.55 *** (1.43 – 1.68)			2.19 *** (1.97 – 2.45)
Sexual Orientation						
Het. (ref)			-			-
S/O Min.			1.17 *** (1.10 – 1.23)			1.13 *** (1.06 – 1.22)
VPC / σ^2	0.099/ 1.07	0.091/ 1.07	0.004/ 1.07	0.076/ 3.29	0.073 3.29	0.001/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 28. Subsample Asthma (Models 4C, 5C, 6C) and Diabetes (4D, 5D, 6D)

	Model 4C	Model 5C	Model 6C	Model 4D	Model 5D	Model 6D
Predictors	*Odds Ratios (95% CI)*			*Odds Ratios (95% CI)*		
Intercept	0.26 *** (0.24 – 0.29)	0.23 *** (0.21 – 0.25)	0.21 *** (0.19 – 0.23)	0.04 *** (0.04 – 0.05)	0.03 *** (0.03 – 0.03)	0.02 *** (0.02 – 0.02)
Discrim. Distress		1.10 *** (1.07 – 1.13)	1.10 *** (1.07 – 1.13)		1.26 *** (1.20 – 1.33)	1.26 *** (1.19 – 1.33)
Race						
White (ref)			-			-
Black			1.09 (0.98 – 1.21)			1.65 *** (1.43 – 1.91)
Lat./Hisp.			0.89 * (0.81 – 0.98)			1.62 *** (1.43 – 1.85)
Asian			0.62 *** (0.56 – 0.69)			0.83 * (0.71 – 0.96)
PI			0.88 (0.64 – 1.20)			1.88 * (1.12 – 3.14)
AINA			1.40 *** (1.19 – 1.64)			2.32 *** (1.79 – 3.00)
SWANA			0.79 ** (0.66 – 0.93)			0.96 (0.69 – 1.33)
Multi			1.25 *** (1.13 – 1.38)			1.21 * (1.03 – 1.43)
Add			1.01 (0.64 – 1.60)			2.02 (0.93 – 4.37)
Gender						
CM (ref)			-			-
CW			1.05 (0.97 – 1.12)			1.07 (0.96 – 1.20)
GM			1.19 ** (1.07 – 1.32)			1.24 * (1.04 – 1.48)
Sexual Orientation						
Het. (ref)			-			-
S/O Min.			1.18 *** (1.10 – 1.26)			1.04 (0.93 – 1.15)
VPC / σ²	0.022/ 3.29	0.021/ 3.29	0.001/ 3.29	0.036/ 3.29	0.032/ 3.29	0.000/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 29. Subsample Sleep (Models 4F, 5F, 6F) and Cardiovascular Disorders (4H, 5H, 6H)

	Model 4F	Model 5F	Model 6F	Model 4H	Model 5H	Model 6H
Predictors	*Odds Ratios (95% CI)*			*Odds Ratios (95% CI)*		
Intercept (Ref)	0.15 *** (0.13 – 0.18)	0.10 *** (0.08 – 0.11)	0.09 *** (0.08 – 0.10)	0.12 *** (0.11 – 0.13)	0.10 *** (0.09 – 0.11)	0.13 *** (0.11 – 0.14)
Discrim. Distress		1.34 *** (1.30 – 1.39)	1.34 *** (1.30 – 1.39)		1.15 *** (1.11 – 1.19)	1.15 *** (1.11 – 1.19)
Race						
White (ref)			-			-
Black			0.58 *** (0.51 – 0.66)			0.86 * (0.75 – 0.99)
Lat./Hisp.			0.72 *** (0.64 – 0.81)			0.88 (0.77 – 1.00)
Asian			0.45 *** (0.40 – 0.51)			0.65 *** (0.56 – 0.74)
PI			0.87 (0.60 – 1.25)			1.19 (0.82 – 1.72)
AINA			1.40 *** (1.17 – 1.68)			1.31 * (1.06 – 1.61)
SWANA			0.85 (0.70 – 1.03)			0.90 (0.73 – 1.11)
Multi			0.82 ** (0.73 – 0.93)			0.80 ** (0.69 – 0.92)
Add			1.25 (0.76 – 2.03)			1.38 (0.81 – 2.35)
Gender						
CM (ref)			-			-
CW			1.06 (0.97 – 1.16)			0.74 *** (0.67 – 0.81)
GM			1.60 *** (1.41 – 1.80)			0.83 ** (0.72 – 0.96)
Sexual Orientation						
Het. (ref)			-			-
S/O Min.			1.50 *** (1.38 – 1.63)			1.06 (0.97 – 1.16)
VPC / σ^2	0.067 / 3.29	0.062 / 3.29	0.001 / 3.29	0.015 / 3.29	0.016 / 3.29	0.002 / 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 30. Subsample Digestive Disorders (Models 4I, 5I, 6I)

	Model 4I	Model 5I	Model 6I
Predictors	*Odds Ratios (95% CI)*		
Intercept (Ref)	0.13 *** (0.11 – 0.15)	0.10 *** (0.09 – 0.12)	0.10 *** (0.09 – 0.11)
Discrim. Distress		1.17 *** (1.13 – 1.20)	1.17 *** (1.13 – 1.20)
Race			
White (ref)			-
Black			0.44 *** (0.38 – 0.51)
Lat./Hisp.			0.62 *** (0.55 – 0.70)
Asian			0.36 *** (0.32 – 0.41)
PI			0.61 * (0.41 – 0.91)
AINA			0.90 (0.73 – 1.10)
SWANA			0.90 (0.75 – 1.09)
Multi			0.69 *** (0.61 – 0.79)
Add			1.47 (0.93 – 2.33)
Gender			
CM (ref)			-
CW			1.49 *** (1.35 – 1.65)
GM			1.61 *** (1.40 – 1.84)
Sexual Orientation			
Het. (ref)			-
S/O Min.			1.24 *** (1.14 – 1.36)
VPC / σ^2	0.063/ 3.29	0.061/ 3.29	0.002/ 3.29

*CI = Confidence Interval; * p<0.05 ** p<0.01 *** p<0.001*

Table 31. Proportion of Change in Variance (PCV) for Models 4A-4I, 5A-5I, and 6A-6I

Outcome Measures	Models Compared	PCV	Models Compared	PCV
Chronic Count	4A (null) to 5A	0.081	5A to 6A	0.964
Chronic Pain/Migraines	4B (null) to 5B	0.044	5B to 6B	0.988
Asthma	4C (null) to 5C	0.042	5C to 6C	0.956
Diabetes	4D (null) to 5D	0.105	5D to 6D	0.992
Sleep Disorders	4F (null) to 5F	0.074	6F to 6F	0.980
Heart/Vasc. Disorders	4H (null) to 5H	-0.029	5H to 6H	0.892
Digestive Disorders	4I (null) to 5I	0.037	5I to 6I	0.976

Additive Identity Effects and Discriminatory Accuracy (Discrimination Sample).

Among the models run for the reduced sample (n = 60,140) filtered only to include participants who endorsed discrimination, the area under the curve (AUC) results between Models 5B-5I and Models 6B-6I showed very little change in the models' ability to predict between cases and non-cases of illness after adding fixed identity effects. The AUC estimate for Model 6B (chronic pain/migraines), 6C (asthma), 6F (sleep disorders), 6H (cardiovascular disorders), and 6I (digestive disorders) were all between 0.000 and 0.002. For Model 6D (diabetes), there was a very marginal improvement in the model's predictive ability (0.008 or ~1%) (See Table 32).

Table 32. Area Under Curve (AUC) for Models 5B-2I and 6B-6I

Model	AUC	Model	AUC
Model5A	-	Model6A	-
Model5B	0.649	Model6B	0.649
Model5C	0.579	Model6C	0.577
Model5D	0.605	Model6D	0.597
Model5F	0.647	Model6F	0.646
Model5H	0.571	Model6H	0.569
Model5I	0.635	Model6I	0.634

CHAPTER FOUR – DISCUSSION

The primary goal of this study was to examine the relationship between discrimination experiences and discrimination-related distress and chronic health conditions among college students with marginalized racial, ethnic, gender, and sexual orientation identities. The second goal of this study was to understand how prevalence of chronic health conditions among college students varies by these identities and to understand the degree to which these differences can be explained by discrimination, related distress, and intersectional effects beyond the additive effect of identities using the I-MAIHDA approach (Evans, 2015; Evans et al., 2018; Evans et al., 2024b).

Previous research has shown higher risks for most physical health outcomes for individuals with marginalized racial and ethnic identities (Bailey et al., 2017; Brockie et al., 2013; Mays et al., 2007; Simons et al., 2018; Ruiz et al., 2016) and sexual orientation minorities (Cochran & Mays, 2007; Conron et al., 2010; Mays et al., 2018; Meyer et al., 2017), however only a few studies to date have examined this relationship for transgender and gender expansive communities (e.g., American Psychological Association, 2015; James et al., 2016; Meyer et al., 2017; Seelman et al., 2017) and those with intersecting marginalized racial, ethnic, gender, and sexual orientation identities (e.g., Parra & Hastings, 2018; Seelman et al., 2017; Trinh et al., 2017). While numerous past studies have shown that self-reported experiences with discrimination are associated with poorer health outcomes for individuals with marginalized identities (e.g., Carlisle, 2015; Dawson et al., 2015; Edwards, 2008; Flentje et al., 2022; Everson-Rose et al., 2015; Kassing et al., 2021; Thakur et al., 2017; Todorova et la., 2010; Stepanikova et al., 2017), few studies have directly examined the role that distress related to these experiences

plays on health outcomes (e.g., Anderson, 2013; Fisher et al., 2000; Sellers et al., 2003; Torres-Harding & Turner, 2015; Williams et al., 2023). This study builds on past research by separately examining the roles of discrimination experiences and discrimination-related distress on physical health outcomes across intersecting identities of race/ethnicity, gender identity, and sexual orientation with a focus on a young adult population attending college.

Discrimination Experiences

Previous research has highlighted the prevalence of discrimination and microaggression experiences among marginalized racial, ethnic, gender, and sexual orientation communities and the negative impacts on mental and physical health outcomes (Flentje et al., 2022; Kassing et al., 2021; McDonald et al., 2014; Williams et al., 2019). In the current study, about one-fifth of all participants (20.6%; n = 60,140) reported having experienced discrimination and/or microaggressions in the past year. However, discrimination and microaggression experiences were more common for all racial and ethnic minority groups compared to White/European individuals, with Black/African Americans reporting the highest incidence rate (40.4% of Black/African Americans vs. 14.4% of White/Europeans). Similarly, LGBTQIA+ individuals all reported higher than average rates of discrimination, including around half of all transgender men (46.9%) and gender expansive individuals (53.7%) and around one-third of all transgender women (32.8%), bisexual individuals (35.7%), and gay/lesbian individuals (39.7%) (Table 18).

For this study, I predicted that endorsement of discrimination and/or microaggressions during the past 12 months would be associated with a higher count of chronic health conditions and increased likelihood for each of the eight health condition categories (H1). Results supported this prediction, showing that endorsement of discrimination and/or microaggressions during the past year predicted poorer health outcomes for all measured health outcome variables. People

who reported discrimination and/or microaggressions also reported a 61% increase in mean number of chronic health conditions. Individuals who experienced discrimination or microaggressions were 111% more likely to report sleep disorders, 80% more likely to report chronic pain and migraines, 69% more likely to report autoimmune disorders, 64% more likely to report digestive disorders, 62% more likely to report cardiovascular conditions, 53% more likely to report diabetes, 49% more likely to report endocrine disorders, and 36% more likely to report asthma.

Discrimination endorsement partially explained some of the differences in health outcomes between intersectional groups. Adding discrimination to the model reduced the unexplained variance between strata for most health outcomes, although the magnitude of this effect was variable. The proportion of change in variance (PCV) between strata after adding discrimination endorsement was highest for sleep disorders (23.5%), followed by number of chronic health conditions (20.1%), diabetes (17.7%), and asthma (15.7%), suggesting that a substantial portion of the differences based on intersecting identities for these conditions can be explained by discrimination and microaggression experiences.

This result has important implications for the I-MAIHDA model (Alvarez & Evans, 2021; Borrell et al., 2025; Evans, 2015; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b). Because accounting for discrimination experiences reduced the variance between strata for several of the examined health conditions, this suggests that intersectional differences in health outcomes are at least partially explained by the impact of direct experiences with discrimination. This interpretation is strongly aligned with intersectionality theory, which regards systems of oppression as the catalyst for inequitable experiences for those with multiple marginalized identities (Crenshaw, 1989; Combahee River

Collective, 1977). However, it is important to note that discreet, recent experiences of discrimination only account for part of the picture when it comes to conceptualizing oppression as the driving force behind health disparities.

Discrimination-Related Distress and Chronic Health Conditions

Discrimination-related distress has been correlated with higher rates of depression, trauma symptoms, and other negative mental health outcomes (Fisher et al., 2000; Sellers et al., 2003; Torres-Harding & Turner, 2015; Williams et al., 2023), as well as greater number of poor physical health days (Anderson, 2013). Among those who experienced discrimination during the past year for the current study, people with marginalized racial and ethnic identities reported slightly higher average levels of distress related to these experiences compared to White/European individuals, with Pacific Islanders, Black/African Americans, and American Indian/Native Alaskans reporting an average distress level of about 12% higher than White/Europeans (1.54/1.53/1.53 vs. 1.36 on a 0-3 scale). Transgender women, transgender men, and gender expansive individuals also reported higher discrimination distress on average compared to cisgender men and cisgender women (1.59/1.57/1.57 vs. 1.28/1.44). Average discrimination distress was slightly higher for bisexual + (1.48), asexual+ (1.44), and gay/lesbian and questioning individuals (both 1.43) when comparted to heterosexuals (1.39).

For the current study, I predicted that among individuals who report experiencing discrimination and/or microaggressions during the past 12 months, self-reported level of distress related to these experiences would be associated with a higher count of chronic health conditions and increased likelihood for each of the eight health condition categories (H2). Results also supported this hypothesis, with discrimination-related distress showing a statistically significant effect for all health outcome measures. For each one-unit increase in level of distress related to

discrimination, odds of having the disorder increased by 36% for sleep disorders, 26% for diabetes, 21% for chronic pain and/or migraines, 17% for digestive disorders, 15% for cardiovascular disorders, and 10% for asthma.

In contrast with discrimination endorsement alone, discrimination-related distress added considerable predictive power in understanding risk for chronic health conditions. While the coefficients were similar between these two variables, the effect range was broader for discrimination-related distress because this variable was measured by units of increase rather than as binary. For example, while discrimination endorsement increased odds for diabetes by 53%, each one-unit increase in discrimination-related distress further increased odds for diabetes by 26%. Thus, an individual who reported "high distress" (level of 3) related to discrimination would be predicted to have 78% higher odds for diabetes compared to someone who felt unbothered by their experience of discrimination, or 3 times the odds ratio for discrimination distress for diabetes (OR = 0.26). Among individuals who experience discrimination, reporting "high distress" related to these experiences would predict a 105% increase in odds for sleep disorders, or three times the coefficient for discrimination distress onto sleep disorders.

For the discrimination-only sample, the variance between strata had already been reduced significantly because participants had been filtered to include only those who reported 12-month experiences of discrimination and/or microaggressions – a factor which accounted for a substantial proportion of the variance estimates across models in the original sample. Accounting for distress related to discrimination further reduced the variance for all chronic conditions (except for cardiovascular disease), with the largest proportionate reductions appearing for diabetes (10.5%) and sleep disorders (7.4%).

The current study's findings regarding racial, gender, and sexual orientation disparities in rates of chronic health conditions – which will be discussed further in the following section – underscore the devastating role of inequitable healthcare access and quality, environmental injustice, inequitable access to affordable, healthy food and exercise opportunities, and other fundamental structural health disparities (Bauer, 2014; Bourabain & Verhaeghe, 2021; Bowleg, 2012; Faugno et al., 2025; Mohottige et al., 2023; Paradies et al., 2015). At the same time, the sweeping findings regarding discrimination distress and odds for chronic health conditions highlight the importance of the individual psychological response to discrimination. If an individual's psychological distress level following experiences of discrimination impacts physical health above and beyond the experience itself, this suggests a variable neurobiological response to stress is at play. This interpretation is aligned with the neurobiological minority stress approach proposed by Parra and Hastings (2018), as well as supported by numerous health scholars who have found that discrimination experiences are associated with cortisol dysregulation (e.g., Berger & Sarnyai, 2015; Huynh et al., 2016; Hatzberger & McLaughlin, 2014). As described in the introduction, cortisol dysregulation is a biomarker for over-activation of the HPA axis.

While I did not directly measure cortisol levels or other physiological biomarkers of stress in the current study, psychosocial stress is known to be a risk factor for most of the chronic health conditions I examined within the discrimination distress models. As may be expected, the impacts of discrimination-related distress were strongest for illnesses that have been well-documented as having a strong psychogenic component in terms of risk for onset and/or disease prognosis. There is a strong relation between various types of psychological stressors, such as trauma, adverse childhood experiences, work-related stress, or self-reported chronic stress and

prevalence for sleep disorders (Hirotsu et al., 2015; Merrill, 2022), diabetes (Hackett & Steptoe, 2016; Lynch et al., 2013), chronic pain (Blackburn-Monroe & Blackburn-Monroe, 2001; Van Uum et al., 2008), migraines (Stubberud et al., 2021), digestive disorders (Keskin, 2019; Qin et al., 2014), and cardiovascular conditions (Hackett & Steptoe, 2016; Vaccarino et al., 2013; Wirtz & von Känel, 2017). In finding that discrimination-related distress substantially increases odds for all of these chronic health conditions, the current study supports the idea that neurobiological stress responses explain at least some of the health disparities among LGBTQ communities and communities of color (Berger & Sarnyai, 2015; Parra & Hastings, 2018).

Identity and Chronic Health Conditions

Most modern public health scholars and health psychologists argue that health disparities are rooted in the complex impacts of systemic discrimination (Flentje et al., 2022; Hendricks & Testa, 2012; Kelleher, 2009; Meyer, 2003). While direct, conscious experiences with perceived everyday discrimination and microaggressions constitute part of this effect (Todorova et al., 2010), such experiences form only one element of systemic discrimination (Bourabain & Verhaeghe, 2021, Paradies et al., 2015). Regardless of whether individuals directly experience and report everyday incidents of discrimination or microaggression experiences or not, the cumulative impact of systemic inequities is believed to impact minority health through systemic discrimination which disadvantages marginalized communities through multiple pathways: higher psychosocial stress, systemic and community violence, reduced economic access which improves quality of life and safety, increase environmental hazards, and inequitable access to timely, affordable, and quality medical diagnostic services and treatment (Bauer, 2014; Bowleg, 2012; Faugno et al., 2025; Mohottige et al., 2023; Singer & Hodge, 2016; Taylor et al., 2006).

Given this complexity, I predicted that even controlling for both endorsement of discrimination experiences and discrimination distress, individuals with marginalized racial, ethnic, gender, and sexual orientation identities would still experience poorer health outcomes compared to those with privileged identities (H3 and H4). Support for this prediction was mixed, with a great deal of variation across identity groups and important differences in prevalence based on specific racial, ethnic, gender identity, and sexual orientation identities.

Racial/Ethnic Minorities and Chronic Health Conditions

American Indian/Native Alaskans (n = 4.185) reported higher prevalence rates for chronic pain, migraines, asthma, diabetes, endocrine disorders, sleep disorders, autoimmune disorders, cardiovascular conditions, and digestive disorders when compared to the sample mean. Even after controlling for discrimination experiences, American Indian/Native Alaskans still had the highest predicted odds of any racial/ethnic group for most chronic health conditions, with notable disparities compared to White/Europeans in higher predicted odds for diabetes (132% higher[42]), sleep disorders (51% higher), autoimmune disorders and endocrine disorders (both 52% higher), heart disease (40% higher), chronic pain/ migraines (36% higher) and asthma (19% higher).

Pacific Islanders (n = 854) also experienced significant disparities in higher prevalence rates for diabetes, heart conditions, and asthma compared to the sample mean. Pacific Islanders continued to encounter substantially higher predicted odds for diabetes even after controlling for discrimination experiences (145% higher); the results for heart conditions and asthma were still elevated but were not significant in the multi-level models. This may have been due to the comparatively small sample size for Pacific Islanders.

[42] Discrimination-controlled model

Results for both American Indian/Native Alaskan and Pacific Islanders are consistent with previous research highlighting health disparities in chronic health conditions among these communities, particularly for conditions which impact mortality such as diabetes and cardiovascular disease (Adakai et al., 2018; Indian Health Service, 2023; Weitzman Institute, 2022; U.S. Department of Health and Human Services, Office of Minority Health, 2023). The history and present-day colonization of indigenous people in the Americas and the Pacific have generated a host of social and environmental conditions which predispose American Indian/Native Alaskan and Pacific Islanders to chronic health risks. These include underfunded healthcare systems, economic exploitation, cultural disenfranchisement, intergenerational trauma, lifetime exposure to violence and trauma, and – particularly for American Indian/Native Alaskans – the systematic destruction of clean water sources and air pollution reservations through mining, fossil fuel extraction, power plants, pipeline construction, and hazardous waste disposal near indigenous reservations and nearby communities (Singer & Hodge, 2016; Subica et al., 2024; Warne & Lajimodiere, 2015).

Black/African American individuals in the current study (n = 15,932) reported higher prevalence rates for several chronic conditions compared to the general sample proportion, with notable disparities for diabetes, asthma, and heart conditions. Accounting for discrimination within the models, predicted odds for diabetes were still higher for Black and African American individuals than White/Europeans by 89% for the discrimination-controlled model and 65% for the distress-controlled model. Predicted odds for asthma and heart conditions after controlling for discrimination experiences were close to those of White/Europeans, however these results were not statistically significant.

Latino/a/e and Hispanic individuals (n = 40,783) within the current study reported lower rates of illness compared to the sample for all chronic conditions except for diabetes (3.5%). Similar to Black/African Americans, the disparity in diabetes prevalence held even after controlling for both discrimination (62% higher odds than White/Europeans) and discrimination-related distress (also 62% higher).

While the results for diabetes are consistent with previous research showing higher risk for diabetes among Black/African Americans and Latino/a/e and Hispanics (Avilés-Santa et al., 2017; Lett et al., 2020), the persistence of diabetes even after accounting for discrimination and discrimination-related distress suggests that the etiology factors contributing to higher diabetes risk extend beyond interpersonal discrimination and microaggressions and related distress. This is consistent with public health studies on diabetes, which conceptualize inequitable risk for diabetes as the consequence of multiple institutional, social, economic, medical and institutional factors such as inequitable access to healthy food, outdoor/recreational opportunity, opportunities for enrichment activities involving physical activity, prevention and screening programs, and epigenetic risk due to intergenerational trauma (Hill-Briggs et al., 2022; Larson et al., 2009; Mohottige et al., 2023; Taylor et al., 2006).

The current study's findings for Black/African Americans and Latino/a/e and Hispanics differ from most population health studies for conditions outside of diabetes. For Black/African Americans, most previous studies show higher rates for asthma (Binney et al., 2024), hypertension (U.S. Department of Health and Human Services, Office of Minority Health, 2024), some autoimmune conditions such as lupus (Parodis et al., 2023), and chronic pain (Zajacova et al., 2022). Population health data typically shows higher rates for many chronic conditions among the Latino/a/e and Hispanic population in the U.S., including asthma and some

autoimmune disorders (Binney et al., 2024; Goonesekera et al., 2024; Parodis et al., 2023). The current findings do not necessarily contradict existing research but likely indicate that multiple factors are at play, including sample selection factors and demographic generalizability.

One major factor to consider is that the results presented in the current study were not found in a nationally representative sample of U.S. racial and ethnic minorities attending higher education. The current study was comprised of roughly 57.7% White/Europeans 14.2% Asian, 14% Latino/a/e and Hispanic, 5.5% Black/African American, 5.3% multiracial, 1.6% Southwest Asian/North African, 1.4% American Indian/Alaskan Native, and 0.3% Pacific Islander students, and 0.09% students of additional races and ethnicities[43]. Yet, according to data published by the Education Data Initiative (Hanson, 2025), the makeup of the U.S. college student population is 52.3% White, 21.46% Hispanic/Latino, 13.2% Black/ African American, 7.4% Asian/Asian American, 4.34% multiracial, 0.69% American Indian/Alaska Native, and 0.25% Pacific Islander[44].

The American College Health Association (ACHA, 2021) acknowledges that the data this study used from the National College Health Assessment "cannot be said to be generalizable" to the U.S. college student population because the participating colleges opt into the NCHA – in other words, because colleges "self-select" to participate, selection factors influence the sample. Across most of the semesters that the NCHA-III was administered for the datasets used in this study, no Historically Black Colleges and Universities (HBCU's) participated[45]. The proportion of participating universities and colleges defined as either Hispanic Serving Institutions (HSI's)

[43] Note that these were not the demographic statistics for this version of the NCHA-III, but rather for the filtered sample based on my data cleaning process describe in the "Chapter Two: Methods" section of this manuscript.
[44] The Education Data Initiative does not provide this specific data for Southwest Asian/North African (SWANA) students or students of additional races and ethnicities.
[45] See Table 1., Page 16 of this manuscript.

or High Hispanic Enrollment (Emerging HSI's) varied across the six semesters that the NCHA-III data was gathered for the current study, ranging between 7%-27%. However, HSI's and emerging HSI's make up a total of 34% of U.S. colleges and universities (Excelencia in Education 2025a; Excelencia in Education 2025b). The current study substantially underrepresents historically minority serving institutions, which likely impacts the underrepresentation of U.S. Black and Latino/a/e and Hispanic students. It is reasonable to propose that the underrepresented health condition prevalence among Latino/a/e and Hispanic students within this study is influenced by the overall underrepresentation of these communities within the sample used in this study.

Moreover, institutional economic resources may play a role in which universities self-select to participate in the NCHA, as universities must pay to participate (ACHA, 2024). If that is the case, then one possibility may be that students from more financially under resourced institutions may be underrepresented within the sample, which may mean that more socioeconomically disadvantaged students are also underrepresented. Given that systemic economic inequality is an important contributing factor to racial and ethnic health disparities, it is worth questioning whether underrepresentation of working class Black/African American and Latino/a/e and Hispanic students may be occurring within the study.

Additionally, differences in my findings compared to previous research on Black/African American and Latino/Hispanic health disparities may be due to the younger age of the current sample compared the general population. While some disproportionate prevalence rates such as asthma and diabetes commonly show in pediatric samples (Hill-Briggs et al., 2022; Thakur et al., 2017), many racial health disparities become more pronounced over the lifespan due to the cumulative effects of structural racism over time (Adler & Stewart, 2010). Another key factor

which differentiates college samples is socioeconomic status. Many of the chronic conditions facing Black/African American and Latino/a/e and Hispanic communities in the U.S. are heavily impacted by socioeconomic status and residential neighborhood factors (Mohottige et al., 2023). U.S. college students tend to include a higher proportion of middle and higher socioeconomic status individuals compared to the general population (National Center for Education Statistics, 2022), thus the conditions which contribute to these health disparities may be present at lower levels for U.S. Black/African and Latino/a/e and Hispanic college students compared to the general public. Additionally, U.S. Latinos have the highest uninsured rate of any aggregate racial or ethnic group (U.S. Department of Health and Human Services, Office of Minority Health, 2025). This can delay diagnostic services for individuals, experiences symptoms of chronic health issues (Faugno et al., 2025). This disparity in diagnostic services might have a disproportionate effect on younger individuals, whose illnesses may not yet be advanced or severe enough to warrant seeking care against the heavy burden of healthcare without health insurance.

Multiracial individuals (n = 15,932) reported higher prevalence rates of chronic pain, migraines, asthma, sleep disorders, and diabetes when compared to the sample mean. Compared to White/Europeans, Multiracial individuals continued to face asthma odds 19% higher after controlling for discrimination experiences. While most identity-based disparities in disease prevalence declined further after accounting for discrimination-related distress, it is notable that the disparity for asthma among multiracial people became even larger even after controlling for discrimination-related distress. The unique disparity of asthma among multiracial individuals is consistent with a recent study by Lam-Hine and colleagues (2024) in California which found that asthma rates are higher among multiracial individuals than any other racial group in the state.

People whose racial and ethnic identities (n = 273) were not easily categorized within larger identity groups were notable for facing higher prevalence rates across all chronic health conditions than either the sample mean or White/Europeans. After controlling for discrimination, people of additional races and ethnicities continued to face higher predicted odds for digestive disorders (49% higher[46]), sleep conditions (90% higher), and diabetes (95% higher), as well as 46% higher average number of chronic health conditions. While the makeup of this group is unclear, write-in data suggests than many Jewish and Caribbean individuals used only the "Other/Additional" box. Limited past research suggest notable chronic health risks for many conditions among both Jewish (Pearson & Geronimus, 2011) and Caribbean communities (Carlisle, 2015). Given that neither group was intentionally included in the NCHA-III and both groups are rarely included as distinct options in healthcare research, these findings highlight the importance of providing options for Jewish and Caribbean self-identification in future health research.

Southwest Asian/North African individuals encountered higher rates of some conditions when compared to the sample mean, specifically chronic pain (7.3% vs. 6.9%) and endocrine disorders (4.0% vs. 3.4%). However, there was no significant disparity for either condition after controlling for discrimination. Across most other conditions, rates for Southwest Asian/North African individuals were typically lower than or similar to White/Europeans. Yet remarkably, Southwest Asian/North African gender and sexual minorities were among the highest-ranking strata (top 5-10) for chronic pain/migraines, asthma, endocrine disorders, cardiovascular disorders and digestive disorders. This suggests that there may be a unique intersectional effect

[46]Discrimination-controlled model

happening for Southwest Asian/North African gender and sexual minorities which was not captured by the I-MAIHDA analysis.

Asian individuals reported the lowest incidence rates for most of the illnesses studied when compared to other racial and ethnic groups. These findings differ from national studies showing higher rates of diabetes among Asian and Southwest Asian/North Africans compared to U.S. White/Europeans (Menke et al., 2015). Similar to the findings for Black/African American and Latino/a/e and Hispanic participants, these findings within the college sample may be an underestimate of the population due to the fact that many of these health disparities evolve over the lifespan (Adler & Stewart, 2010). Moreover, the identity categories of Asian and Southwest Asian/North African are incredibly heterogenous. Aggregate group trends mask important differences which affect specific populations – such as higher rates of diabetes among Hmong immigrants (Stewart et al., 2016), and significant barriers to preventative healthcare access and screening among Southwest Asian/North African refugees (Moezzi et al., 2024). Additionally, reliance on self-report of chronic conditions may underestimate the true prevalence of some chronic conditions for U.S. Asian populations, as one previous study found that U.S. Asians are at higher risk of having undiagnosed hypertension and diabetes compared to U.S. White/Europeans (Kim et al., 2018). Finally, it is essential to remember that discrimination impacted chronic health risks for all participants and that Asian and Southwest Asian/North Africans participants, like others with minoritized identities, reported higher rates of discrimination and discrimination-related distress than White/Europeans. This is grounded in previous research with Asian Americans, which supported the association between discrimination and odds for chronic health conditions such as cardiovascular disease, chronic pain, and respiratory illness (Gee et al., 2007).

White/European individuals generally ranked in the middle of the range for most illnesses when compared to other racial and ethnic groups and were the second-highest racial/ethnic group for autoimmune disorders, chronic pain, endocrine and cardiovascular conditions after controlling for discrimination experiences. Previous research on chronic health conditions among U.S. White/Europeans often shows higher self-reported rates of digestive disorders and migraines compared to most other aggregate racial/ethnic groups (Almario et al., 2018; Loder et al., 2015) and lower prevalence rates for diabetes, cardiovascular disease, and asthma compared to aggregate U.S. Black, Latino/a/e and Hispanic, and American Indian/Native Alaskan populations (Avilés-Santa et al., 2017; Binney et al., 2024; Indian Health Service, 2023; Lett et al., 2020). For autoimmune diseases, multiple studies have shown that systemic lupus erythematosus (SLE) disproportionately affects Black/African American and Latino/a/e and Hispanic women, with worse outcomes for both groups compared to White/Europeans (Goonesekera et al., 2024; Parodis et al., 2023). National statistics regarding racial and ethnic differences in other autoimmune diseases such as rheumatoid arthritis (RA) rates vary widely due to issues with biased sample selection and disparities in healthcare access (Greenberg et al., 2013; Yip & Navarro-Millán, 2021). While it was previously believed that RA affected White/Europeans more, recent studies suggest true prevalence may be higher among Black and Latino/a/e and Hispanic communities, especially after adjusting for age.

One factor contributing to higher rates for some conditions among White/Europeans compared to other groups may be the conflagration of factors that impact diagnostic equity: self-reporting bias, provider sensitivity to patient complaints of pain, health insurance access and quality, and access to specialty care (Anderson et al., 2009; Carabello et al., 2022). Previous research shows that compared to patients of color – especially Black/African American and

Latino/a/e and Hispanic patients – White/Europeans are more likely to receive timely referrals and screening needed to obtain diagnoses (Faugno et al., 2025). Migraines, chronic pain, as well as some digestive and autoimmune disorders involve symptoms which affect quality of life by generating significant discomfort – such as fatigue, joint pain, headaches, stomachaches, or digestive complaints – but which may not always taken seriously by all healthcare providers for all patients. As Faugno and colleagues (2025) and Anderson and colleagues (2009) describe, racial and ethnic minority individuals experiencing symptoms may be less likely to seek care and when they do seek care, their providers may be more likely to offer short-term treatments than to provide advanced referrals for diagnostic and treatment services. Moreover, even for individuals who do receive such referrals, racial disparities in accessing care such as health insurance coverage, transportation, and wait times may make racial and ethnic minority patients less likely to follow up – and thus less likely to receive an accurate diagnosis (Caraballo et al., 2022).

LGBTQIA+ Individuals and Chronic Health Conditions

Gender Minorities and Chronic Health Conditions. Across nearly all conditions, gender minority individuals reported higher prevalence rates of most illnesses compared to their cisgender peers. Both transgender men and gender expansive individuals ranked highly for prevalence of asthma (19.7% TM vs. 22.9% GE vs. 16.4% sample), sleep disorders (17.5% TM vs. 17.9% GM vs. 7.2% sample) digestive disease (13.3% TM vs. 14.5% GE vs. 9% sample), cardiovascular conditions, (10.7% TM vs. 9.3% GE vs. 7.4% sample), endocrine disorders (4.9% TM vs. 4.5% GE vs. 3.4% sample) and autoimmune disorders. (3.7% TM vs. 4.2% GE vs. 2.2% sample). Transgender women experienced higher rates of all illnesses when compared with both cisgender women and cisgender men, with notable risks for chronic pain (8.3% vs. 6.9% sample), diabetes (3.4% vs. 2.4% sample), and endocrine disorders (4.5% vs. 3.4% sample).

Even when controlling for discrimination experiences and discrimination-related distress, gender minorities – who were aggregated as one group in the multilevel models – continued to experience significantly higher predicted odds for all conditions when compared to cisgender men except for cardiovascular disease. Predicted odds for gender minorities were 154% higher for autoimmune disorders, 127% higher for chronic pain/migraines, 74% higher for digestive disorders, and 71% higher for sleep disorders when compared with cisgender men, controlling for discrimination experiences. After controlling for discrimination-related distress, gender minorities continued to face significantly higher predicted odds for all conditions (except cardiovascular disease), including 119% higher odds for chronic pain/migraines, 24% higher odds for diabetes, and 19% higher odds for asthma.

These findings are consistent with a growing body of research suggesting that gender minority individuals face higher overall risk for numerous chronic conditions, including asthma (Tran et al., 2023), diabetes and cardiovascular disease (Downing & Przedworski, 2018), and autoimmune disorders (Logel et al., 2023). However, this study is one of the first to examine the relationship between gender minority identity and risk for endocrine disorders, migraines, sleep disorders and digestive disorders. Moreover, this study is one of the first to control for discrimination and/or discrimination distress in assessing the relationship between any chronic physical illness and marginalized gender identity.

Sexual Orientation Minorities and Chronic Health Conditions. Sexual orientation minority individuals also reported higher prevalence rates of most illnesses compared to heterosexuals. Bisexual+ individuals reported the highest rates of most chronic conditions, with notable disparities for migraines, (16.8% vs. 11.5% sample) sleep disorders, (13.2% vs. 7.2% sample) autoimmune disorders, (3.3% vs. 2.2% sample) and digestive conditions (12.9% vs. 9%

sample). Gay/lesbian individuals encountered higher disease rates than questioning or heterosexual individuals for all conditions, with similar rates to bisexual and asexual+ individuals for chronic pain, asthma, and diabetes, and the highest rate of any sexual orientation identity for cardiovascular conditions (9.9% vs. 7.4% sample mean). Asexual individuals typically experience chronic condition rates that fell between the rates for bisexual+ and gay/lesbian individuals and suffered the highest rate for endocrine disorders (4.6% vs. 3.4% sample mean).

Sexual orientation minorities as an aggregated group continued to experience higher rates of most chronic health conditions, even after controlling for discrimination. This included 70% higher odds for sleep disorders, 35% higher odds for digestive conditions, 26% higher odds for asthma, 24% higher odds for autoimmune conditions, 19% higher odds for chronic pain/migraine, and 16% higher odds for diabetes. Higher risk for endocrine disorders was no longer present after accounting for discrimination, however sexual orientation minorities were the only marginalized group who experienced significantly higher predicted odds (13%) than the reference group for cardiovascular conditions. After controlling for discrimination-related distress, there was no longer a significant effect for diabetes or cardiovascular conditions – suggesting that distress related to discrimination may influence higher rates of these illnesses among sexual orientation minorities.

Implications for LGBTQIA+ Health. Among LGBTQIA+ young adults, these results suggest that while discrimination experiences and discrimination distress play an important role in risk for all of the chronic conditions studied, factors beyond recent everyday discrimination continue to impact health for this community.

There are numerous systemic reasons why sexual and gender minority individuals face higher risk for chronic illness compared to cisgender heterosexual individuals even after controlling for direct discrimination experiences and discrimination distress. For the LGBTQIA+ community, there is pervasive systemic discrimination in the form of hateful public opinion and inequitable laws and policies (Casey et al., 2019; Flentje et al., 2022; Hendricks & Testa, 2012; Reisner et al., 2016;). Even without experiencing overt or discreet discrimination events, LGBTQIA+ individuals may face unwelcoming educational settings, workplaces, or communities where they may not feel safe, supported, or included because of their identities – or they may fear rejection or mistreatment based on past experiences or peers' experiences (American Psychological Association, 2015; Flentje et al., 2022; Kelleher, 2009). It is important to remember that many young LGBTQIA+ individuals may also have experienced discrimination earlier in life prior to attending college, such in their home communities or family life (Robinson, 2018), and these experiences may not be captured by the NCHA-III question assessing only 12-month experiences of discrimination.

Transgender and gender expansive individuals in particular face numerous systemic factors which can affect health. Compared to the general U.S. population, transgender and gender expansive adults face higher rates of unemployment, housing insecurity, food insecurity, and victimization from violence – all factors which researchers have regarded as key social determinants of physical and mental health (Hendricks & Testa, 2012; James et al., 2016; Seelman et al., 2017). Another factor which may be impacting risk for chronic health conditions among gender minority individuals is reduced healthcare access and negative healthcare experiences (James et al., 2016). The Kaiser Foundation reports that 36% of LGBT+ individuals endorse having had at least one negative experience with a healthcare provider (compared to

22% of non-LGBT individuals) (Dawson et al., 2021). Similarly, a national study of 489 LGBTQIA+ adults conducted in 2017 found that 18% of LGBTQIA+ adults avoided seeking necessary healthcare services due to fear of discrimination (Casey et al., 2019).

At the time this dissertation manuscript was defended, the federal government had just passed a national ban on gender affirming care for gender diverse youth (Redfield, 2025). This ban came as part of a wave of federal and state legislation criminalizing transgender and gender expansive individuals and legalizing discrimination against transgender and gender expansive people (Movement Advance Project, 2025). Amidst an onslaught of anti-transgender hate and misinformation enveloping national politics at the time this document was written, gender diverse communities are at even greater risk of experiencing harmful conditions which can contribute to negative health consequences.

Cisgender Women and Chronic Health Conditions

Cisgender women also faced significant health disparities when contrasted with cisgender men. Compared to cisgender men, cisgender women reported higher prevalence rates for migraines (14.0% CW vs. 5.7% CM), chronic pain (7.7% CW vs. 4.2% CM), asthma (16.9% CW vs. 14.7% CM), diabetes (2.6% CW vs. 1.9% CM), endocrine disorders (4.4% CW vs. 1.2% CM), sleep disorders (7.5% CW vs. 5.4% CM), autoimmune disorders (2.6% CW vs. 1.1% CM), and digestive disorders (10.5% CW vs. 5.4% CM). Cardiovascular disorders were the only condition where cisgender men reported slightly higher overall prevalence (7.5% vs. 7.2%).

Disparities for cisgender women continued for some disorders even after controlling for discrimination. In particular, cisgender women still had 232% higher predicted odds for endocrine disorders, 97% higher odds for autoimmune diseases, 66% higher odds for digestive conditions, 27% higher odds for diabetes, 20% higher odds for sleep disorders, and 8% higher

odds for asthma. At the same time, controlling discrimination and discrimination-related distress appeared to reduce disparities for some health conditions between cisgender women and cisgender men – specifically making these differences nonsignificant for diabetes, asthma, and sleep disorders.

Differences between cisgender women and cisgender men in prevalence of many chronic health conditions have been well established, with studies showing that women face higher rates for migraines, diabetes, and metabolic and endocrine disorders (Batulan et al., 2024c), autoimmune disorders (Parodis et al., 2023), and digestive disorders (Almario et al., 2018). Public health and health psychology scholars have argued that in addition to biological and genetic factors (Batulan et al., 2024a), social and environmental factors contribute greatly to disparities for cisgender women, including structural sexism in healthcare, psychosocial stress associated with systemic misogyny, and income disparity (Batulan et al., 2024b).

It worth drawing attention to the fact that in the current study, discrimination reduced the significance of the disparity for diabetes, asthma, and sleep disorders for cisgender women. Contrary to a biological essentialist perspective on male/female differences, this finding suggests that health differences between cisgender women and cisgender men may be more impacted by systemic forms of gender inequity, including direct perceived discrimination, than previously believed. While there may be numerous biological and environmental factors which contribute to higher rates of certain illnesses among cisgender women (Batulan et al., 2024a), the current study highlights the importance of examining the role of discrimination and discrimination-related distress more closely and avoiding defaulting to purely biological explanations for these differences in health outcomes.

Intersectional Identities and Between-Stratum Variance

Working within the I-MAIHDA framework (Alvarez & Evans, 2021; Borrell et al., 2025; Evans, 2015; Evans et al., 2018; Evans & Erickson, 2019; Evans et al., 2020; Evans et al., 2023; Evans et al., 2024b), I predicted that controlling for discrimination experiences and discrimination-related distress, the intersection of identities would still explain a significant proportion of the between-stratum variance in number of chronic health conditions and likelihood for each of the eight health condition categories, beyond the additive effects of identities (H5 and H6).

Results did not directly support this hypothesis. For Models 3A-3I, adding the fixed effects for race, gender, and sexual orientation (after already controlling for discrimination) eliminated most of the remaining statistical variance in health outcomes between stratum by between 91.8% - 99.1% (PCV). The same was true for Models 6A-6I, where adding fixed effects for identity after controlling for discrimination-related distress reduced the remaining between-stratum variance by 89.2% - 99.2% (PCV). For these final models, differences between strata accounted for between 0.1% - 0.4% (VPC) of the total variance once the additive effect of identities was included in the analysis both for the full sample and reduced sample comparisons. This suggests that there were no statistical differences in the effect that discrimination and discrimination-related distress had across intersecting groups on average. It also suggests that, after accounting for discrimination experiences and discrimination distress, the differences between intersectional groups at the statistically measurable level could be explained by the additive effect of combined identities. This does not mean that there were no intersectional effects – but rather, it means that the intersectional effects were statistically captured by measuring discrimination plus the additive effect of intersecting identities.

There are a number of factors which may have contributed to the lack of substantial VPC's for the additive identity plus discrimination fixed effects models (Models 3A-3I and 6A-6I). First, the combination of low overall prevalence rates and small stratum sizes may have led to insubstantial between-stratum variance, especially between smaller groups. Most of the chronic health conditions under study are rare among college students – only asthma and migraines[47] had a sample prevalence rate over 10%, while all other conditions ranged between 2.2% and 9.0% prevalence. While these low prevalence rates would not affect larger strata, this issue would certainly affect the stability of the variance estimates for smaller strata. While the I-MAIHDA approach typically works well for small stratum sizes, Evans has primarily modeled this approach with continuous health outcomes, such as Hemoglobin A1c (Evans et al., 2024b), birthweight (Evans et al., 2023), body mass index (BMI) (Evans et al., 2018) and logistic data where incidence is substantially higher – such as diabetes in the general population (Evans et al., 2024b) or depression (Evans & Erickson, 2019). For logistic outcomes, low population endorsement rates for outcome variables can lead to restricted ranges. For the current study, it is possible that some of the intersectional strata with the highest additive risk for certain conditions (e.g., American Indian/Native Alaskan gender and sexual minority individuals for several conditions) may have been too small to show substantial stratum-level variance in outcomes beyond the sum of identity fixed effects.

Secondly, by controlling for discrimination experiences and discrimination-related distress, I likely addressed some of the forces which cause individuals with multiple intersecting marginalized identities to experience poorer health outcomes. At the heart of intersectionality theory is the concept that multiple oppressions are at play for individuals with multiple

[47] In the analysis, migraines were combined with chronic pain, which had a sample prevalence of 6.9%. The prevalence rate for asthma was 16.9%.

intersecting oppressed identities (Crenshaw, 1989); certainly, experiences of discrimination and the psychological impacts of those experiences form an essential part of what constitutes multiple oppressions. While structural discrimination plays a key role in health outcomes, controlling for perceived discrimination and related distress may have reduced variation in outcomes enough to reduce intersectional health outcomes. Moreover, it is possible that there may be additional individual level factors which made participants who report everyday experiences of discrimination more vulnerable to the impacts of structural discrimination as well – such as socioeconomic status, immigration status, disability status, and other important parts of identity which were not assessed by the current study.

Evans and colleagues (2024a) have cautioned that VPC's in I-MAIHDA studies are usually less than 5% after accounting for the additive impact of fixed identity effects. Borrell, Nieves and Evans (2025) have argued that small VPC's do not necessarily mean that distinct intersectional effects are not at play in individual health outcomes; rather, these can occur because the distributions between strata "overlap substantially." The issue of overlapping distributions is likely at play for the current study. Several marginalized identity groups in this study had very similar odds to one another for many of the health conditions, which I believe obscures how their experiences differs from more privileged groups (See Tables 20-24 and 27-30). For example, in the discrimination-controlled and discrimination-distress models, Black/African Americans, Latino/a/e and Hispanic, and Pacific Islander participants all had significantly higher odds for diabetes compared to White/Europeans, with considerable overlap in the confidence intervals (see Tables 20-24 and 27-30). Because stratum-level variance represents the average variance between strata, having multiple strata with overlapping distributions may obscure larger differences that actually lie between privileged and

marginalized groups. In other words, the intersectional difference between health outcomes may not be occurring equally between all groups.

Thus, building on Borrell and colleagues' argument (2025) regarding the impact of overlapping distributions, I believe that important privilege-based differences may be blurred by the assumption that each identity group would have a distinct risk pattern. While minoritized communities are incredibly diverse and have distinct cultural, historical, and systemic experiences, systemic racism affects health across racial and ethnic minority groups within the U.S. (Bailey et al., 2017). Shared factors that affect many communities of color and ethnic minority communities in the U.S. include socioeconomic and intergenerational wealth inequity, environmental inequities such as air and water quality, inequitable healthcare access and healthcare discrimination, access to healthy affordable food and exercise programs, intergenerational trauma, legal discrimination, state violence, and internalized oppression (Anderson et al., 2009; Anderson, 2013; Bailey et al., 2017; Faugno et al., 2025; Yannatos et al., 2023). While these factors by no means affect all racial and ethnic minority groups in the same way or to the same degree, there may be enough overlap in systemic impacts across groups that the differences are not producing measurable intersectional effects within the current study. It is possible that in order to understand differences based on intersectional identities within an I-MAIHDA model, it would be more pragmatic to use aggregate identities which represent distinct levels of societal power or shared experiences of systemic oppression, such as organizing race by White/European and Black, Indigenous and People of Color (BIPOC). However, I recognize that there could be countless unintentional pitfalls of excessive identity aggregation – especially for racial and ethnic minority groups – and caution anyone who attempts this approach within an I-

MAIHDA model to consider the benefits, purpose, and necessity, and to weigh these against the convolution of meaningful differences which occurs when marginalized groups are aggregated.

Notable Intersectional Differences in Health Outcomes

Evans and colleagues have advised not to conceptualize I-MAIHDA or other quantitative intersectional approaches as a way of trying to prove or disprove the role of intersectionality in people's lives or health outcomes (2024b). For the current study, given the lack of measurable intersectional differences between strata beyond discrimination and the sum of additive identity effects, it is essential to consider descriptive information to understand how intersecting identities affected risk for certain groups. Moreover, controlling for discrimination and discrimination distress were theoretical exercises aimed at understanding the prevailing impacts of structural discrimination and examining whether discrimination and related distress account for a measurable proportion of the variation in outcomes – in the real world, some groups do experience more discrimination, and this affects their real, everyday experiences and risk.

The descriptive results sweepingly illustrated that several groups with multiple marginalized identities were at much greater risk for poor health outcomes when compared to the sample means (See Appendix Tables A.1 through A.9). The top 5 most affected strata for all health outcomes consisted of LGBTQIA+ people with marginalized racial and ethnic identities or cisgender heterosexual women with marginalized racial and ethnic identities, illustrating the importance of multiple forms of oppression in health outcomes. Among the top 10 most affected groups for nearly every health condition were American Indian/Native Alaskan sexual and gender minority individuals, Pacific Islander sexual and gender minority individuals, Black/African American sexual and gender minority individuals, Southwest African/North African sexual and gender minority individuals, multiracial sexual and gender minority

individuals, Latino/a/e and Hispanic sexual and gender minority individuals, and sexual and gender minority individuals of another race or ethnicity. Notably, intersectional strata with White/European individuals were rarely among the groups most affected, and usually only when holding multiple other marginalized identities (e.g., sexual minority cisgender women or sexual and gender minority identities).

As the descriptive data highlights, this study showed health inequities based on holding multiple intersecting marginalized identities which were not captured by the I-MAIHDA models. Clearly, LGBTQIA+ racial and ethnic minorities and racial and ethnic minority women face greater risk of the chronic health conditions under study, even in a college population which is younger and higher SES than the general population. This highlights the importance of examining specific affected groups, incorporating prevalence data, and exercising caution when using I-MAIHDA with identity groups who have this combination of overlapping distributions (Borrell et al., 2025), small stratum sizes, and rare outcome measures. Moreover, the differences in identity-based disparities between the descriptive data and the I-MAIHDA models underscore the degree to which health inequities based on intersecting identities in the real world may be attributable to the effects of discrimination experiences and discrimination distress.

Limitations

This study had several limitations. First, I did not have information about whether participants' health conditions began before or after their experiences of discrimination. The NCHA-III items assessed for discrimination during the past 12 months, whereas the chronic health condition items assessed for lifetime diagnosis. Thus, it is possible for participants to have been diagnosed prior to the past 12 months. It is also possible that some participants may have experienced discrimination or microaggressions on the basis of their chronic physical health

conditions rather than on the basis of the identities I examined, thus indicating that any association between the predictor and outcome variables could have an alternative causal direction which is not included in my model. For any cross-sectional dataset, is impossible to be certain of what environmental, social, genetic, biological, or behavioral factors contributed to the onset of each participant's physical health condition – a challenge which similar studies have also encountered (e.g., Flentje et al., 2022; Kassing et al., 2021).

Another limitation was that the NCHA-III survey did not assess for (1) the severity of chronic health conditions or (2) whether the participant currently experiences symptoms of the illness. Because of the lack of information about severity of illness, there may be varying degrees of illness severity that are influenced by identity, discrimination, and/or discrimination distress, but that are not captured in the available data. Moreover, there may be participants who endorsed lifetime diagnosis of an illness for which they no longer experience any symptom, or which is in remission.

On the NCHA-III, there were no items assessing participant's socioeconomic status. This poses another limitation as this leaves out a key social determinant of health which is understood to be a contributing factor in health outcomes (Seelman et al., 2017). Without information about socioeconomic status, it is difficult to truly understand participants' experiences and social positionality or to understand how the distribution of SES may have varied between other identity groups (Meyer, 2003).

Finally, as described earlier in this discussion, the distribution of health outcomes between strata showed significant overlap as evident in the confidence intervals (See Tables 20-24 and 27-30). This likely reduced the between-stratum variance (Borrell et al., 2025), and may have obscured intersectional effects occurring based not on specific identities, but on shared

experiences of oppression-related health impacts (Anderson et al., 2009; Anderson, 2013; Bailey et al., 2017; Faugno et al., 2025; Yannatos et al., 2023).

Future Directions

My hope for this study was to raise awareness about how discrimination affects chronic health outcomes, particularly for LGBTQIA+ people, people with marginalized racial and ethnic identities, and people with intersecting marginalized identities. This study illustrated not only the powerful role that discrimination experiences have on chronic health conditions, but also the role that distress related to discrimination experiences plays on these outcomes. However, this study was conducted with college students who were overall a lower-risk population for chronic health conditions compared to the general public, due to younger average age (Adler & Stewart, 2010) and higher average socioeconomic status (National Center for Education Statistics, 2022). Moreover, due to cross-sectional design, this study was unable to assume causality or see risk change over the lifespan. Future research may add to these findings by assessing the impact of discrimination distress on chronic health conditions within the general public as well as over time using longitudinal designs.

For public health research and programming, this study highlights the importance of gathering, assessing, and reporting information about specific intersecting identities, including gender identity and sexual orientation. Further, this study illustrated the importance of disaggregating identities that are commonly aggregated for convenience but have very different population health outcomes, such as Asian and Pacific Islanders. Evans herself has argued that I-MAIHDA may be used to disaggregate identity groups because of the approach's ability to handle small sample sizes (Evans et al., 2018). Yet, there is an ongoing conversation about how and when to aggregate identities and for what purpose (e.g., McCall, 2005; Evans et al., 2024b).

As mentioned earlier, future researching using the I-MAIHDA method may benefit from stratum identity aggregation strategies which organize strata inductively based on similar descriptive outcomes as well as shared types of oppression (e.g., racial oppression or cisnormative oppression). For example, it could be useful within an I-MAIHDA approach to aggregate all of the racial minority groups who are at a similar risk for asthma into the strata creation, in order to highlight the impacts of racial oppression on asthma risk. Of course, this should only be done where there is substantial evidence to suggest similar health risks both within the data and in the established literature, and disaggregated descriptive data should also be provided for all variables under study for clarity and transparency. As expressed previously, there is always a risk of losing important information about differences between groups when identities are aggregated. Thus, the suggested approach to aggregate based on proximity to power should only be tested with great care, knowledge of the communities being studied, and with clear intentionality, and with a willingness to document the rationale and provide group-level data in addition to aggregate data. Moreover, it may not be appropriate for every study.

The findings of the current study have broad implications for medical and mental health practitioners. Given the finding that discrimination experiences and discrimination distress both played a distinct and meaningful role in predicting risk for several chronic health conditions, researchers and practitioners in the field of health psychology might consider developing screening tools which assess recent or lifetime discrimination experiences and related level of distress. Particularly in medical settings, offering integrated behavioral health (IBH) services to address discrimination distress may help to reduce the risk of long-lasting health impacts of discrimination. These might include integrating short-term therapy approaches commonly used in integrated primary care – such as CBT and motivational interviewing – with multicultural

feminist and liberation psychology approaches which emphasize questioning harmful dominant-culture narratives about minoritized groups, externalizing internalized oppression, connecting to powerful cultural histories, and increasing empowerment through everyday acts of resistance (Comas-Díaz & Greene, 1994; Comas-Díaz, 2020; Hunter et al., 2021). Where such interventions exceed the capacity or session limits for IBH, developing strong relationships with local therapy providers who focus on oppression-related mental health issues may improve referral success. Additionally, working to reduce discrimination in healthcare can be seen not only as an equity issue, but as an important prevention measure in reducing risk for chronic health conditions.

Outside of research and clinical practice, I hope that this study will help the public to better understand how communities of color, queer, and transgender folks are impacted both by structural oppression and everyday acts of discrimination. More than any other time in recent history, it is essential for the U.S. public to understand that systemic inequities have countless real-life consequences, including on the health and wellbeing of valuable but targeted members of our society. For any who deny that racism, misogyny, homophobia and transphobia are real, I sadly but earnestly hope that more knowledge about these health consequences may be a testimony to the reality and danger of these forces.

Amongst readers with systemically marginalized identities, I hope these results do not dishearten but rather highlight that the challenges and stressors we experience are real and valid. May this illustrate the importance of supporting one another, building one another up, seeking therapy to address the everyday impacts of discrimination, and continuing to work together to advocate for the health, safety, and wellbeing of our own and one another's communities.

Author Positionality Statement

I am a cisgender, lesbian White non-Latina woman and mother. I am from a working-class background but have enjoyed the benefits of pursuing an advanced degree, allowing me to access many middle-class privileges such as access to information, resources, and health insurance. My interest in the study of discrimination and health disparities is based on my own experience as a queer individual with chronic health conditions and my observations of how systemic disparities have played a role in the physical and mental health of my family members, friends, colleagues, and community. Moreover, especially as a queer parent, I have experienced healthcare discrimination while seeking pregnancy care and during the childbirth and postpartum care period. My previous research examined the role of systemic racism in shaping the physical and mental health experiences of Latino/a/e frontline workers during the Covid-19 pandemic.

It is essential to discuss my own positionality and how this factored into my process and decisions. I am in a position of holding many dominant identities relative to many of the individuals in this study. While I felt I have some personal insight into how sexual orientation affects my own direct experience, I am not a member of any of the racial or ethnic minority communities or gender minority communities included in this study.

Being a White cisgender individual, I found myself feeling especially challenged by and uncomfortable with the role of making choices about how to categorize gender, racial, and ethnic identities and interpret health data for these communities. The historical precedent of White people categorizing and describing the health of racial and ethnic minorities is not lost on me. Not only did my collective ancestors invent the construct of race, but White culture has been obsessed with taxonomizing people of color for centuries, with both dehumanizing intent and devastating consequences (Mills, 1997). Moreover, Eurocentric science and clinical practice has

often approached health among racial and ethnic minorities from a deficit-minded approach (Comas-Díaz, 2020). Any White researcher who finds themself in a position of handling population health data that includes racial and ethnic minority communities inherits this legacy, even if they are not examining or questioning the process.

Reckoning with this history, I did my best to conduct a thorough, research-grounded and transparent identity aggregation process and to admit when my aggregation approach failed to do justice to the communities involved. While interpreting the data, I tried to attend to factors which can skew the data and emphasize systemic factors over other explanations. However, I defer to the lived experiences of people with all of the identities described over any interpretation or speculation I may have. No statistical figure or tool can substitute for what individuals know about their own identities, experiences, and communities.

Disclosures

Along with several other training resources, I used ChatGPT by OpenAI (2025) to assist with learning how to use new coding tools in R Studio, as well as experimenting with multiple different coding approaches for specific functions, troubleshooting code errors, and making tedious coding and formatting modifications more efficient (e.g., renaming my variables or adding a new covariate across all models).

While I was granted access to data from the American College Health Association (ACHA), the opinions, interpretations, and comments included in this manuscript are my own and do not reflect the position or opinions of the ACHA or their affiliate universities or partners.

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APPENDIX: STRATUM-LEVEL RANKINGS

Table A.1. Chronic Health Conditions: Full Stratum Rankings (Observed Means)

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Observed Stratum Mean	SD
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	2.56	3.53
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	1.84	3.29
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	1.81	2.46
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	1.64	2.27
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	1.53	2.53
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	1.47	1.74
White/European	Gender Minorities	Sexual Minorities	7,015	1.41	1.91
Multiracial	Gender Minorities	Sexual Minorities	855	1.41	2.17
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	1.36	1.75
Pacific Islander	Gender Minorities	Sexual Minorities	24	1.33	1.69
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	1.33	1.73
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	1.31	1.98
Black/African American	Gender Minorities	Sexual Minorities	412	1.27	2.11
Pacific Islander	Gender Minorities	Heterosexual	9	1.22	1.79
White/European	Cisgender Women	Sexual Minorities	27,000	1.20	1.67
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	1.18	1.87
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	1.15	1.83

Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	1.15	1.71
Multiracial	Cisgender Women	Sexual Minorities	3,115	1.09	1.63
Pacific Islander	Cisgender Women	Sexual Minorities	123	1.08	1.29
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	1.01	1.36
Multiracial	Gender Minorities	Heterosexual	104	0.98	2.10
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	0.96	1.45
Black/African American	Gender Minorities	Heterosexual	111	0.94	2.30
Asian	Gender Minorities	Sexual Minorities	840	0.94	1.88
White/European	Cisgender Women	Heterosexual	82,819	0.93	1.47
White/European	Gender Minorities	Heterosexual	1,041	0.91	1.45
Black/African American	Cisgender Women	Sexual Minorities	2,289	0.91	1.36
Multiracial	Cisgender Women	Heterosexual	6,834	0.88	1.48
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	0.85	1.40
Pacific Islander	Cisgender Women	Heterosexual	449	0.84	1.56
Pacific Islander	Cisgender Men	Sexual Minorities	41	0.83	1.18
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	0.82	1.32
Black/African American	Cisgender Women	Heterosexual	9,015	0.80	1.36
Black/African American	Cisgender Men	Sexual Minorities	487	0.79	1.42
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	0.79	1.50
Multiracial	Cisgender Men	Sexual Minorities	787	0.78	1.30
White/European	Cisgender Men	Sexual Minorities	7,217	0.76	1.26
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	0.75	1.28
Pacific Islander	Cisgender Men	Heterosexual	208	0.75	1.52

American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	0.74	1.38
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	0.69	1.21
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	0.63	0.88
Asian	Cisgender Women	Sexual Minorities	4,574	0.59	1.14
Multiracial	Cisgender Men	Heterosexual	3,650	0.58	1.27
White/European	Cisgender Men	Heterosexual	43,139	0.54	1.07
Black/African American	Cisgender Men	Heterosexual	3,618	0.52	1.16
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	0.51	1.06
Asian	Cisgender Men	Sexual Minorities	1,471	0.48	1.34
Asian	Gender Minorities	Heterosexual	380	0.47	1.03
Asian	Cisgender Women	Heterosexual	20,135	0.46	0.99
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	0.46	0.96
Asian	Cisgender Men	Heterosexual	14,161	0.33	0.86
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.00	0.00

Table A.2. Chronic Pain/Migraines: Full Stratum Rankings (Observed Prevalence)

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
Pacific Islander	Gender Minorities	Heterosexual	9	44.4
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	40.4
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	36.4
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	35.1
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	32.0
White/European	Gender Minorities	Sexual Minorities	7,015	29.2
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	27.7
White/European	Cisgender Women	Sexual Minorities	27,000	25.9
Pacific Islander	Gender Minorities	Sexual Minorities	24	25.0
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	24.4
Pacific Islander	Cisgender Women	Sexual Minorities	123	24.4
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	24.0
Multiracial	Gender Minorities	Sexual Minorities	855	24.0
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	23.6
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	21.8
Multiracial	Cisgender Women	Sexual Minorities	3,115	21.7
White/European	Cisgender Women	Heterosexual	82,819	20.4
White/European	Gender Minorities	Heterosexual	1,041	18.9
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	18.7
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	18.7
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	18.4
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	18.2
Black/African American	Gender Minorities	Sexual Minorities	412	18.0
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	17.6
Multiracial	Cisgender Women	Heterosexual	6,834	17.6

Pacific Islander	Cisgender Women	Heterosexual	449	16.7
Black/African American	Cisgender Women	Sexual Minorities	2,289	16.5
Multiracial	Gender Minorities	Heterosexual	104	16.3
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	16.2
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	15.2
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	14.9
Asian	Gender Minorities	Sexual Minorities	840	14.6
Black/African American	Cisgender Women	Heterosexual	9,015	14.5
Black/African American	Gender Minorities	Heterosexual	111	13.5
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	13.0
White/European	Cisgender Men	Sexual Minorities	7,217	12.5
Pacific Islander	Cisgender Men	Sexual Minorities	41	12.2
Black/African American	Cisgender Men	Sexual Minorities	487	11.3
Multiracial	Cisgender Men	Sexual Minorities	787	11.2
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	10.1
Asian	Cisgender Women	Sexual Minorities	4,574	10.0
White/European	Cisgender Men	Heterosexual	43,139	9.5
Multiracial	Cisgender Men	Heterosexual	3,650	9.2
Asian	Cisgender Women	Heterosexual	20,135	8.7
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	8.6
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	8.2
Pacific Islander	Cisgender Men	Heterosexual	208	8.2
Asian	Gender Minorities	Heterosexual	380	8.2
Black/African American	Cisgender Men	Heterosexual	3,618	7.7
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	7.6
Asian	Cisgender Men	Heterosexual	14,161	4.8
Asian	Cisgender Men	Sexual Minorities	1,471	4.6
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	3.7
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.3. Asthma: Full Stratum Rankings (Observed Prevalence)

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	32.1
Multiracial	Gender Minorities	Sexual Minorities	855	27.4
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	27.3
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	26.4
Black/African American	Gender Minorities	Sexual Minorities	412	25.5
Black/African American	Cisgender Women	Sexual Minorities	2,289	23.2
Multiracial	Cisgender Women	Sexual Minorities	3,115	23.0
Multiracial	Cisgender Men	Sexual Minorities	787	22.9
White/European	Gender Minorities	Sexual Minorities	7,015	22.8
Pacific Islander	Gender Minorities	Heterosexual	9	22.2
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	22.2
Pacific Islander	Cisgender Women	Sexual Minorities	123	22.0
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	21.9
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	21.8
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	21.7
Black/African American	Cisgender Men	Sexual Minorities	487	21.4
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	21.0
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	20.7
White/European	Cisgender Women	Sexual Minorities	27,000	20.5
Multiracial	Cisgender Women	Heterosexual	6,834	20.4
Asian	Gender Minorities	Sexual Minorities	840	19.0
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	19.0
Multiracial	Cisgender Men	Heterosexual	3,650	18.9
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	18.7
Pacific Islander	Cisgender Women	Heterosexual	449	18.5
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	18.3
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	18.2

Black/African American	Cisgender Women	Heterosexual	9,015	18.2
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	17.6
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	17.5
White/European	Cisgender Men	Sexual Minorities	7,217	17.4
White/European	Cisgender Women	Heterosexual	82,819	17.3
Pacific Islander	Cisgender Men	Sexual Minorities	41	17.1
Pacific Islander	Cisgender Men	Heterosexual	208	16.8
Pacific Islander	Gender Minorities	Sexual Minorities	24	16.7
Black/African American	Gender Minorities	Heterosexual	111	16.2
Black/African American	Cisgender Men	Heterosexual	3,618	16.1
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	15.9
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	15.7
White/European	Gender Minorities	Heterosexual	1,041	15.5
White/European	Cisgender Men	Heterosexual	43,139	15.3
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	14.8
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	14.0
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	14.0
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	13.1
Asian	Cisgender Women	Sexual Minorities	4,574	12.9
Asian	Cisgender Men	Sexual Minorities	1,471	12.1
Multiracial	Gender Minorities	Heterosexual	104	11.5
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	10.8
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	10.6
Asian	Gender Minorities	Heterosexual	380	10.0
Asian	Cisgender Men	Heterosexual	14,161	9.8
Asian	Cisgender Women	Heterosexual	20,135	9.3
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.4. Diabetes: Full Stratum Rankings

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	8.3
Pacific Islander	Cisgender Men	Sexual Minorities	41	7.3
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	6.8
Black/African American	Gender Minorities	Sexual Minorities	412	6.8
Pacific Islander	Cisgender Women	Heterosexual	449	6.7
Black/African American	Cisgender Men	Sexual Minorities	487	5.5
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	5.4
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	5.3
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	5.0
Pacific Islander	Cisgender Men	Heterosexual	208	4.8
Black/African American	Cisgender Women	Sexual Minorities	2,289	4.7
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	4.7
Black/African American	Cisgender Women	Heterosexual	9,015	4.6
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	4.6
Black/African American	Gender Minorities	Heterosexual	111	4.5
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	4.5
Multiracial	Gender Minorities	Sexual Minorities	855	4.3
Pacific Islander	Gender Minorities	Sexual Minorities	24	4.2
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	4.2
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	4.1
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	4.1
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	4.0
Multiracial	Gender Minorities	Heterosexual	104	3.8
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	3.8
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	3.7
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	3.7

Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	3.7
Asian	Gender Minorities	Sexual Minorities	840	3.7
Multiracial	Cisgender Women	Sexual Minorities	3,115	3.1
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	3.1
Black/African American	Cisgender Men	Heterosexual	3,618	2.9
White/European	Gender Minorities	Sexual Minorities	7,015	2.7
Multiracial	Cisgender Women	Heterosexual	6,834	2.6
Asian	Cisgender Women	Sexual Minorities	4,574	2.5
White/European	Cisgender Women	Sexual Minorities	27,000	2.5
Multiracial	Cisgender Men	Sexual Minorities	787	2.4
White/European	Cisgender Men	Sexual Minorities	7,217	2.4
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	2.3
White/European	Gender Minorities	Heterosexual	1,041	2.3
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	2.2
White/European	Cisgender Women	Heterosexual	82,819	2.1
Asian	Gender Minorities	Heterosexual	380	1.8
Multiracial	Cisgender Men	Heterosexual	3,650	1.8
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	1.8
Asian	Cisgender Women	Heterosexual	20,135	1.7
Asian	Cisgender Men	Sexual Minorities	1,471	1.7
White/European	Cisgender Men	Heterosexual	43,139	1.6
Pacific Islander	Cisgender Women	Sexual Minorities	123	1.6
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	1.5
Asian	Cisgender Men	Heterosexual	14,161	1.4
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	0.0
Pacific Islander	Gender Minorities	Heterosexual	9	0.0
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	0.0
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.5. Endocrine Disorders: Full Stratum Rankings

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	9.3
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	9.1
Pacific Islander	Cisgender Women	Sexual Minorities	123	8.9
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	8.4
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	8.1
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	8.0
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	8.0
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	7.0
Black/African American	Gender Minorities	Heterosexual	111	6.3
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	5.9
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	5.6
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	5.1
White/European	Cisgender Women	Sexual Minorities	27,000	5.1
White/European	Gender Minorities	Sexual Minorities	7,015	5.0
White/European	Cisgender Women	Heterosexual	82,819	4.9
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	4.5
Pacific Islander	Gender Minorities	Sexual Minorities	24	4.2
White/European	Gender Minorities	Heterosexual	1,041	4.0
Multiracial	Gender Minorities	Sexual Minorities	855	4.0
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	3.9
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	3.9
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	3.8
Multiracial	Cisgender Women	Sexual Minorities	3,115	3.8
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	3.7
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	3.7

Multiracial	Cisgender Women	Heterosexual	6,834	3.7
Black/African American	Gender Minorities	Sexual Minorities	412	3.6
Asian	Cisgender Women	Heterosexual	20,135	3.1
Asian	Gender Minorities	Sexual Minorities	840	2.9
Asian	Cisgender Women	Sexual Minorities	4,574	2.7
Black/African American	Cisgender Women	Heterosexual	9,015	2.5
Pacific Islander	Cisgender Women	Heterosexual	449	2.4
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	2.3
Black/African American	Cisgender Women	Sexual Minorities	2,289	2.2
Asian	Gender Minorities	Heterosexual	380	2.1
White/European	Cisgender Men	Sexual Minorities	7,217	1.8
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	1.7
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	1.7
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	1.5
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	1.5
Multiracial	Cisgender Men	Heterosexual	3,650	1.3
Asian	Cisgender Men	Sexual Minorities	1,471	1.2
White/European	Cisgender Men	Heterosexual	43,139	1.2
Multiracial	Cisgender Men	Sexual Minorities	787	1.1
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	1.1
Black/African American	Cisgender Men	Sexual Minorities	487	1.0
Asian	Cisgender Men	Heterosexual	14,161	1.0
Multiracial	Gender Minorities	Heterosexual	104	1.0
Black/African American	Cisgender Men	Heterosexual	3,618	0.7
Pacific Islander	Cisgender Men	Heterosexual	208	0.5
Pacific Islander	Cisgender Men	Sexual Minorities	41	0.0
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	0.0
Pacific Islander	Gender Minorities	Heterosexual	9	0.0
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.6. Sleep Disorders: Full Stratum Rankings

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	31.1
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	29.7
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	29.4
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	27.3
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	22.6
Pacific Islander	Gender Minorities	Heterosexual	9	22.2
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	21.2
Pacific Islander	Gender Minorities	Sexual Minorities	24	20.8
White/European	Gender Minorities	Sexual Minorities	7,015	19.3
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	18.0
Multiracial	Gender Minorities	Sexual Minorities	855	18.0
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	16.8
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	15.9
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	14.9
Black/African American	Gender Minorities	Sexual Minorities	412	14.1
White/European	Cisgender Women	Sexual Minorities	27,000	12.9
Multiracial	Cisgender Women	Sexual Minorities	3,115	12.8
Asian	Gender Minorities	Sexual Minorities	840	12.1
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	11.4
Pacific Islander	Cisgender Women	Sexual Minorities	123	11.4
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	10.9
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	9.8
Black/African American	Cisgender Women	Sexual Minorities	2,289	9.6
White/European	Cisgender Men	Sexual Minorities	7,217	9.6
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	9.2

Multiracial	Cisgender Men	Sexual Minorities	787	9.0
Pacific Islander	Cisgender Men	Heterosexual	208	8.7
Black/African American	Cisgender Men	Sexual Minorities	487	8.6
White/European	Gender Minorities	Heterosexual	1,041	8.1
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	7.8
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	7.8
Multiracial	Gender Minorities	Heterosexual	104	7.7
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	7.7
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	7.4
Multiracial	Cisgender Women	Heterosexual	6,834	7.0
White/European	Cisgender Women	Heterosexual	82,819	6.8
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	6.5
Asian	Cisgender Women	Sexual Minorities	4,574	6.1
Black/African American	Cisgender Women	Heterosexual	9,015	6.1
Pacific Islander	Cisgender Women	Heterosexual	449	5.8
Multiracial	Cisgender Men	Heterosexual	3,650	5.5
Asian	Cisgender Men	Sexual Minorities	1,471	5.5
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	5.5
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	5.5
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	5.2
White/European	Cisgender Men	Heterosexual	43,139	5.2
Asian	Gender Minorities	Heterosexual	380	4.7
Black/African American	Cisgender Men	Heterosexual	3,618	4.6
Black/African American	Gender Minorities	Heterosexual	111	4.5
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	4.2
Asian	Cisgender Women	Heterosexual	20,135	3.6
Asian	Cisgender Men	Heterosexual	14,161	2.9
Pacific Islander	Cisgender Men	Sexual Minorities	41	2.4
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.7. Autoimmune Disorders: Full Stratum Rankings

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	11.8
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	10.8
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	9.1
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	9.1
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	8.8
White/European	Gender Minorities	Sexual Minorities	7,015	4.6
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	4.3
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	4.3
Pacific Islander	Gender Minorities	Sexual Minorities	24	4.2
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	4.1
White/European	Cisgender Women	Sexual Minorities	27,000	4.0
Multiracial	Gender Minorities	Sexual Minorities	855	3.7
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	3.7
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	3.6
Black/African American	Gender Minorities	Sexual Minorities	412	3.4
White/European	Cisgender Women	Heterosexual	82,819	3.2
Multiracial	Gender Minorities	Heterosexual	104	2.9
Black/African American	Gender Minorities	Heterosexual	111	2.7
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	2.5
White/European	Gender Minorities	Heterosexual	1,041	2.5
Multiracial	Cisgender Women	Heterosexual	6,834	2.5
Multiracial	Cisgender Women	Sexual Minorities	3,115	2.5
Pacific Islander	Cisgender Men	Sexual Minorities	41	2.4
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	2.4
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	2.2
Black/African American	Cisgender Men	Sexual Minorities	487	2.1

Asian	Gender Minorities	Sexual Minorities	840	2.0
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	2.0
Pacific Islander	Cisgender Men	Heterosexual	208	1.9
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	1.9
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	1.7
Multiracial	Cisgender Men	Sexual Minorities	787	1.7
White/European	Cisgender Men	Sexual Minorities	7,217	1.6
Asian	Gender Minorities	Heterosexual	380	1.6
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	1.5
Black/African American	Cisgender Women	Sexual Minorities	2,289	1.4
Pacific Islander	Cisgender Women	Heterosexual	449	1.3
White/European	Cisgender Men	Heterosexual	43,139	1.3
Black/African American	Cisgender Women	Heterosexual	9,015	1.3
Multiracial	Cisgender Men	Heterosexual	3,650	1.2
Asian	Cisgender Men	Sexual Minorities	1,471	1.2
Asian	Cisgender Women	Sexual Minorities	4,574	1.1
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	1.1
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	1.0
Asian	Cisgender Women	Heterosexual	20,135	0.9
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	0.9
Pacific Islander	Cisgender Women	Sexual Minorities	123	0.8
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	0.7
Black/African American	Cisgender Men	Heterosexual	3,618	0.6
Asian	Cisgender Men	Heterosexual	14,161	0.5
Pacific Islander	Gender Minorities	Heterosexual	9	0.0
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	0.0
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	0.0
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.8. Cardiovascular Disorders: Full Stratum Rankings

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
Pacific Islander	Cisgender Men	Sexual Minorities	41	22.0
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	20.5
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	18.7
Pacific Islander	Gender Minorities	Sexual Minorities	24	16.7
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	16.1
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	14.5
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	13.8
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	13.5
Pacific Islander	Cisgender Men	Heterosexual	208	13.5
Black/African American	Cisgender Men	Sexual Minorities	487	12.5
Multiracial	Gender Minorities	Heterosexual	104	12.5
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	11.8
Pacific Islander	Gender Minorities	Heterosexual	9	11.1
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	10.7
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	10.3
Black/African American	Gender Minorities	Sexual Minorities	412	10.2
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	10.1
Multiracial	Gender Minorities	Sexual Minorities	855	10.1
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	10.0
Multiracial	Cisgender Men	Sexual Minorities	787	9.7
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	9.6
White/European	Cisgender Men	Sexual Minorities	7,217	9.6
White/European	Gender Minorities	Sexual Minorities	7,015	9.5
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	9.4
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	9.1

Black/African American	Gender Minorities	Heterosexual	111	9.0
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	8.8
Asian	Cisgender Men	Sexual Minorities	1,471	8.6
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	8.5
Black/African American	Cisgender Women	Heterosexual	9,015	8.3
Black/African American	Cisgender Men	Heterosexual	3,618	8.1
White/European	Cisgender Women	Sexual Minorities	27,000	8.1
Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	8.1
Pacific Islander	Cisgender Women	Heterosexual	449	8.0
Asian	Gender Minorities	Sexual Minorities	840	8.0
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	7.9
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	7.7
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	7.6
White/European	Cisgender Women	Heterosexual	82,819	7.5
Black/African American	Cisgender Women	Sexual Minorities	2,289	7.5
White/European	Gender Minorities	Heterosexual	1,041	7.5
Multiracial	Cisgender Women	Sexual Minorities	3,115	7.4
White/European	Cisgender Men	Heterosexual	43,139	7.2
Multiracial	Cisgender Women	Heterosexual	6,834	7.1
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	6.9
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	6.9
Multiracial	Cisgender Men	Heterosexual	3,650	6.8
Asian	Cisgender Men	Heterosexual	14,161	5.8
Asian	Cisgender Women	Sexual Minorities	4,574	5.5
Asian	Gender Minorities	Heterosexual	380	5.3
Pacific Islander	Cisgender Women	Sexual Minorities	123	4.9
Asian	Cisgender Women	Heterosexual	20,135	4.4
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	0.0
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0

Table A.9. Digestive Disorders: Full Stratum Rankings

Race/Ethnicity	Gender Identity	Sexual Orientation	Stratum Size	Prevalence (%)
Additional Races/Ethnicities	Gender Minorities	Sexual Minorities	17	23.5
Southwest Asian/Northwest African	Gender Minorities	Sexual Minorities	137	19.7
American Indian/Native Alaskan	Gender Minorities	Sexual Minorities	193	19.2
Additional Races/Ethnicities	Cisgender Women	Sexual Minorities	37	18.9
Additional Races/Ethnicities	Cisgender Men	Sexual Minorities	11	18.2
Additional Races/Ethnicities	Cisgender Women	Heterosexual	119	17.6
American Indian/Native Alaskan	Gender Minorities	Heterosexual	44	15.9
White/European	Gender Minorities	Sexual Minorities	7,015	15.8
American Indian/Native Alaskan	Cisgender Women	Sexual Minorities	628	15.6
White/European	Cisgender Women	Sexual Minorities	27,000	14.8
Southwest Asian/Northwest African	Cisgender Women	Sexual Minorities	516	14.7
Multiracial	Gender Minorities	Sexual Minorities	855	14.4
Southwest Asian/Northwest African	Cisgender Men	Sexual Minorities	179	14.0
American Indian/Native Alaskan	Cisgender Women	Heterosexual	2,085	13.0
Additional Races/Ethnicities	Cisgender Men	Heterosexual	87	12.6
White/European	Gender Minorities	Heterosexual	1,041	12.6
Pacific Islander	Gender Minorities	Sexual Minorities	24	12.5
Pacific Islander	Cisgender Women	Sexual Minorities	123	12.2
White/European	Cisgender Women	Heterosexual	82,819	12.1
Latino/a/e and Hispanic	Gender Minorities	Sexual Minorities	1,234	11.8
Southwest Asian/Northwest African	Cisgender Women	Heterosexual	2,298	11.3
Multiracial	Cisgender Women	Sexual Minorities	3,115	11.3
Black/African American	Gender Minorities	Sexual Minorities	412	10.9
White/European	Cisgender Men	Sexual Minorities	7,217	10.3
Multiracial	Gender Minorities	Heterosexual	104	9.6

Latino/a/e and Hispanic	Cisgender Women	Sexual Minorities	6,266	9.4
Multiracial	Cisgender Women	Heterosexual	6,834	9.0
Multiracial	Cisgender Men	Sexual Minorities	787	8.8
American Indian/Native Alaskan	Cisgender Men	Sexual Minorities	161	8.7
Asian	Gender Minorities	Sexual Minorities	840	7.9
Latino/a/e and Hispanic	Cisgender Women	Heterosexual	20,699	7.7
Latino/a/e and Hispanic	Cisgender Men	Sexual Minorities	1,981	7.4
Black/African American	Cisgender Women	Sexual Minorities	2,289	7.4
Black/African American	Cisgender Women	Heterosexual	9,015	6.9
Latino/a/e and Hispanic	Gender Minorities	Heterosexual	291	6.9
Black/African American	Cisgender Men	Sexual Minorities	487	6.4
Black/African American	Gender Minorities	Heterosexual	111	6.3
American Indian/Native Alaskan	Cisgender Men	Heterosexual	1,074	6.2
White/European	Cisgender Men	Heterosexual	43,139	5.7
Asian	Cisgender Women	Sexual Minorities	4,574	5.6
Southwest Asian/Northwest African	Cisgender Men	Heterosexual	1,484	5.3
Pacific Islander	Cisgender Women	Heterosexual	449	5.1
Multiracial	Cisgender Men	Heterosexual	3,650	5.1
Asian	Cisgender Men	Sexual Minorities	1,471	5.0
Pacific Islander	Cisgender Men	Sexual Minorities	41	4.9
Latino/a/e and Hispanic	Cisgender Men	Heterosexual	10,312	4.4
Asian	Cisgender Women	Heterosexual	20,135	4.3
Pacific Islander	Cisgender Men	Heterosexual	208	3.8
Southwest Asian/Northwest African	Gender Minorities	Heterosexual	27	3.7
Asian	Gender Minorities	Heterosexual	380	3.4
Black/African American	Cisgender Men	Heterosexual	3618	2.9
Asian	Cisgender Men	Heterosexual	14,161	2.6
Pacific Islander	Gender Minorities	Heterosexual	9	0.0
Additional Races/Ethnicities	Gender Minorities	Heterosexual	2	0.0