Different Shades of Health*:* The Joint Consequences of Skin Color, Race, Gender, and Social Class in a Life Course Context

By

Taylor Woodland Hargrove

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Approved:

Tyson H. Brown, Ph.D.

Daniel B. Cornfield, Ph.D.

C. André Christie-Mizell, Ph.D.

Hedwig Lee, Ph.D.

DEDICATION

To my grandparents, whose strength, hard work, determination, and unwavering love have continued to inspire me and pave the way for all of my endeavors in life. I am truly blessed and honored to be able to call you family. Love you always, John R. Hargrove, Sr. ("Pop Pop"), Shirley H. Hargrove ("Gammy"), George F. Woodland ("Hi-G"), and Ada C. Woodland ("Grandmother").

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CHAPTER I

Introduction

A guiding principle of sociology is that a multitude of social factors combine to shape life chances and opportunities (Weber 1946 [1922]). A particularly important resource that can be used to improve one's quality of life is good health. A plethora of social science research has examined the relationship between a variety of social factors and health, particularly the influences of race/ethnicity, gender, and socioeconomic status (SES). These systems of stratification predominate the social sciences given their ability to structure access to opportunities, desired resources, and exposures to risks. Additionally, race/ethnicity, gender, and SES are not only used by others to evaluate individuals and organize social life (Massey 2008; Hughes 1945; Reskin and Bielby 2005), but shape individuals' personal and social identities as well—all of which are influential in structuring health-relevant beliefs, behaviors, and practices (Griffith, Gunter, and Allen 2011; Haslam et al. 2009; Karlsen and Nazroo 2002; Oyserman, Fryberg, and Yoder 2007). Consequently, race/ethnicity, gender, and SES have a robust relationship with health; disadvantaged groups, namely blacks, Hispanics, women, and those of lower SES, tend to have worse health than their more advantaged counterparts across an array of outcomes, including heart disease, diabetes, hypertension, and body mass index (BMI; Bird and Rieker 2008; Braveman et al. 2005; Link and Phelan 1995; Ogden et al 2014; Pleis, Ward, and Lucas 2010; Read and Gorman 2010).

While much of the population health literature has focused on racial/ethnic, gender, and socioeconomic inequality, few studies have considered the extent to which these key dimensions of stratification multiplicatively combine to shape health trajectories. Instead, the majority of

prior research has examined the individual or additive consequences of these social statuses. These additive approaches assume that systems of inequality (and their effects) are independent of one another, and thereby mask the unique and simultaneous positions of power and disadvantage within which individuals are situated (Collins 2000; Dill and Zambrana 2009; Ore 2003). Studies relying on additive approaches may be over- or underestimating health inequalities, or overlooking groups that are particularly vulnerable in terms of health. Consequently, this unidimensional approach may lead to inaccurate conclusions regarding the social stratification of health.

Addressing these limitations of prior research requires the use of a multiple-hierarchy stratification perspective, which seeks to investigate the extent to which social statuses interact over the life course to shape health and other life chances (Brown et al. 2016; Clark and Maddox 1992; Jeffries and Ransford 1980). The supposition of this perspective—that the cumulative effects of social statuses combine in ways that are more influential than the effect of any one status—has led to two alternative hypotheses: multiple jeopardy (which embodies the dominant assumption that social categories have independent, additive effects) and intersectionality (which challenges the additive nature of social statuses). Due to the limitations of additive models, scholars have increasingly utilized an intersectionality framework for studying health disparities. Stemming from feminist legal scholarship, intersectionality posits that the construction and consequences of any one category is infused with meanings attached to the other social identities an individual embodies (Collins 2000; Crenshaw 1989; King 1988). The differentiated meanings of race and gender that characterize and distinguish the lived experiences of black women, for example, compared to black men or white women are due to the "interlocking systems of oppression" (Ore 2003) embedded in the simultaneity of social statuses (Caldwell et al. 2006;

Collins 2000; Crenshaw 1989; Dill and Zambrana 2009; King 1988). These interlocking systems of oppression, including racism, patriarchy, and capitalism, work to shape not only the social locations of individuals, but social practices, institutional arrangements, and cultural ideologies as well—all of which ultimately affect life chances, including health (Collins 2000; Davis 2008; Landry 2006). Examining the lived experiences of individuals who are located at intersections of various systems of oppressions and identities brings attention to the fluidity of boundaries among socially constructed groups, and to the differing power relations and hierarchies that may exist within these groups. As a result, individuals occupying similar positions in the social hierarchy may have shared—but not equivalent nor essentialized—experiences (Collins 2004). Intersectionality therefore highlights the potential for differences in pathways to health between and within social groups.

Recent studies have demonstrated the utility of multidimensional approaches to stratification for understanding health inequality among multiple racial/ethnic groups. For example, by drawing on an intersectionality framework, Ailshire and House (2011) were able to identify specific groups, defined by race/ethnicity, gender, SES, and age, that experience the disproportionate burden of weight gain in the U.S between early and middle adulthood—groups that would have been overlooked if a traditional, unidimensional approach had been used. Additionally, Brown and Hargrove (2013) examined the ways in which race/ethnicity and gender combine to shape the functional health of older white, black, and Mexican American adults. The results of this study indicated that women of color had the worst functional health compared to all other racial/ethnic-gender groups, and that racial/ethnic and gender stratification combined additively for Mexican Americans, yet multiplicatively among blacks. Moreover, Cummings and Jackson (2008) investigated the joint effects of race, gender, and SES on self-rated health, and

uncovered a more complicated relationship between these social statuses and health than previously documented. For example, these authors found that while black women tended to have the worst health out of all race-gender groups, their trajectories of self-rated health were more dynamic than their same race male counterparts. Additionally, their results showed that socioeconomic resources were less beneficial for black women in particular, and that different levels of SES accounted for less of the black-white gap among women than the racial disparity among men.

Studies that have taken a multidimensional approach to examining the social stratification of health have therefore provided a more complex picture of health inequality across racial/ethnic, gender, and socioeconomic lines. While informative and contributing to a new perspective of conceptualizing and understanding health disparities, these studies have focused primarily on the consequences of race/ethnicity, gender, and SES. This leaves uncertain the extent to which other important dimensions of stratification influence health. Furthermore, the inability of prior research to fully explain between-group disparities in health requires a different approach to the study of social factors and health. More specifically, previous studies have focused on the explanatory power of SES, showing that adjustment for socioeconomic resources such as education, income, marital status, and occupation does not completely account for racial/ethnic or gender disparities in several measures of health (Cummings and Jackson 2008; Hayward et al. 2000; Read and Gorman 2010; Williams 2012; Williams and Sternthal 2010). These residual gaps have encouraged researchers to consider additional factors that may underlie health disparities, such as sources of intragroup heterogeneity in mechanisms linking social statuses to health (e.g., Monk 2015).

The examination of intragroup heterogeneity in pathways to health reflects a within-group approach that is necessary for a more complex understanding of health inequality. More specifically, a within-group approach emphasizes greater specificity in the pathways to health among social groups. This differs from a between-group approach (which predominates the population health literature) by shifting the focus from the assumed homogenized mechanisms underlying health among members of the same social group, to sources of differentiation that alter the relationship between social factors and health. Incorporating a within-group approach is therefore vital to understanding the nature of disparities because identifying variations in pathways to health among groups that are often erroneously treated as homogenous (e.g., African Americans) highlights how simultaneously experienced social statuses may differentiate the experience of broad social groups (Schwartz and Meyer 2010; Whitfield et al. 2008).

One source of intragroup heterogeneity that has received relatively little attention in the population health literature is skin color. Colorism constitutes a system of stratification that privileges and awards unearned advantages to lighter-skinned minorities because of their closer phenotypic resemblance and presumed genetic similarity to Europeans and, therefore, to Eurocentric standards of beauty, morality, intellect, and status (Hill 2002; Hunter 2007; Rueter 1917; Russell, Wilson, and Hall 1992; Thompson and Keith 2001). Indeed, studies have provided evidence of skin color stratification in several social and economic outcomes among African Americans, including income, educational attainment, marital status, and personal attributes. Extant research, however, has not provided a systematic overview of the relationship between skin color and health, one of the most crucial facets of life. That is, previous studies that have investigated the effect of skin color on health have tended to focus on a single health outcome (Keil et al. 1981; Keil et al. 1977; Klag et al. 1991), and have produced mixed findings

(Borrell et al. 2006; Boyle 1970; Gillum 1979; Harburg et al. 1978; Monk 2015). The extent to which skin tone shapes health among minority groups, particularly African Americans, is an especially crucial topic given population trends that are shifting the color line in the U.S., and making skin tone an increasingly important marker of inequality and status (Bonilla-Silva 2004). More specifically, some scholars have argued that the U.S. is experiencing a transition from a bi-racial hierarchy (in which blacks are subordinated to whites) to a more complex and loosely organized tri-racial order. This tri-racial hierarchy positions whites at the top, nonwhites or collective blacks at the bottom, and a new, intermediary group of "honorary whites" that act as a buffer for racial conflict between whites and nonwhites (Bonilla-Silva 2004; Bonilla-Silva and Dietrich 2010). Several social and population trends have sparked the transition from a bi- to tri-racial structure, including increases in an array of socioeconomic resources for certain nonwhite groups (e.g., Asians), rising rates of interracial unions and non-white immigrant populations, and the increasingly popular notion that the significance of race is declining. This shift in the racial hierarchy and the ensuing importance of skin color as a determinant of racial/ethnic inequality holds significant implications for the nature of health disparities.

In addition to the lack of studies examining skin tone variations in health among African Americans, there has been a dearth of research on the extent to which skin color intersects with other key systems of stratification to shape health. A majority of research on health disparities has examined the impact of a single dimension of inequality, or the additive or multiplicative effects of race/ethnicity, gender, and SES in particular. This general approach in the literature overlooks the synergistic effects of social statuses other than the "holy trinity" of stratification (Massey 2008). Furthermore, the limited work that has considered multiple social statuses in the study of skin color and health has focused on the independent or additive consequences of skin

color, gender, and SES. Similar to the limitations discussed above, these studies do not account for the simultaneous advantages and disadvantages experienced by members of the same social group. Consequently, the multifaceted nature of health inequalities in a changing racial context remains unclear.

A final limitation of prior population health research is the relative inattention to the role of age. Few studies have explicitly examined how the independent and joint effects of social statuses may differ by age and stage of the life course. A notable exception is work on the weathering hypothesis, which posits that social disadvantages and inequalities culminate throughout their lives to accelerate the physiological aging of African Americans compared to their white counterparts (Geronimus 1991). The research on weathering therefore constitutes early evidence of the extent to which age intersects with race, gender, and SES to shape health and well-being (e.g., Geronimus et al. 2001; Geronimus et al. 2006; Taylor 2008). While this literature provides rich information regarding the social stratification of health, these initial studies of intersecting disadvantaged statuses suffer from several limitations. For example, most of these studies focus on the health experiences of whites and African Americans, leaving unknown the extent to which the physiological aging of other racial/ethnic minorities, such as Hispanics, differs from whites and African Americans. Additionally, these studies do not explicit test multiple jeopardy or intersectionality hypotheses with longitudinal data, which is necessary when investigating the cumulative effects of life events and experiences on health. Explicitly incorporating a life course perspective into the study of social statuses and health would help provide an improved understanding of health inequality across age. Specifically, a life course perspective posits that historical, biographical, and social contexts throughout one's life span cumulatively combine to shape life chances (Elder, Johnson, and Crosnoe 2003; Thorpe and

Kelley-Moore 2013). This perspective highlights the interplay between structural and agentic factors that works to shape developmental pathways and the nature and significance of transitions between social events and roles (Elder 1998; Pearlin 2010). Furthermore, a life course approach conceptualizes age as a social construction whose meanings structure lives through age-related expectations, sanctions, and timetables. Consequently, age not only represents an objective point in one's life, but also a subjective understanding of the temporal nature of life. Age is thereby infused with social and personal meanings that are consequential for a host of life chances, including health (Elder et al. 2003).

While age has long been considered an important dimension of stratification (e.g., Riley et al. 1972) and shown to be a significant factor in shaping trajectories of health and well-being (e.g., Ailshire and House 2011; Brown et al. 2016; Taylor 2008), scholars infrequently investigate the extent to which *intersecting* inequalities in health across multiple statuses increase, decrease, or remain stable with age (for exceptions, see Ailshire and House 2011; Brown et al. 2016; Clark and Maddox 1992). These patterns conform to three life course hypotheses of intracohort inequality: cumulative disadvantage, aging-as-leveler, and persistent inequality hypotheses, respectively. The implicit assumption that the effects of social statuses do not vary with age may limit our understanding of the dynamic nature of health disparities over the life course. Furthermore, the life course principle of timing (e.g., that the antecedents and consequences of life transitions, events, and behaviors vary according to *when* they occur in life) highlights the possibility that intersecting social statuses may differentially affect health depending on the stage of the life course (e.g., adolescence, young adulthood, midlife). Indeed, each life stage encompasses specific role transitions and expectations of social, familial, and economic accomplishments, which, in turn, may alter the health consequences of social statuses

at a particular age. Given these limitations, the extent to which age and stage of the life course condition the patterning of intersecting social inequalities remains unclear.

RESEARCH QUESTIONS

In this dissertation, I integrate social stratification, colorism/pigmentocratic, and life course literatures to investigate the extent to which race/ethnicity, skin color, gender, and SES intersect to shape age trajectories of health across adolescence, early adulthood, and mid-life. I consider four main research questions to address the limitations of prior research and better understand the unique and complex nature of health inequality among whites, African Americans, and Hispanics:

1. To what extent do race/ethnicity, gender, and SES intersect to shape health?
2. Do the intersectional effects of these social statuses widen, narrow, or remain stable with age?
3. Does skin tone account for variations across an array of health outcomes among African Americans?
4. How does skin tone stratification in health vary by gender and change across the life course?

These research questions require both a between- and within-group approach. Accordingly, I employ longitudinal panel data from two sources. For questions 1 and 2, I utilize 15 waves of data from the National Longitudinal Survey of Youth (NLSY) 1997 cohort. These waves were collected between 1997 and 2011, when respondents were 13 to 31 years old. For questions 3 and 4, I draw on 8 waves of data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study, which encompass the years between 1985 and 2011, and ages 25 to 55. My outcomes of interest are body mass index (BMI) for questions 1, 2, and 4, and a combination of

objective and self-reported health measures for question 3, including allostatic load, self-rated health, hypertension, diabetes, and heart disease. The research questions that frame my dissertation are addressed in three distinct papers, which are outlined in more detail below.

PROJECT OVERVIEW

The first paper draws on multiple-hierarchy stratification and life course perspectives in tandem with panel data from the National Longitudinal Survey of Youth (NLSY) 1997 cohort (ages 13-31) to examine the extent to which racial/ethnic inequalities in BMI are gendered and/or classed, and whether the intersectional effects of race/ethnicity, gender, and SES result in widening, narrowing, or persistent BMI gaps as people age. This study will be among the first to investigate the joint consequences of race/ethnicity, gender, SES of origin, and age on BMI trajectories among whites, blacks, and Hispanics. Additionally, this study examines individuals during a critical stage of the life course: the transition to adulthood. This period of life is typically characterized by several demographic and life transitions (e.g., completing education, joining the workforce, marriage, and childbearing) that are shaped, in part, by health and have implications for future life chances (Arnett 2007; Rindfuss 1991). Thus, it is paramount to understand how social factors affect BMI trajectories between adolescence and early adulthood.

The second paper utilizes the colorism literature and data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study to systematically investigate whether skin tone accounts for variations in health (across multiple health measures) among African American adults (ages 25-55), and the extent to which socioeconomic resources mediate the skin tone-health relationship. This study extends prior research by providing an extensive overview of skin tone stratification in physical health across an array of outcomes including biomarkers, self-rated

health, and fatal chronic diseases. The results of this study will shed light on a pertinent and understudied source of heterogeneity among African Americans.

The third paper draws on the CARDIA study to investigate the extent to which skin tone, gender, and SES jointly combine to shape BMI trajectories from early adulthood to middle life (ages 25-55). By combining multiple-hierarchy, colorism/pigmentocratic, and life course perspectives, this study examines skin tone variations in BMI trajectories among African Americans. Specifically, the third study evaluates the extent to which skin tone inequalities in BMI are gendered and/or classed, and if the intersectional effects of skin color, gender, and SES change with age. This paper will be among the first to investigate the effects of an understudied dimension of stratification (skin color) on health and how the consequences of skin tone vary with age and interact with other social statuses to shape health trajectories.

SIGNIFICANCE AND CONTRIBUTIONS OF THIS DISSERTATION

This dissertation project extends the population health literature in several important ways. First, by combining multiple-hierarchy stratification, colorism/pigmentocratic, and life course perspectives, this dissertation investigates how multiple dimensions of inequality intersect to shape health over the life course. As a result, the three papers of this dissertation will provide a more nuanced understanding of health disparities by identifying marginalized groups that may experience the disproportionate burden of health risks and exposures. These groups, who arguably require increased attention by policymakers, may be overlooked in studies that utilize a unidimensional approach. Furthermore, the perspectives that frame this project explicitly highlight the ways in which social statuses *multiplicatively* combine to influence the health of social groups across different stages of the life course. Prior studies have either assumed dimensions of stratification to be autonomous of one another, with social categories having

additive effects on health, or have focused on their joint consequences in middle- or late-life among whites and African Americans (e.g., Ailshire and House 2011; Hayward et al. 2000; Hinze et al. 2012). This leaves uncertain the extent to which simultaneous social statuses intersect to shape trajectories of health, particularly in early life (e.g., adolescence and young adulthood). This dissertation therefore extends prior research by explicitly investigating the interactive effects of social statuses on health among whites, African Americans, and Hispanics in adolescence, early adulthood, and middle life. It is important to incorporate Hispanics into studies of multiple disadvantaged statuses and health because this population subgroup represents one of the fastest growing minority groups in the U.S. Furthermore, understanding the dynamic and complex nature of health inequality in early life among an array of racial/ethnic groups is critical given its implications for the future health, productivity, and social and economic well-being of the U.S.

Second, the combination of multiple-hierarchy stratification and life course perspectives allows for between- and within-group approaches to the study of health disparities. A between-group approach highlights the effects of varying positions in the social hierarchy on health, while a within-group approach leads to greater specificity in the identification of mechanisms underlying health among social groups (Schwartz and Meyer 2010). Using both approaches is crucial to understanding and addressing social inequality in health across several stages of the life course. For example, identifying varied pathways to health *within* social groups—pathways that are often erroneously treated as homogenous and static throughout the life course—highlights the consequences of simultaneously experienced social statuses that differentially position individuals in the social hierarchy. Accordingly, the three papers of this dissertation

draw, concurrently, on between- and within-group approaches to examine the joint effects of social statuses on health trajectories.

Third, the integration of literature on colorism and pigmentocratic perspectives into the study of intersecting social statuses and health enhances our knowledge of whether and how additional systems of stratification differentiate pathways to health among social groups. In particular, skin color is an important, yet understudied dimension of inequality that has long influenced the life chances of African Americans (Hughes and Hertel 1990; Keith and Herring 1999; Monk 2014). Scholars have noted that skin color is becoming an increasingly important marker of inequality and status due to a number of population and social trends. These trends are creating a more complex and loosely organized racial order in the U.S. that is based on skin tone, which may ultimately alter the consequences of racial/ethnic stratification (Bonilla-Silva 2004). Investigating the extent to which skin color works independently and in tandem with social statuses to shape health is important for understanding the nature of health inequality during this time of changing social structures and racial contexts. Furthermore, the inability of prior research to explain between-group differences in health (e.g., Cummings and Jackson 2008; Hayward et al. 2000; Williams and Sternthal 2010; Williams 2012) necessitates the incorporation of other social factors into the study of health inequality. To address these limitations, this dissertation systematically investigates the relationship between skin color and multiple indicators of health, as well as the joint consequences of skin color, gender, SES, and age on health among African Americans between early adulthood and mid-life. Results of these studies will likely have great utility for understanding the dynamic nature of health disparities both within and between racial/ethnic, skin color, gender, and socioeconomic groups.

Lastly, by explicitly conceptualizing and investigating how prominent and understudied dimensions of inequality combine with age and stage of the life course to influence health, this dissertation project bridges social stratification and life course literatures. Prior research on intersecting social statuses and health has generally overlooked the impact of age and stage of the life course on patterns of health inequality, while life course studies have generally focused on the independent or additive effects of race/ethnicity, gender, and SES. Integrating these two literatures is essential for identifying specific social groups who bear the disproportionate burden of disease at particular stages of the life course.

CHAPTER II

Combining Multiple-Hierarchy Stratification and Life Course Perspectives to Understand BMI Trajectories Across Adolescence and Early Adulthood

Abstract

Prior research on health disparities has typically employed unidimensional or additive approaches to understanding the social stratification of health. These approaches assume that the effects of social statuses, including race/ethnicity, gender, and socioeconomic status (SES), are independent systems of stratification. However, assuming that systems of stratification are autonomous structures of inequality overlooks the unique and simultaneous positions of power and disadvantage within which individuals are situated, and may lead to inaccurate conclusions regarding the nature of health inequality. To address the limitations of prior research, this study combines multiple-hierarchy stratification and life course perspectives to evaluate how race/ethnicity, gender, and SES interact to shape trajectories of BMI between adolescence and young adulthood. Using data from the National Longitudinal Survey of Youth (NLSY) 1997 cohort (ages 13-31) and growth curve models, this paper examines the extent to which racial/ethnic inequalities in BMI are gendered and/or classed, and whether the intersectional effects of race/ethnicity, gender, and SES result in widening, narrowing, or persistent gaps across age among whites, blacks, and Hispanics. Results suggest that race/ethnicity, gender, and SES combine in a multiplicative fashion to shape BMI trajectories. More specifically, racial inequality in BMI is greatest among women, with black women experiencing the highest BMI, and greatest increases in BMI with age. Additionally, findings indicate that socioeconomic resources are less protective for blacks and Hispanics compared to their white counterparts. Overall, these results are broadly consistent with intersectionality and cumulative disadvantage hypotheses. The examination of trends in BMI during key stages of the life course (e.g. adolescence, the transition to adulthood, early adulthood) sheds light on the particular life stages during which inequalities in BMI emerge, peak, and possibly begin to wane, thereby helping to identity relevant points of intervention.

INTRODUCTION

Race/ethnicity, gender, and socioeconomic status (SES) comprise the "holy trinity" of social stratification (Massey 2008). As key dimensions of inequality, these social systems structure the unequal allocation of desired resources and social power, both of which are crucial to health and well-being. Indeed, racial/ethnic, gender, and socioeconomic inequalities in health are well-documented in the population health literature. Disadvantaged groups, namely blacks, Hispanics, women, and those of lower SES, tend to have worse health compared to their more advantaged counterparts across an array of outcomes, including body mass index (BMI; Bird and Rieker 2008; Braveman et al. 2005; Farmer and Ferraro 2005; Link and Phelan 1995; Ogden et al 2014; Pleis, Ward, and Lucas 2010; Read and Gorman 2010; Wang and Beydoun 2007). Moreover, studies have documented that the average BMI in the U.S. has increased in recent decades for all social groups, and that BMI disparities along racial/ethnic, gender, and SES lines persist (Clarke et al. 2009; Ogden et al 2014).

While previous research has provided ample evidence that race/ethnicity, gender, and SES independently structure health, few studies have investigated the extent to which these dimensions of stratification *combine* to shape trajectories of health. More specifically, the majority of studies of health disparities has focused on either racial/ethnic or gender inequality in health, with little consideration of how the experience or consequences of racial/ethnic inequality may be gendered or how gender inequality may be racialized. These unidimensional approaches that predominate the population health literature may lead to inaccurate conclusions regarding the social stratification of health because they overlook the unique and simultaneous positions of power and disadvantage within which individuals are situated (Collins 2000; Dill and Zambrana 2009; Ore 2003). The limitations of prior research necessitate a more nuanced approach to the

study of social statuses and health, such as a multiple hierarchy stratification perspective. Consistent with a central tenet of sociology—that life chances are shaped by a host of social factors—multiple-hierarchy stratification perspectives seek to understand how social statuses intersect over the life course to shape various life chances, including health (Brown et al. 2016; Clark and Maddox 1992; Jeffries and Ransford 1980). Compared to unidimensional approaches to stratification, multiple-hierarchy stratification approaches have greater utility for understanding complex patterns of social disparities in health (Brown and Hargrove 2013). For example, a recent study by Ailshire and House (2011) uses an intersectionality framework to identify specific groups, defined by race/ethnicity, gender, SES, and age, that experience the disproportionate burden of weight gain in the U.S between early and middle adulthood. By explicitly focusing on the simultaneous and multiplicative effects of social statues, these authors provide an improved understanding of healthy inequality. More specifically, these authors are able to highlight the unique experiences of disadvantaged groups that may have been overlooked when using a traditional, unidimensional approach.

Another limitation of prior research on health disparities is the lack of attention given to aging. Few studies have considered how the independent and joint effects of social statuses may differ by age and stage of the life course. An exception, however, is research on the weathering hypothesis, which posits that African Americans experience accelerated physiological aging due to the cumulative effects of social inequality (Geronimus 1991). Studies on weathering provide early evidence of interactions among social statuses, most notably race, gender, social class, and age. Results from these studies show that African Americans of varying socioeconomic statuses tend to experience poor and worsening health at earlier ages compared to their white counterparts (Geronimus 1992; Geronimus et al. 2001; Taylor 2008). The literature on weathering, however,

has focused primarily on African American-white disparities, and has generally relied on cross-sectional data. Consequently, although age has long been considered and shown to be an important dimension of stratification (e.g., Geronimus et al. 2006; Riley, Johnson, and Foner 1972), scholars infrequently consider the extent to which the joint consequences of racial/ethnic, gender, and SES inequality in health increase, decrease, or remain stable with age. The implicit assumption that the effects of race/ethnicity, gender, and SES are additive and do not vary with age may limit our understanding of the dynamic nature of BMI disparities over the life course.

This study aims to address these prevailing gaps in the literature by investigating the extent to which race/ethnicity, gender, SES of origin, and age intersect to shape BMI inequalities from adolescence to early adulthood. By drawing on multiple-stratification hierarchy and life course perspectives, this study addresses two central research questions. First, to what extent are racial/ethnic inequalities in BMI gendered and/or classed? Second, do the intersectional effects of race/ethnicity, gender, and SES of origin result in widening, narrowing, or persistent gaps with age during the transition from adolescence to early adulthood? To answer these questions, I investigate group differences in BMI among non-Hispanic white, non-Hispanic black, and Hispanic American men and women aged 13-31 using the National Longitudinal Survey of Youth 1997 Cohort (NLSY97). BMI is a particularly important health outcome to investigate among adolescents and younger adults given the negative impact of being overweight or obese on physical, mental, and emotional health (Allison et al. 1999; Carr and Friedman 2005; Must et al. 1999; Onyike et al. 2003; Paeratakul et al. 2002; Wang et al. 2011). These adverse and potentially accumulating consequences of being overweight or obese at a young age have implications for the larger population, as projections suggest that by 2030, health care costs attributable to being overweight or obese will total over $800 billion, accounting for 16-18% of

the total U.S. health care costs (Wang et al. 2008). Identifying the social groups most plagued by increasing BMI is critical for developing efficacious strategies to eliminate health inequality.

BACKGROUND

Social Disparities in BMI

Recent estimates of the obesity epidemic in the U.S. suggest that 32% of youth and 69% of adults are overweight or obese (Ogden et al. 2014). Rates of overweight and obesity are socially patterned, with blacks and Hispanics, women, and those of lower SES having higher prevalence rates than their white, male, and higher SES counterparts (Clarke et al. 2009; Flegal et al. 2002; Ogden et al. 2014; Wang and Beydoun 2007; Zhang and Wang 2004). Furthermore, some studies have found that racial/ethnic differences in BMI are larger among women (Ailshire and House 2011; Flegal et al. 2002). These patterns in BMI are consistent with the 'fundamental causes' of disease theory, which posits that social factors shape access to important resources (e.g., knowledge, power, money, prestige) that can be used to avoid health risks or ameliorate the consequences of disease after its onset (Link and Phelan 1995). Two of these important resources are education and income. Previous studies suggest that education and income work through shared, yet independent mechanisms to affect health across age (Taylor 2010). In particular, education is typically completed by early adulthood and embodies an intrinsic resource that may impact psychosocial and social processes that are consequential for health. For example, higher levels of education may facilitate the development of an individual's sense of control over his or her life, increase health-promoting knowledge, and encourage healthier behaviors and utilization of preventative and therapeutic health care (Herd et al. 2007; Ross and Mirowsky 2003).

Income, however, is an instrumental resource that represents the tangible means to act on knowledge gained from increased education. It enables direct access to health care, allows

individuals to acquire material resources necessary for health promotion, such as healthy foods, and provides the means for reducing exposure to psychosocial toxins in work and home environments (Herd et al. 2007; House and Williams 2005). Additionally, income is more dynamic over the life course than education, generally growing in early adulthood to middle age, stabilizing, then declining in later life (Duncan 1988). The dynamic nature of income may therefore result in a stronger impact on the progression or development of health issues for certain social groups. Given that blacks, Hispanics, and women tend to be of lower socioeconomic status (Massey 2008; Read and Gorman 2010; Williams and Sternthal 2010), these groups often have less access to tangible health-promoting resources, resulting in worse health compared to whites, men, and those of higher SES (Link and Phelan 1995; Ogden et al. 2014; Wang and Beydoun 2007; Williams and Mohammed 2013; Zhang and Wang 2004).

In addition to adult SES, parental SES or SES of origin is significantly associated with rates of BMI and obesity through adolescence and adulthood. Specifically, individuals growing up in poverty or low socioeconomic contexts are more likely to be overweight or obese than their advantaged counterparts (Haas et al. 2003; Laitinen, Power, and Järvelin 2001; Lee et al. 2014; Shrewsbury and Wardle 2008; Strauss and Knight 1999). Furthermore, several principles of the life course perspective suggest that parental SES may have a particularly powerful impact on weight gain in adolescence and later stages of life. For example, the *principle of timing* suggests that the consequences of life events and transitions vary according to when they occur in an individual's life (Elder, Johnson, and Crosnoe 2003; Mannheim 1952). There are critical or sensitive periods during which social exposures (e.g., in early life) have lasting effects and may permanently alter trajectories of health, resulting in disease and mortality in adulthood. SES of origin may therefore impact the health of adolescents and young adults in several ways. First,

parental SES has significant implications for the accumulation of socioeconomic resources among children. Parents with higher levels of education and income, for example, are better able to provide the environment and resources necessary to increase their children's subsequent socioeconomic circumstances (Blau and Duncan 1967; Haas and Rohlfsen 2010). Second, the health-related knowledge, behaviors, and resources of parents that are displayed or espoused in the household may facilitate the development of lifelong patterns, dispositions, and understandings of healthy living among children (Lau, Quadrel, and Hartman 1990; Story, Neumark-Sztainer, and French 2002; Wickrama et al. 1999).

Additionally, the life course *principle of linked lives* posits that exposures and events experienced by an individual's social network can have an impact on one's own health trajectory (Elder et al. 2003). Relationships in social networks are reciprocal and dynamic such that the socioeconomic resources of parents, for example, may affect subsequent determinants of health for children, such as SES, health-promoting knowledge, and resources to increase healthy living (Hayward and Gorman 2004). Consequently, blacks and Hispanics, who are also more likely than whites to experience early life socioeconomic disadvantage (Warner and Brown 2011), may begin and remain in worse health between adolescence and early adulthood.

While social scientists have long recognized that higher rates of physical morbidity and mortality among racial/ethnic minorities are shaped by social class and a variety social contextual factors (e.g., DuBois 1899; Engels [1845] 1984; Williams 1997), a majority of studies on health disparities has focused on the role of SES. The population health literature has generally shown that group differences in SES account for a substantial portion of racial/ethnic and gender disparities in health, yet they often do not completely explain these gaps, including BMI disparities (Cummings and Jackson 2008; Hayward et al. 2000; Read and Gorman 2010;

Robert and Reither 2004; Williams 2012). These residual gaps have led researchers to consider the "added burden of race" (Williams 1996), which cites racism as a critical, yet often overlooked, contribution to health inequality. More specifically, forms of institutional racism (e.g., race-based residential segregation) and interpersonal racism (e.g., discrimination) have been shown to affect an array of health outcomes through multilevel pathways, including access to opportunities and desired socioeconomic resources, exposure to stressors, and residence in neighborhoods characterized by concentrated social and economic disadvantages (Gee and Ford 2011; Pager and Shepard 2008; Williams 2012; Williams and Collins 2001; Williams and Mohammed 2013). Given that blacks and Hispanics are more likely to experience discrimination than whites (Barnes et al. 2005; Massey and Denton 1993; Pager and Shepard 2008; Turner and Avison 2003; Williams et al. 1997), racism may be a particularly important mechanism underlying social disparities in BMI.

Although many studies find that BMI varies along racial/ethnic, gender, and SES lines, the evidence regarding the nature of these disparities over time is mixed. For example, while prior research generally indicates that BMI increases with age for all social groups (e.g., racial/ethnic, gender, SES, and age groups) (Ogden et al. 2006), several longitudinal and repeated cross-section studies suggest that BMI increases more rapidly with age for women, blacks, and Hispanics compared to their male and white counterparts (Clarke et al. 2009; Lee et al. 2011; Ogden et al. 2014). A recent study also finds differences in BMI trends by race-gender groups, with BMI increasing among men of all races with age, but only significantly increasing for black and Mexican American women (Flegal et al. 2012). Additionally, research on socioeconomic disparities in BMI across age provides inconsistent results. One study, for example, finds that individuals with less education experience greater increases in BMI with age

compared to those with more education (Clarke et al. 2009), while others find that those of higher SES actually experience more rapid increases in BMI (especially among women), resulting in a narrowing SES gap in BMI (Zhang and Wang 2004). Furthermore, a study by Mujahid and colleagues (2005) suggests that specific socioeconomic resources (e.g., education and income) may actually be positively related to BMI trajectories among blacks, yet negatively associated with BMI change among white men and women. In addition to these mixed findings, research on socioeconomic inequality in BMI is lacking investigations of the extent to which *SES of origin* shapes BMI trajectories in adolescence and early adulthood. SES of origin likely contributes to health among adolescents and young adults in unique ways given its impacts on social and economic experiences in early life and subsequent socioeconomic circumstances. Moreover, SES of origin may be a more appropriate measure for studying health at this stage of the life course, as adolescents and young adults are likely still establishing their own socioeconomic statuses (e.g., Arnett 1997; Settersten and Hagestad 1996).

Conceptual Framework

Multiple-Hierarchy Stratification Perspectives on Health Inequality

Although social disparities in BMI have been well-documented, the degree to which multiple social statuses combine to shape health is largely unknown. More specifically, a majority of past research has focused on the independent or additive effects of race/ethnicity, gender, SES, and age on BMI trajectories, with little attention to how these statuses may intersect or condition the effects of each other on BMI. A notable exception, however, is the literature on the weathering hypothesis. In particular, studies investigating the process of weathering have provided some insight into how age may intersect with social statuses to influence health. Stemming from the field of epidemiology and focusing on the unique disadvantages of middle-

class Blacks, particularly women, the weathering hypothesis posits that African Americans experience early health deterioration relative to their white counterparts as a consequence of cumulative experiences with adverse social, economic, and political conditions and circumstances (Geronimus 1991; Geronimus et al. 2001). By conceptualizing age as not only a developmental measure, but also as a reflection of the health consequences of lifelong social inequality (Geronimus 1991), the literature on weathering constitutes early evidence of race, gender, class, and age interactions. These studies further highlight racial/ethnic, gender, and socioeconomic differences in the aging process, such as the onset and progression of health problems (Geronimus 2001; Taylor 2008). While the weathering hypothesis underscores the joint health consequences of age and other social statues, this literature suffers from a number of limitations. For example, most studies on weathering focus exclusively on whites and African Americans, with little consideration of other racial/ethnic minority groups. Furthermore, few studies have explicitly tested whether these social statuses intersect and combine in a *multiplicative* fashion to influence health, and explored how joint these consequences unfold across the life course using longitudinal data.

In the absence of attention to how social factors work together to jointly affect health, the prevailing assumption remains that these statuses are autonomous structures of inequality. Addressing this limitation of prior research requires the use of a multiple-hierarchy stratification perspective, which seeks to investigate the ways in which social statuses interact over the life course to shape health (Brown et al. 2016; Clark and Maddox 1992; Jeffries and Ransford 1980). This perspective is closely related to, and articulated by, intersectionality theory. Intersectionality posits that inequalities based on various social factors—including race/ethnicity, gender, and SES—interact in multiplicative ways to mutually construct one another and produce unique

social contexts that condition the lived experiences and life chances of the individuals situated within those contexts (Collins 2000). Stemming from black feminist legal scholarship, theories of intersectionality seek to capture the impacts of the cumulative "interlocking systems of oppression" (Ore 2003) embedded in the simultaneity of social statuses (Crenshaw 1989; King 1988; Caldwell et al. 2006; Dill and Zambrana 2009). Moreover, they bring attention to the fluidity of boundaries and differential power relations between and within social groups. As a result, individuals located at similar intersections in the social structure may have shared—but not equivalent nor essentialized—experiences (Crenshaw 1989; King 1988; Ore 2003; Collins 2004; Caldwell et al. 2006; Dill and Zambrana 2009). Intersectionality therefore highlights both between- and within-group differences in life chances.

By emphasizing the simultaneous and multiplicative effects of social statuses, an intersectionality framework challenges the dominant perspective in the existing health literature, which generally views social categories as having independent, additive effects. According to this dominant perspective, commonly referred to as the multiple jeopardy hypothesis, the poor health of multiply disadvantaged individuals is due to the sum of the disadvantages associated with each social status. Low SES women of color, for example, would have the worst health because of the disadvantages associated with being poor, a woman, and a racial/ethnic minority (Beal 1970). These additive approaches, however, are argued to be over simplistic and insufficient because they ignore the interdependence among racism, sexism, and classism (King 1988). More specifically, the interdependence of systems of inequality creates different contexts in which the forms and consequences of sexism and classism vary by race, racism and classism vary by gender, and racism and sexism vary by social class (e.g., Weber 2010). Furthermore, additive approaches overlook other factors that shape the importance of any one status or system

of oppression. These factors include the particular aspect of life or social phenomenon being investigated, the reference group to whom one is being compared, and the socio-historical context in which lives are experienced. Moreover, the *a priori* assumption that the consequences of race/ethnicity, gender, and socioeconomic inequality are additive reinforces the notion that social statuses and identities are autonomous dimensions of stratification (King 1988). Consequently, additive approaches ignore how other social statuses influence the likelihood of, and responses to, various lived experiences.

Few studies have investigated the joint consequences of race/ethnicity, gender, and SES on health, particularly with regards to BMI. Research on the multiplicative effects of social statuses on health in general has mainly focused on interactions between just two categories. These studies have generally found that racial/ethnic health inequality is larger among women (e.g., Brown and Hargrove 2013; Umberson et al. 2014) and that there are diminishing returns to increasing socioeconomic resources among blacks and Hispanics compared to whites (Cummings and Jackson 2008; Farmer and Ferraro 2005; Pearson 2008). Research that specifically examines trajectories of BMI has additionally suffered from several limitations. For example, most studies only considered trends among blacks and whites (excluding Hispanics), or have utilized a configurational approach, whereby groups comprised of multiple social status, such as black women or Hispanic men, are compared to a reference group, usually white men (Alon 2007). Further, many of these studies have not explicitly examined statistical interactions between social statuses. For example, Ailshire and House (2011) examined the interactive effects of race and gender among groups of different socioeconomic positions (defined by education and income). They found that low SES black women experienced the highest BMI at baseline (ages 25-39) while high SES whites had the lowest BMI at baseline. In their study, however, Ailshire

and House only considered explicit interactions between race and gender among blacks and whites, omitting the examination of Hispanics as well as statistical tests for the potentially conditioning effect of SES. Additionally, Clarke et al. (2009) found that BMI was consistently higher for racial/ethnic minorities, women, and those of lower SES. Similar to the limitations of Ailshire and House (2011), Clarke and colleagues examined two-way interactions (between gender and adult SES, race and adult SES, and childhood and adulthood SES) rather than a three-way interaction between race, gender, and SES. Findings from this study suggested that the effects of social statuses were additive rather than multiplicative. A further limitation of these past studies is that they have tended to focus on a broad age range of older adults, without attention to the joint consequences of social factors on BMI trajectories during adolescence and early adulthood. The transition to adulthood is a particularly important stage of the life course to examine given the number of demographic transitions that occur during this time (e.g., completing education, joining the workforce, marriage, childbearing) and the unique challenges facing young adults (Rindfuss 1991).

Given the limitations of prior research, the extent to which race/ethnicity, gender, and SES combine to shape BMI trajectories remains unclear. By drawing on multiple-hierarchy stratification perspectives, this study aims to investigate the interactive effects of race/ethnicity, gender, and SES on trajectories of BMI among whites, blacks, and Hispanics from adolescence through early adulthood. Based on theory and empirical evidence, I hypothesize that race/ethnicity, gender, and class will combine in a multiplicative fashion, leading women of color from lower socioeconomic statuses to have the worst health while white men from higher socioeconomic statuses will experience the best health. Additionally, socioeconomic resources will not be as salubrious for BMI among blacks and Hispanics, especially black and Hispanic

women, given increased exposure to race-based and gendered stressors at higher levels of socioeconomic status (Pearson 2008).

Integrating Multiple-Hierarchy Stratification and Life Course Perspectives

Age is an additional dimension of stratification that is rarely considered in the literature on social disparities in health (Riley et al. 1972). It is important to examine the extent to which the patterns and nature of health inequality vary by age given the potential for health risk and protective factors to accumulate or dissipate over the life course. Three life course hypotheses have been proposed to describe how the nature of health inequalities may change with age. First, the *aging-as-leveler hypothesis* asserts that while aging affects all individuals, the negative consequences of aging may disproportionately impact those of advantaged statuses because socially disadvantaged groups who survive to older ages, despite elevated exposures to social and economic adversities across the life course, may constitute a selective, robust group of individuals (House et al. 1994; Preston, Hill, and Drevenstedt 1998; Yang and Lee 2009). Thus, the aging-as-leveler hypothesis predicts that disparities in health should diminish with age (House et al. 2005; Haas and Rohlfsen 2010; Shuey and Willson 2008). The second hypothesis is *persistent inequality*, which posits that health disadvantages hold over time, with age leaving the nature of health disparities unaltered. This hypothesis therefore predicts that gaps in health are stable across the life course (Henretta and Campbell 1976).

Lastly, the *cumulative disadvantage hypothesis* maintains that health trajectories of advantaged and disadvantaged individuals widen with age (Dannefer 1987; DiPrete and Eirich 2006; O'Rand 1996; Willson et al. 2007). Individuals with initial advantages accumulate more health-relevant resources and opportunities over time, while individuals with early exposure to disadvantage likely acquire more disadvantages and risks with age. Thus, cumulative advantages

and disadvantages over the life course magnify health inequalities with age, resulting in widening health gaps.

The extent to which one of the three life course hypotheses best explains health over time, and how specific stages of the life course condition the patterning of racial/ethnic, gender, and class inequalities remains unknown due to several limitations of prior research. For example, as previously discussed, most longitudinal studies have assumed that social statuses are additive in nature, leading researchers to only consider the independent effects of racial/ethnic, gender, and socioeconomic inequality on BMI trajectories. Prior research has therefore given little attention to how these social factors may combine in a multiplicative fashion, and further intersect with age and stage of the life course. Given the life course principle of timing, it is possible that age dynamics in conjunction with race/ethnicity, gender, and SES of origin may vary across different stages of the life course (e.g., adolescence, young adulthood, midlife) to shape health trajectories. While accumulating evidence suggests that health disparities increase through midlife before waning in later life among older adults (Brown, O'Rand, and Adkins 2012; Shuey and Willson 2008; Willson et al. 2007), few studies have investigated the nature of health inequality between adolescence and early adulthood. It is likely, however, that social inequalities in BMI along racial/ethnic, gender, and socioeconomic lines will increase between adolescence and early adulthood.

DATA AND METHODS

Data

This study uses data from waves 1-15 of the 1997 National Longitudinal Survey of Youth (NLYS97). The NLSY is an ongoing panel study that collects information on employment, income, education, family dynamics, dating, crime and substance abuse, and health. The baseline

interview for the NLSY97 (conduced in 1997) targeted individuals born between 1980 and 1984, when respondents were between the ages of 12 and 17), This initial interview was comprised of two subsamples. The first was a representative sample of people living in the United States during 1997 and who were born between January 1, 1980 and December 31, 1984 (N=6,748). The second was an oversample of African Americans and Hispanics (N=2,236), resulting in a total sample size of 8,984. Stratified, multistage probability sampling was used to generate the two subsamples. Respondents were interviewed annually from 1997-2011, with retention rates ranging from 82% to 94% (average retention rate is 86%). The NLSY97 cohort has nearly equal amounts of males (51%) and females (49%) and a substantial proportion of non-Hispanic blacks (26%) and Hispanics (21%).

Dependent Variable

The outcome of interest is body-mass index (BMI). Self-reported weight (in pounds) and height (in inches) were measured in every round of data. Self-reports of weight and height have been shown to have low reporting error and are considered to be reliable estimates of BMI (Ailshire and House 2011; Gorber et al. 2007). This information was used to create a BMI variable for each respondent at each round of data based on the standard equation:

$$BMI = weight\ (lb) / [height\ (in)]^2 \times 703.$$

BMI values smaller than 11 or larger than 70 were treated as missing, and women who were pregnant were excluded from the analyses. Supplemental analyses showed that the main findings were robust to alternative ranges of BMI and approaches to handling outliers.

Independent Variables

Social Statuses. Three binary variables measure self-reported *race/ethnicity*: non-Hispanic white (yes=1); non-Hispanic black (yes=1); and Hispanic (yes=1). Non-Hispanic

whites serve as the reference group. Only U.S. born respondents are considered in the analyses given the documented immigrant advantage in BMI (Hao and Kim 2009; Oza-Frank and Cunningham 2010). *Gender* is indexed by a dummy variable (0=men; 1=women) and *age* is measured in years (ages 13-31). Given the age of the respondents at baseline and theoretical evidence suggesting parental SES may be particularly consequential for adolescent and young adult health, *socioeconomic status of origin* is used in the analyses and measured by parental educational attainment and household income-to-poverty level ratio. Parental educational attainment ranged from 1-20 years, and reflects the average of parents' educational levels at baseline or the educational attainment of the sole parent in the case of single-parent households. Supplemental analyses also showed that the findings were robust to alternative operationalizations of parental education (e.g., using only the highest educated parent regardless of household structure). Parental household income to poverty ratio ranged from 0.00-32.27, wherein values below 1 indicated respondents were living in poverty. The income to poverty ratio represents an ideal measure of tangible and expendable resources available in the household than income alone because it takes into account family size and composition, both of which effect the accessibility and use of income.

Control Variables. To account for differential rates of *attrition due to dropout*, a measure of the proportion of waves a respondent was not interviewed is included in the models (Brown et al. 2012). Additionally, given the disproportionate rates of incarceration for blacks and Hispanics during late adolescence and early adulthood, particularly among men (Alexander 2010), the models also include a measure of whether the respondent was *ever incarcerated* during the study (yes=1). All models control for whether the respondent lives in an *urban environment* (yes=1) given racial/ethnic differences in neighborhood contexts (Massey and Denton 1993; Williams

and Collins 2001) and the robust relationship between the built environment and health, including BMI (Ewing et al. 2014; Gordon-Larsen et al. 2006). Lastly, the models examining the effect of parental education on BMI control for a measure of whether the respondent *grew up in a two-parent household* (yes=1) to account for differences in parental education across household types.

Analytic Strategy

The research questions are addressed in two stages. First, I use multilevel models estimated within a mixed model framework to examine the joint consequences of race/ethnicity, gender, and SES of origin on the mean level of BMI among whites, blacks, and Hispanics between ages 13 and 31. These models are ideal for panel data because they adjust for correlations and non-independence of observations due to repeated measures of the same individual across multiple waves (Raudenbush and Byrk 2002). Given the sampling design of the NLSY97, responses may also correlate among clusters (e.g., students within schools). Both fixed effects of covariates and random effects for the intercept are included in the model. Estimating random effects for the intercept accounts for person-specific errors (or subject-specific deviations), which represent unobserved differences between individuals that are stable over time and not accounted for by the covariates. Main effects of, and interactions among, race/ethnicity, gender, and SES of origin on BMI are examined. A comparison of likelihood ratio tests (LRTs) indicated that including a quadratic term for age slightly improved the overall model fit. As a result, an age and age-squared term are included in each model. All models are also stratified by gender and chow tests are used to determine whether the effects of race/ethnicity, SES, and their interactions, statistically differ for men and women. Non-significant interactions among race/ethnicity, gender, and SES of origin would suggest that these social statues have

independent effects on BMI, and therefore, provide evidence supporting the multiple jeopardy hypothesis. Conversely, statistically significant interactions among race/ethnicity, gender, and SES of origin would provide evidence of multiplicative effects among these social statuses, and support the intersectionality hypothesis.

Second, I employ random coefficient growth curve models to 1) examine social inequalities in BMI trajectories from ages 13-31, and 2) statistically test whether the joint consequences of race/ethnicity, gender, and SES of origin narrow, widen, or remain stable with age. Growth curve models allow for the estimation of person-specific intercepts (initial value) and slopes (rate of change) that describe intra-individual variations in the effect of age on health. Model fit indices suggested that a quadratic growth curve with random intercepts and random linear and quadratic slopes provided the best fit to the data. Further analyses indicated that the model fit did not improve when regressing social statuses on quadratic slopes. For the sake of parsimony, models are stratified by gender, and coefficients for race/ethnicity, SES, and their interactions are regressed on the intercepts and linear age slopes only. Regressing these variables on the linear age slopes provides information regarding the three life course hypotheses. The persistent inequality hypothesis would be supported if age slopes were similar across groups (e.g., no significant effects of race/ethnicity, gender, and SES of origin on the age slopes). Conversely, support for the aging-as-leveler or cumulative disadvantage hypotheses would come from results indicating that health inequalities narrow or widen with age (e.g., evidence of significant effects of race/ethnicity, gender, and SES of origin on the age slopes).

RESULTS

Table 1 provides the means and proportions of all study variables at baseline by race/ethnicity and gender. Results show that BMI, SES, and control variables differ across

racial/ethnic and gender lines. More specifically, black women experience the highest BMI at baseline (age 13-17), followed by Hispanic men, black men, and Hispanic women. Furthermore, blacks and Hispanics have a lower SES of origin compared to whites. Women of color generally grew up in households with less income compared to other racial/ethnic-gender groups, and Hispanic men and women have parents with lower levels of educational attainment than other groups.

Table 1. Baseline Means and Proportions of Study Variables, by Race/Ethnicity and Gender[a]

	WM	WW	BM	BW	HM	HW
BMI	21.633	21.122*†	22.592*	23.235*†	22.768*	22.106*†
SES						
Parental Education	13.476	13.468*†	12.452*	12.491*†	11.255*	11.213*†
Income to Poverty Ratio	3.689	3.652*†	2.027*	1.963*†	2.270*	2.130*†
Age	14.953	15.010*†	14.978*	14.961*†	15.120*	14.885*†
Controls						
Two Parent Household	.781	.751*†	.446*	.460*†	.666*	.671*†
Proportion of Waves Missing	.143	.131*†	.129*	.080*†	.153*	.107*†
Urban Residence	.617	.599*†	.735*	.775*†	.861*	.893*†
Incarcerated (in 1998)	.004	.001*†	.016*	.000*†	.005*	.000*
N	1692	1552	669	636	518	462

[a] Based on information from respondents' baseline interview
* $p < .05$ for comparison of racial/ethnic-gender group to white men
† $p < .05$ for comparison between the men and women within racial/ethnic groups

Taken together, patterns from Table 1 suggest that those in the most privileged positions (e.g., high SES white men) tend to be advantaged in adolescence, while women of color appear to be the most disadvantaged racial/ethnic-gender groups in terms of health and SES of origin.

Joint Consequences of Race/Ethnicity, Gender, and Socioeconomic Status on Mean BMI

Table 2 presents multilevel models of BMI using data from waves 1-15 of the NLSY97. These models investigate the extent to which racial/ethnic differences in health are gendered and/or classed. Model 1 regresses race/ethnicity on the mean level of BMI across ages 13-31, while Model 2 adjusts for socioeconomic resources, and Model 3 includes the main effects of

race/ethnicity, SES, and their interactions. All models are stratified by gender and control for age, attrition, urban residence, and incarceration. Results from Model 1 suggest that BMI varies along racial/ethnic lines for both men and women. Blacks and Hispanics have a higher BMI than their white counterparts. Additionally, the statistically significant Chow test for the intercept and black coefficient indicates that white women have lower BMIs than white men, and that black-white inequality in BMI is greater among women than men; the latter finding is consistent with the intersectionality hypothesis. Moreover, results from Model 1 show that black women have the highest levels of BMI compared to other racial/ethnic-gender groups.

Model 2 adds SES measures to Model 1. The inclusion of socioeconomic status slightly reduces racial/ethnic disparities in BMI between white and Hispanic men, and white and black women. Parental education, which is negatively related to BMI for both men and women, explains the racial/ethnic BMI gap between white and black men and white and Hispanic women. Model 3 of Table 2 estimates the effects of race/ethnicity x gender x SES interactions on mean levels of BMI. The significant negative coefficients for the main effects of parental education for men and women indicate that parental education is inversely related to BMI among whites. Consistent with the intersectionality hypothesis, the negative coefficients of parental education in tandem with the positive coefficients for interactions between black/Hispanic and parental education among men suggests that parental education is less protective for black and Hispanic men compared to white men. Similarly, the significant positive coefficient for the interaction between Hispanic and parental education among women suggest that parental education is less protective against weight gain for Hispanic women compared to white women. The non-significant coefficient for the interaction between black and parental education among

women indicates that the association between parental education and BMI is similar for black and white women.

Table 2. Multilevel Models of Race/Ethnicity, Gender, SES, and BMI

	Model 1			Model 2			Model 3		
Fixed Effects [a]	Men	Women	[b] m≠w	Men	Women	m≠w	Men	Women	m≠w
Intercept	20.911***	20.106***	†	21.942***	23.372***		23.888***	25.130***	
Race (ref. White)									
Black	.574***	2.872***	†	.459[t]	2.411***	†	-2.553[t]	.213	
Hispanic	1.394***	1.387***		1.153***	.622[t]		-1.432	-1.650	
SES									
Parental Education				-.092***	-.203***		-.235***	-.328***	
Income to Poverty Ratio				.011[t]	.002		.010	-.013[t]	†
Race × SES									
Black × Parental Education							.235***	.154	
Hispanic × Parental Education							.197*	.179*	
Black × Income-Poverty Ratio							-.030[t]	.051*	†
Hispanic × Income-Poverty							.024	.002	
Age	.704***	.678***		.759***	.730***		.758***	.729***	
Age^2	-.016***	-.013***		-.018***	-.015***		-.018***	-.015***	
Random Effects									
Level 1 Residual	2.408***	2.903***		2.322***	2.818***		2.322***	2.817***	
Level 2 Intercept	4.583***	5.633***		4.715***	5.878***		4.710***	5.874***	
-2 Log Likelihood	11252102	10954253		7276302	7226512		7275179	7225830	
N	3945	3728		3674	3466		3674	3466	

[a] All models control for proportion of waves missing, urban residence, and whether the respondent was ever incarcerated
[b] 'm≠w' indicates Chow tests for differences between men and women
[t] $p<.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
† indicates a statistically significant ($p< 0.05$) difference in coefficients for men and women

Furthermore, the significant positive coefficient for the interaction between black and income among women suggest that increasing levels of income are not beneficial for black women in terms of BMI. Overall, the results suggest that there are diminishing returns to increasing parental education for black men and Hispanic men and women, while increasing income has a deleterious effect on BMI among black women. The joint consequences of race/ethnicity, gender, and SES of origin on BMI are graphically illustrated in Figures 1 and 2 (based on estimates of Model 3 of Table 2). Specifically, Figure 1 shows that white men and women whose parents have more than a high school education have the lowest BMI, while black men and Hispanic men and women with highly educated parents have the highest BMI.

Figure 1. BMI by Race/Ethnicity, Gender, and Parental Education

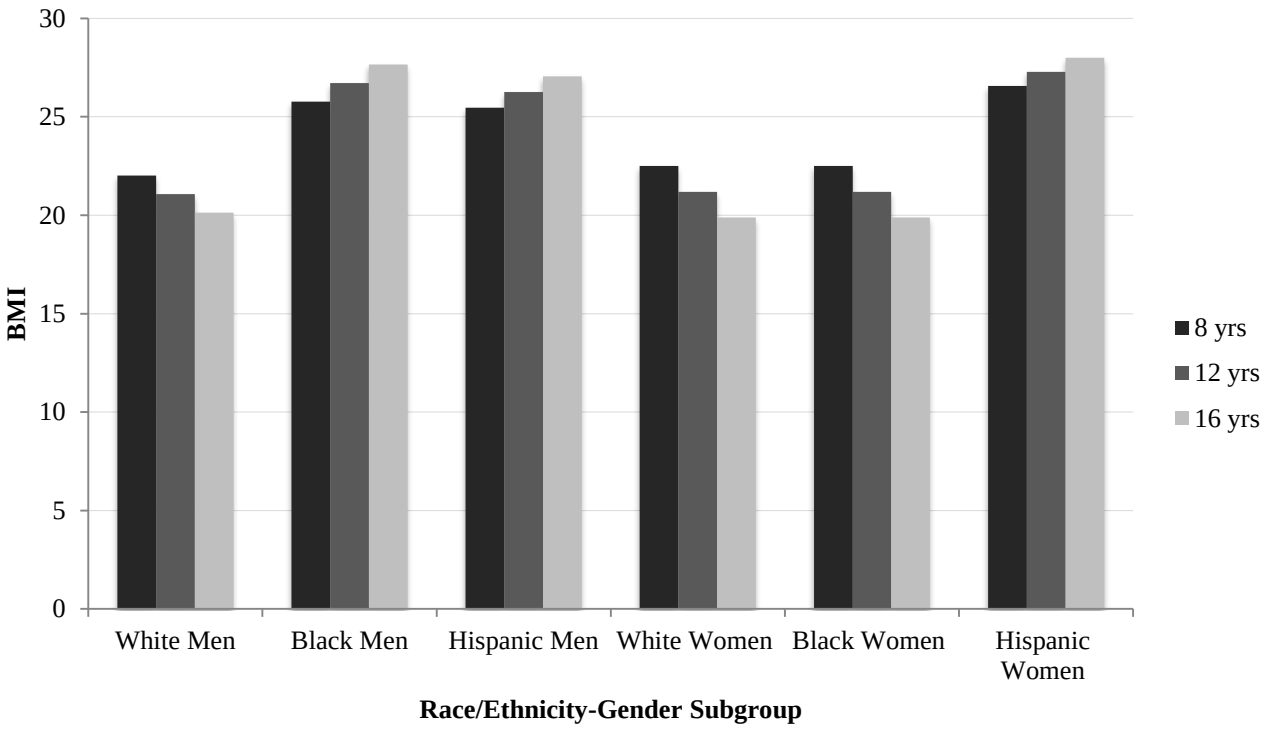
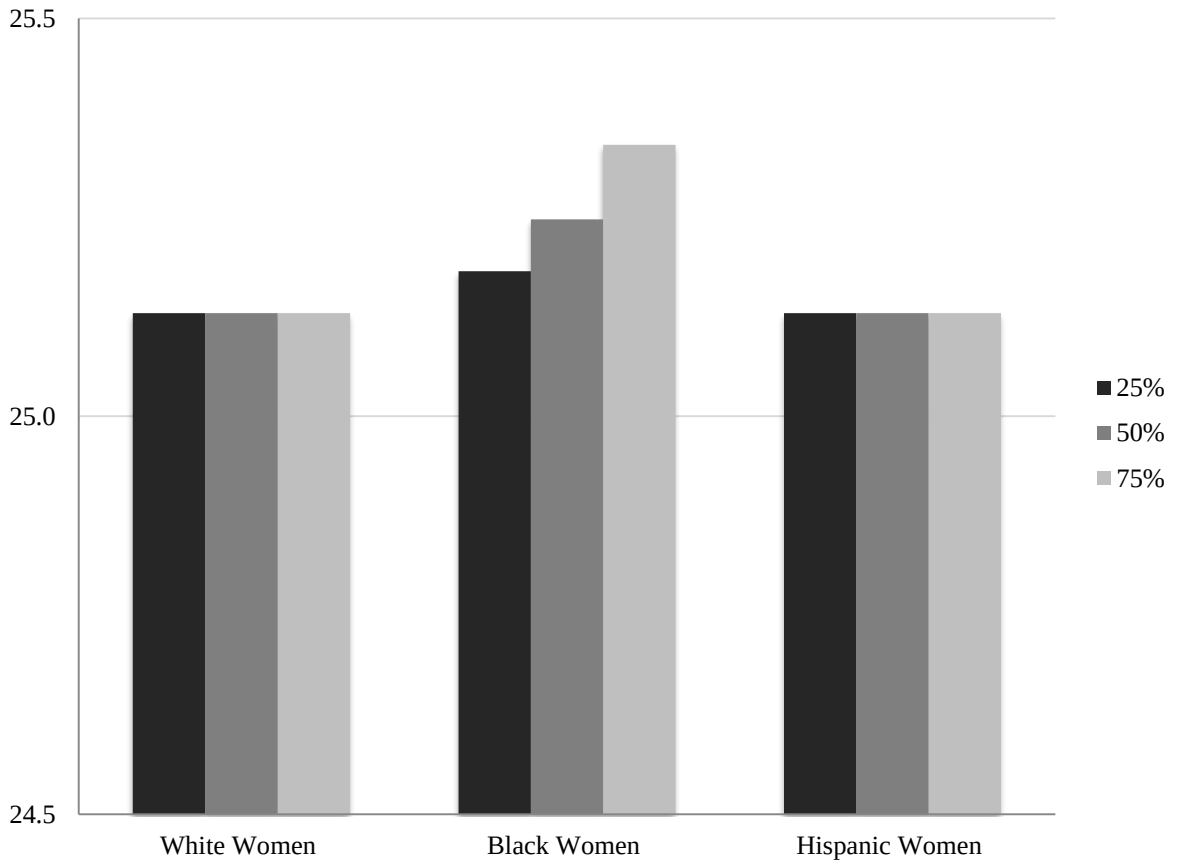


Figure 2 displays the relationship between income and BMI only among women given that the coefficients for income and race/ethnicity x income interactions are not significant among men. This figure indicates that the white-black disparity in BMI among women is greater at higher levels of income than lower levels of income. The effect of income on BMI is similar for white and Hispanic women. Lastly, the significant positive coefficient for the linear age slope and the significant negative coefficient for the quadratic age slope in all three models in Table 2 indicate that BMI tends to increase with age at a decelerating rate. Specifically, increases in BMI are steepest at earlier ages, then levels with age.

Figure 2. BMI by Race/Ethnicity, Gender, and Income Level Among Women



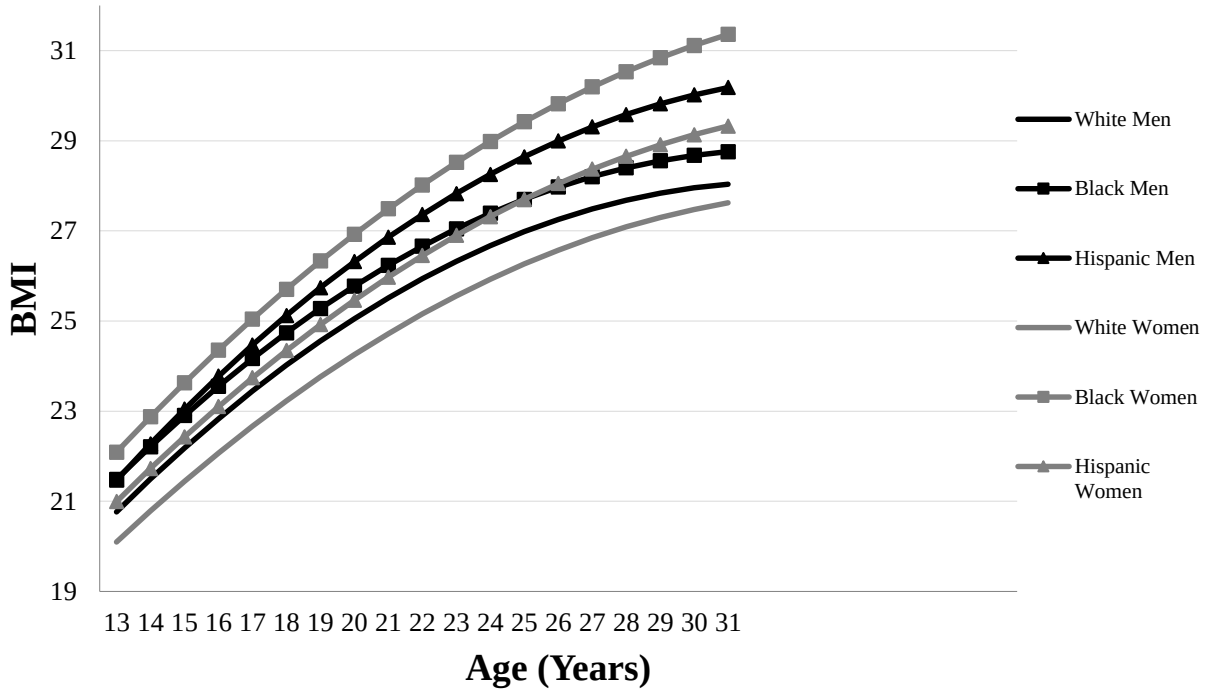
Joint Consequences of Race/Ethnicity, Gender, and Socioeconomic Status on BMI between Adolescence and Adulthood

Table 3 presents growth curve models of BMI between ages 13 and 31. These models provide tests of the alternative life course hypotheses by estimating the joint consequences of race/ethnicity, gender, and SES on BMI intercepts (levels at age 13) and slopes (rates of change with age). All models control for attrition, urban residence, and incarceration, and are stratified by gender. Model 1 of Table 3 tests racial/ethnic and gender inequality in BMI trajectories. The significant positive coefficients for black and Hispanic men and women on BMI intercepts

indicate that blacks and Hispanics have a higher BMI at age 13 compared to their same-gender white counterparts. The significant Chow test for the black coefficient suggests that the magnitude of white-black inequality in BMI at age 13 is greater among women than men. The significant positive coefficients for black and Hispanic on both the intercept and slope among women indicate that the gap between black and white women and Hispanic and white women increases between ages 13 and 31, consistent with the cumulative disadvantage hypothesis. Similarly, the significant positive Hispanic coefficient for the BMI intercept among men in combination with the significant positive Hispanic coefficient on the BMI age slope suggests that the BMI gap between Hispanic and white men widens with age. On the other hand, compared to white men, black men have a higher BMI at baseline, but this racial disparity remains stable between ages 13 and 31 as indicated by the non-significant coefficient for black on the linear age slope among men. This result thereby provides support for the persistent inequality hypothesis. Additionally, the significant positive coefficient for the linear age slope in tandem with the significant negative coefficient for the quadratic age slope in all three models suggests that BMI levels are increasing with age at a decelerating rate. This indicates that weight gain is steeper at earlier ages for white, black, and Hispanic men and women, then levels off at later ages.

These findings from Model 1 are illustrated in Figure 3, which shows the joint consequences of race/ethnicity and gender on BMI trajectories. As described above, black women have the highest BMI, followed by Mexican American men, black men, and Mexican American women. White men and women, conversely, have the lowest BMI. Furthermore, Figure 3 shows that the racial/ethnic inequality in BMI is largest among women and widens between ages 13-31.

Figure 3. Age-Trajectories of BMI by Race/Ethnicity and Gender



Model 2 of Table 3 adds SES measures to the base model. The inclusion of SES reduces, but does not completely explain, the racial/ethnic gap in BMI at age 13 among women and the black-white gap among men, while the Hispanic-white gap among men at age 13 is reduced to non-significance. The interaction between Hispanic and linear age among men, however, does remain significant, indicating that the BMI gap between Hispanic and white men widens in adolescence and early adulthood. Interestingly, neither parental education nor income is significantly associated with the BMI intercept for men or women. Parental education, however, does have a significant negative effect on the age slope for women. This interaction between age and parental education indicates that BMI disparities between women whose parents have lower

levels of education compared to women who parents have higher levels of education emerge and widen between ages 13 and 31, consistent with the cumulative disadvantage hypothesis. Furthermore, supplemental analyses suggest that among men, parental education has a significant negative impact on the linear age slope when considered independent of income.

Table 3. Growth Curve Models of the Joint Impacts of Race/Ethnicity, Gender, SES, and Aging on BMI

	Model 1			Model 2			Model 3		
Fixed Effects [a]	Men	Women	[b] m≠w	Men	Women	m≠w	Men	Women	m≠w
Intercept	20.765***	20.098***	†	21.270***	21.179***		22.471***	22.182***	
Race (ref. White)									
Black	.720***	1.991***	†	.627**	1.682***	†	-2.065	-.773	
Hispanic	.703***	.893***		.435	.841***		-.852	-.126	
SES									
Parental Education				-.055	-.054		-.148**	-.126*	
Income to Poverty Ratio				.006	.010		.025	.010	
Race × SES									
Black × Parental Education							.220*	.187	
Hispanic × Parental Education							.105	.079	
Black × Income-Poverty Ratio							-.054	.032	
Hispanic × Income-Poverty							-.025	-.041	
Linear Slope (Age)	.746***	.706***		.862***	.928***		.939***	1.057***	
Race (ref. White)									
Black	-.010	.097***	†	-.014	.084***	†	-.099	-.035	
Hispanic	.080***	.045*		.071***	-.012	†	-.044	-.199*	
SES									
Parental Education				-.004	-.014***	†	-.010**	-.023***	†
Income to Poverty Ratio				-.001	-.001		-.003[t]	-.002	
Race × SES									
Black × Parental Education							.006	.009	
Hispanic × Parental Education							.008	.014*	
Black × Income-Poverty Ratio							.003	.000	
Hispanic × Income-Poverty							.004	.004	
Quadratic Slope (Age^2)	-.019***	-.016***		-.020***	-.017***	†	-.020***	-.016***	†
Random Effects									
Level 1 Residual	1.884***	2.226***		1.827***	2.202***		1.827***	2.203***	
Level 2 Age	.775***	.770***		.776***	.748***		.776***	.747***	
Level 2 Age^2	.040***	.040***		.039***	.038***		.039***	.038***	
Level 2 Intercept	4.247***	4.005***		4.194***	3.646***		4.184***	3.635***	
-2 Log Likelihood	10686031	10326167		6972613	6876531		6971636	6876087	
N	3945	3728		3674	3466		3674	3466	

[a] All models control for proportion of waves missing, urban residence, and whether the respondent was ever incarcerated

[b] 'm≠w' indicates Chow tests for differences between men and women

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† indicates a statistically significant ($p < 0.05$) difference in coefficients for men and women

Lastly, Model 3 of Table 3 considers three-way interactions among race/ethnicity, gender, and SES on BMI intercepts and slopes. The now significant negative coefficient for parental education on the BMI intercept in tandem among men with the positive coefficient for the interaction between black and parental education on the intercept suggests that parental education is less protective of BMI at age 13 for black men compared to white men. Furthermore, the coefficient for parental education on the intercept among women is negative and significant, indicating that at age 13, having parents with more education is protective of increasing BMI for women. The lack of significant coefficients for black/Hispanic x parent education interactions on the intercept suggests that the effect of parental education at age 13 is similar across race/ethnicity among women. However, the positive coefficient for the interaction between Hispanic and parental education on the linear age slopes in combination with the negative main effect of parental education on the linear age slopes among women suggest that parental education is less protective of increasing BMI with age for Hispanic women compared to their white counterparts. Hispanic women with parents who have higher levels of education, for example, experience less steep declines in BMI with age compared to white women whose parents have similar levels of education, indicating that the health gap between Hispanic and white women with highly educated parents increases with age, consistent with the cumulative disadvantage hypothesis. Lastly, results from supplemental analyses indicate that when the effect of income is considered independently among men, the black-white and Hispanic-white gap at age 13 remains significant. Findings from models examining the independent effect of income among women suggest that the racial disparity at age 13 remains significant, there is a widening BMI gap between white and black women, and the gap between white and Hispanic women remains stable.

DISCUSSION

While racial/ethnic, gender, and socioeconomic disparities in health are well-documented in the population health literature, the extent to which these systems of stratification intersect to shape health trajectories remains unknown. Prior research has focused on the independent consequences of these social statuses, or have assumed that their collective effects are additive in nature. Compounding this tendency to view social statuses as autonomous structures of inequality is the lack of attention given to aging. The implicit assumption that the effects of race/ethnicity, gender, and SES do not vary with age hinders a full understanding of the dynamic nature of health inequality. This study addresses these gaps and contributes to our understanding of health inequalities across the life course in several important ways.

First, this study is among the first to explicitly examine the joint consequences of race/ethnicity, gender, and socioeconomic status on health trajectories. Prior studies have tended to compare the health of variously defined social groups to one reference group (e.g., low SES black women vs. high SES white men), with little conceptualization of how dimensions of stratification *multiplicatively* combine to shape health. This study extends previous research by explicitly testing multiple-hierarchy stratification hypotheses: multiple jeopardy (social statuses are predicted to combine in an additive fashion) and intersectionality (social statuses are predicted to combine in a multiplicative fashion). The findings suggest that racial/ethnic inequality in BMI is gendered such that the black-white disparity in BMI is greater among women than men. Black women have the highest BMI compared to all other racial/ethnic-gender groups. These results strongly support the intersectionality hypothesis given the significant interactive relationship between race/ethnicity and gender.

Second, few studies have paid sufficient attention to the ways in which SES intersects with race/ethnicity and gender to shape health inequality, particularly as these intersections relate to BMI (see Ailshire and House 2011 and Clarke et al. 2000 for exceptions). Results from this study indicate that there are significant interactions among race/ethnicity, gender, and SES. For example, findings from multilevel models suggest that the effect of parental education on BMI varies by race/ethnicity among men and women, such that parental education is less protective for minority men, particularly black men, and Hispanic women compared to their white counterparts. However, the beneficial effect of parental education is similar among white and black women. Additionally, results indicate that increasing levels of income have a negative effect on BMI among black women. This negative effect of income is not evident among men or white and Hispanic women. These relationships between race/ethnicity, gender, and SES suggest that socioeconomic resources do not confer the same health benefits across racial/ethnic and gender groups. Prior work has also found that there are diminishing returns to health of socioeconomic mobility among racial/ethnic minorities (e.g., Colen 2011; Colen et al. 2006; Pearson 2008; Smith et al. 2009). This pattern has been attributed to the restricted opportunities for economic success and increased stressors that may be accompanied by higher SES among racial/ethnic minorities in the context of institutional and interpersonal racism (Pearson 2008). What is novel about the findings of this study, however, is the use of SES of origin, which may be a more appropriate measure of socioeconomic context given the stage of the life course in which respondents are experiencing during data collection periods. In particular, the results indicate that the diminishing returns of socioeconomic mobility affect more than just the individual acquiring the additional socioeconomic resources. Furthermore, the findings suggest that childhood socioeconomic circumstances have dynamic effects on individuals' health

throughout adolescence and early adulthood. These lasting effects have implications for subsequent trajectories of health and socioeconomic status among the younger population in particular, and the productivity and advancement of society as a whole.

Similar to research on the diminishing returns of socioeconomic mobility, a hypothesis put forth by James Jackson and colleagues may help explain the unique relationship between SES and health among different race/ethnicity-gender groups. Specifically, their hypothesis suggests that those who are exposed to chronic stress and live in poorer neighborhoods are likely to engage in harmful coping behaviors, such as smoking, overeating, or alcohol use (Jackson and Knight 2006; Jackson, Knight, and Rafferty 2010; Krueger and Chang 2008; Lantz et al. 2005; Mezuk et al 2010). Given that blacks of higher SES are likely to experience elevated levels of stress compared to their lower SES counterparts (Pearson 2008), and, due to race-based segregation, are likely to live in poorer neighborhoods (Alba, Logan, and Stults 2000; Harris 1999; Williams and Collins 2001), it is possible that blacks of higher incomes cope with their stress and surroundings in ways that are deleterious for their physical health, including weight gain. Life course theory provides insight into how these coping behaviors of parents may affect the health of children. The life course principle of linked lives posits that relationships in social networks are reciprocal and dynamic (e.g., Elder et al. 2003). In this case, the exposures and circumstances experienced by parents, for example, may impact health-relevant resources and behaviors among children. More specifically, the health-risk behaviors in which parents of color at higher levels of SES engage to cope with stress (e.g., poor diet, use of drugs and alcohol) may be transferred to their children and understood as legitimate means of coping with one's environment. These behaviors would ultimately result in poorer health. Previous studies, however, have shown that health behaviors such as excessive alcohol use, smoking, and illegal

drug use explain a minor portion of racial/ethnic, gender, and SES social disparities in health (Courtenay 2000; Lantz et al. 2001; Marmot 2006). Similar to prior research, supplemental analyses from this study indicate that heavy drinking (yes=5+ drinks/day), smoking statuses (current smoker=1), and marijuana use (currently smokes marijuana=1) do little to explain BMI disparities by race/ethnicity, gender, and parental SES. Other mechanisms, such as individual, communal, or neighborhood-level stressors, may play a larger role in generating these patterns of health inequality. Overall, however, results of this study are consistent with the intersectionality hypothesis. Notably, the unique relationships among race/ethnicity, gender, and SES of origin would have been overlooked without the use of a multiple-hierarchy stratification approach.

Third, this study combines multiple-hierarchy stratification and life course perspectives to investigate how age in conjunction with race/ethnicity, gender, and SES simultaneously and interactively combine to shape BMI inequality between adolescence and early adulthood. More specifically, this study evaluates the extent to which the joint consequences of social statuses result in narrowing, widening, or stable health gaps between ages 13 and 31. Previous studies have tended to rely on cross-sectional data, or assume that health inequality is stable across the life course. Furthermore, the few studies on age-trajectories of health have examined disparities along racial/ethnic, gender, or SES lines, with limited attention to how these statuses simultaneously intersect with age to shape health. Findings from this study highlight the dynamic nature of health inequality between adolescence and early adulthood. Results from the growth curve models indicate that racial/ethnic disparities in BMI tend to increase or remain stable between ages 13 and 31, providing support for the cumulative disadvantage and persistent inequality hypotheses, respectively. Conversely, the health consequences of socioeconomic resources appear to widen with age, as the models indicated diverging BMI trajectories among

women whose parents have higher vs. lower levels of education. Lastly, results from the growth curve models provide evidence of interactions among race/ethnicity, gender, SES, and age. Parental education, for example is less protective of increasing BMI with age for Hispanic women compared to their white counterparts, resulting in widening health gaps with age between Hispanic and white women with highly educated parents. Overall, these findings suggest that age is an additional dimension of stratification that significantly intersects with other social statues to shape health. This more complex and dynamic social patterning of health trajectories would not have been evident without the combination of multiple-hierarchy stratification and life course perspectives.

A fourth contribution of this study is its examination of an important health outcome during several critical stages of the life course. Recent estimates suggest that about one third of youth and more than two-thirds of adults in the U.S. are overweight or obese (Ogden et al. 2014). While some scholars argue that BMI may only be consequential at extreme values and that individuals may be relatively healthy at high and low BMIs (e.g., Campos et al. 2006; Saguy 2012), a plethora of studies have linked being overweight or obese to an array of poor health outcomes, including depression, chronic conditions, co-morbidities, and death (Allison et al. 1999; Must et al. 1999; Onyike et al. 2003; Paeratakul et al. 2002). Additionally, there are heavy economic tolls of increasing weight gain given the health care costs associated with being overweight and obese (Wang et al. 2008; Wang et al. 2011). The social, economic, and health burdens attributed to overweight or obesity therefore hold significant implications for the future productivity and physical, mental, and emotional well-being of the U.S. Examining trends in BMI during key stages in the life course, including adolescence, the transition to adulthood, and early adulthood, will shed light on the particular life stages during which inequalities in BMI

emerge, peak, and perhaps begin to wane, thereby helping to identity relevant points of intervention. Lastly, this study considers Hispanics in addition to blacks and whites. This is an improvement over prior studies, which have tended to focus on black-white disparities. It is particularly important to examine health trajectories among Hispanics as demographic trends indicate the continued growth of this population subgroup (Passel et al. 2010).

This study is not without limitations. First, given the small sample sizes of racial/ethnic groups other than the ones considered, this study is not able to independently analyze Asians, Native Americans, and subgroups of Hispanics. This limits our understanding of how gender, SES, and age simultaneously combine to shape health trajectories among different racial/ethnic groups. Similarly, the existing data do not allow for the examination of heterogeneity by nativity and ethnicity within racial/ethnic groups. Previous studies have shown that health varies by nativity and ethnicity among African Americans and Latinos. More specifically, African Americans tend to have worse health than their counterparts of African or West Indian ancestry (Read and Emerson 2005; Read, Emerson, and Tarlov 2005), while Puerto Ricans tend to have worse health than any other Latino ethnicity (Cho et al. 2004; Hummer et al. 2000). Furthermore, the "healthy immigrant effect' suggests that foreign-born immigrants generally have better health than their U.S.-born counterparts (Antecol and Bedard 2006; Jasso et al 2004; Singh and Siahpush 2002), though their health advantage erodes over time. Given these consistent findings of intragroup heterogeneity based on nativity and ethnicity, future research should make it a priority to examine how nativity and ethnicity combine with other social statuses to shape health.

A second limitation is the reliance on self-reported data to create the BMI measure, which may be subject to reporting bias. While other methods of data collection may be preferable (e.g., measured height and weight), studies have shown that the use of self-reports

from adolescents to measure BMI is valid (Brener et al. 2003; Goodman 2000). Moreover, past research has noted that adolescents, especially women, tend to underestimate rather than overestimate their weight (Sherry et al. 2007; Gorber et al. 2007). If self-reports of weight were underestimated in this study, the results are likely conservative given that there would be lower estimates of BMI among women in general and women of color in particular (Ailshire and House 2011). Lastly, this study is unable to examine the intersections of social statuses other than race/ethnicity, gender, and SES. While most studies on the social stratification of health focus on inequalities along racial/ethnic, gender, and socioeconomic lines, other social identities, such as sexual orientation and disability, are also simultaneously experienced by individuals and have significant impacts on health-relevant exposures and resources. Future research should expound upon the social statues considered in studies of health inequality.

Despite these limitations, the present study provides strong evidence of the intersecting consequences of race/ethnicity, gender, and SES on trajectories of BMI. These findings highlight the classed and gendered nature of racial/ethnic inequality, and underscore the dynamic nature of heterogeneity in health within racial/ethnic groups. The unique patterns of health disparities uncovered here would have been obscured if studies utilized a unidimensional approach wherein structures of inequality are assumed to be autonomous and additive in nature, rather than interactive and mutually constructing. This more nuanced picture of health inequality renders visible the disproportionate burden of health risks and exposures experienced by marginalized groups. Policies that address the multifaceted pathways to health must consider how race/ethnicity, gender, SES, and age combine to shape exposures to health risks and opportunities for healthy living among different social groups.

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CHAPTER III

Light Privilege?: Skin Tone Stratification in Health among African Americans

Abstract

Historical and contemporary research has indicated that skin tone is a significant social marker used by others to evaluate and rank the social position of blacks. Society has generally favored those of lighter skin complexion over those of darker-skin because of their closer phenotypic resemblance to whites and their assumed superior intellect and social value. While research has documented socioeconomic stratification based on skin tone among African Americans, less attention has been paid to the consequences of skin color for health. The extent to which skin tone shapes health among African Americans is becoming a particularly critical issue given population trends that are shifting the color line in the U.S. and making skin color an increasingly important marker of inequality and status. This study aims to fill these crucial gaps in the literature by using data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study to systematically investigate skin tone stratification in health across an array of outcomes, including biomarkers, self-rated health, and fatal chronic diseases. Results indicate that dark-skinned women have worse health across multiple measures of health compared to their light-skinned counterparts. These associations are not explained by socioeconomic status, nor are they evident among African American men. The results of the present study shed light on pertinent sources of heterogeneity in health among African Americans.

INTRODUCTION

Achieved and ascribed social statuses are fundamental to how individuals experience and interact with the world. Ascribed statuses are often determined or applied outside of one's control and comprise various systems of stratification. One important ascribed status that structures the unequal allocation of opportunities and life chances is race/ethnicity. Indeed, racial/ethnic inequality in an array of outcomes has received considerable attention in the social sciences. Compared to whites, for example, African Americans are more likely to experience early and later life socioeconomic disadvantage (Haas and Rohlfsen 2010; Warner and Brown 2011; Williams and Sternthal 2010), reside in neighborhoods with inadequate living conditions (Massey 2008; Sharkey 2013), have more frequent contact with the criminal justice system (Alexander 2010), and experience poorer health (Colen et al. 2006; Farmer and Ferraro 2005; Williams and Mohammed 2013). While interracial inequality in life chances, particularly health, is well documented, a majority of this literature has been unable to completely explain the health gap between African Americans and whites. Specifically, prior research has focused on the effects of socioeconomic status (SES), showing that adjustment for socioeconomic resources such as education, income, marital status, and occupation does not completely account for racial/ethnic disparities in several measures of health (Cummings and Jackson 2008; Hayward et al. 2000; Williams and Sternthal 2010; Williams 2012). The inability to explain the health disadvantages of racial/ethnic minorities necessitates an investigation of other social factors and, perhaps more importantly, of intragroup heterogeneity in pathways that lead to health. This within-group approach to understanding health inequality differs from a between-group approach in that it identifies specific mechanisms underlying health that are unique to individuals within social groups. As a result, within-group approaches challenge the assumed universal effects of

social factors on health among individuals similarly situated in the social structure. Incorporating a within-group approach is vital to understanding the nature of health inequality because identifying varied pathways to health *within* social groups that are often erroneously treated as homogenous (e.g., African Americans) highlights the differential consequences of multiple and simultaneous social statuses (e.g., Schwartz and Meyer 2010; Whitfield et al. 2008).

One source of intragroup heterogeneity that has received considerably less attention in the social sciences and that may be particularly relevant for the life chances of African Americans is skin color. Historical and contemporary evidence indicates that skin tone is a social marker used by others to hierarchize African Americans in the social structure (Frazier 1957; Hill 2002; Hunter 2007). Stemming from European colonialism and antebellum periods, this system of within group stratification awards advantages and opportunities to those of lighter skin because of their closer phenotypic resemblance to whites and their assumed superior intellect and social value. Today, lighter skin in the African American community still confers social and economic privileges that have meaningful consequences for life chances (Brown 1998; Hill 2002; Hunter 2005; Keith and Herring 1991; Monk 2014, 2015).

While substantial research has documented skin color stratification in various aspects of life, particularly socioeconomic status (Bowman, Muhammad, and Ifatunji 2004; Hughes and Hertel 1990; Keith and Herring 1991; Monk 2014; Thompson and McDonald 2015), much less is known about the significance of skin color for one of the most crucial facets of life: health. A handful of studies have found an association between skin color and physical health, though a majority of these studies were conducted in the 1970s and 1980s, and tended to focus on a single health outcome, such as high blood pressure (Boyle 1970; Keil et al. 1977; Keil et al. 1981; Klag et al. 1991). It is important, however, to examine a wide array of health outcomes in order to

understand the broad effects of social factors on health (Aneshensel 2005). Missing from the literature are recent and systematic investigations of the relationship between skin tone and health (for an exception, see Monk 2015). Our lack of knowledge regarding this skin color-health relationship is particularly problematic given population trends (e.g., rising rates of immigration and interracial marriages) that are shifting the color line in the U.S. from a bi-racial (black/white) to tri-racial hierarchy (black/honorary white/white), and, in turn, making skin tone an increasingly important dimension of inequality (Bonilla-Silva 2004; Bonilla-Silva and Dietrich 2010). The growing pigmentocratization of the U.S. racial system holds significant implications for the nature of health inequality and thus warrants attention from social scientists.

In order to develop efficacious strategies for increasing opportunities for good health among vulnerable populations and reducing health inequalities, both researchers and policymakers need a better understanding of the unique pathways to health among African Americans. To aid in this effort, the present study seeks to investigate the relationship between skin color and health among a sample of African American adults. Two research questions are of primary concern: first, to what extent does skin tone account for variations in physical health among African American adults? Second, do socioeconomic resources mediate the relationship between skin tone and health? To address these research questions, I examine differences in an array of self-reported and objective health measures (e.g., allostatic load, self-rated health, hypertension, diabetes, and heart disease) among African American men and women using the Coronary Artery Risk Development in Young Adults (CARDIA) Study.

BACKGROUND

Skin Tone Stratification: An Overview of Colorism and Its Relationship to Health

Research has long found that the hue of one's skin is a marker of social status that significantly structures access to opportunities and desired resources (Drake and Cayton 1945; Frazier 1957; Hunter 2002). Originating from the times of slavery and European colonialism, colorism is a system of inequality that affords special advantages to lighter-skinned individuals because of their closer phenotypic resemblance and presumed genetic similarity to Europeans and, therefore, to Eurocentric standards of beauty, morality, intellect, and status (Hill 2002; Rueter 1917; Russell, Wilson, and Hall 1992). This system, which is largely unconscious and internalized, creates hierarchies within racial and ethnic groups that materialize into real political, economic, and social consequences. For example, numerous studies find that lighter-skinned individuals are more likely than their darker-skinned counterparts to be married, as well as to have higher educational attainment, income, and higher-status occupations (Hill 2000; Hughes and Hertel 1990; Keith and Herring 1999; Monk 2014; Russell et al. 1992; Seltzer and Smith 1991). The unequal distribution of socioeconomic resources and bestowal of privileges and disadvantages based on skin color continued through surges of black nationalism and socioeconomic progress among the African American community in the 1960s—times when, arguably, the significance of skin tone within the black community may have been temporarily reduced (Keith and Herring 1991; Monk 2014).

Moreover, the social and economic advantages of lighter-skinned African Americans have passed down and accumulated over generations given the general practice of marital homophily, particularly among those of light skin (Bodenhorn 2006; Hall 2010). The intergenerational transfer of wealth and privilege among light-skinned African Americans in

tandem with other exclusionary practices (e.g., social clubs, brown paper bag tests) led to an elite social class within the African American community and, subsequently, class tensions (Hall 2010; Hill 2002; Russell et al. 1992). These social and class dynamics are still evident in the 21st century, as recent research suggests that lighter-skinned African Americans continue to occupy a higher position in social and economic hierarchies compared to their darker-skinned counterparts (e.g., Monk 2014). For example, scholars have noted that positive stereotypes are associated with lighter-skinned individuals, such as being more intelligent, clean, and attractive, while more negative stereotypes are associated with darker-skinned individuals, such as being unintelligent, impoverished, dirty, and ugly (Brown 1998). The prevailing patterns of inequality and presumed traits on the basis of one's skin color suggest that skin tone is an entrenched and diffuse status characteristic by which minorities are unequally assigned and afforded opportunities, privilege, and power by other individuals and social institutions (Hill 2002; Hughes and Hertel 1990).

Prior research also highlights the gendered nature of colorism, with skin tone being particularly consequential for black women. Ideologies of white superiority and black inferiority that were used to justify slavery and racial oppression equated blackness with laziness, sinfulness, vulgarity, and ugliness. Whiteness, contrarily, was associated with beauty, civility, and virtuosity (Hill 2002). These understandings of blackness and whiteness were gendered, such that women of African descent were considered ugly, less feminine, and sexually corrupt while white women were deemed beautiful and sexually moral and chaste (Bell 2004; Collins 2000; West 2004). Skin tone biases emerged out of these racialized and gendered notions of beauty, sexuality, and morality. Fairer-skinned women or "mulattos", who were typically the result of a black female, white male sexual union, were considered more beautiful, feminine, and virtuous than their darker-skinned counterparts because of their greater resemblance to white women.

Hegemonic beliefs in the greater attractiveness, femininity, and morality of light-skinned women became internalized in the black community as well. This is evidenced by the Clark doll studies (Clark and Clark 1947), the existence of "lightness tests" by many prominent African American clubs and organizations (Hill 2002; Russell et al. 1992), and the images and understandings of "beauty" that have historically and contemporarily inundated society as a whole, including blacks (Craig 2002; Perkins 1996). Consequently, light-skinned women have and continue to be afforded special advantages and opportunities (Hill 2002; Reuter 1918; Russell et al. 1992; Williamson 1980). Given that beauty and aesthetics are a critical part of socioeconomic success for women of all races living in a patriarchal society (Anderson et al. 2010), the qualities and characteristics bestowed upon lighter-skinned women as a result of hegemonic, Eurocentric standards of beauty afford them an additional form of capital that can be used to accumulate more social and economic resources relative to their darker-skinned counterparts (Hunter 2002; Hunter 2005; Monk 2014). Indeed, studies have shown that skin color is a significant predictor of important determinants of health and well-being for African American women, such as socioeconomic and psychosocial resources (Keith and Herring 1991; Thompson and Keith 2001).

Skin tone biases continue to exist among both white and black populations in the U.S. For example, studies consistently find that African Americans make associations between lighter skin and perceptions of positive characteristics, including attractiveness, desirability, intellect, and cleanliness (Anderson and Cromwell 1977; Bond and Cash 1992; Drake and Cayton 1993[1945]; Hall 1992; Hill 2002). These positive images of lighter-skinned blacks are also gendered, with skin color being more consequential for evaluations of black women compared to men (Thompson and Keith 2001). Other studies similarly suggest that whites exhibit preferences

toward lighter-skinned blacks. For example, compared to their fairer-skinned counterparts, whites are more likely to assign dark-skinned blacks harsher and longer prison sentences (e.g., Viglione, Hannon, and DeFina 2011), see them as less deserving of aid (e.g., Iyengar and Hahn 2007), and give them less preferable treatment in the labor market (e.g., Goldman, Hamilton, and Darity Jr. 2007; Wade Romano, and Blue 2004). The literature on colorism therefore suggests that skin tone biases are characteristic of society as a whole and, in turn, are of great consequence for life chances among African Americans.

While prior work documents the continued existence of skin tone stratification within the African American community, especially among women, one area that has been particularly understudied is the association between skin color and health. Given that colorism structures access to opportunities and exposures to risks (Hunter 2002, 2007; Monk 2014), skin color likely constitutes a significant determinant of health. Extant research, however, provides modest evidence of an association between skin tone and health among African Americans (Krieger 2000). Overwhelmingly, previous studies have focused on a single health outcome—typically blood pressure—and have considered skin color to be a proxy for black/white genetic admixture. These early studies generally found a positive association between darker skin and high blood pressure and hypertension among African Americans (Boyle 1970; Gillum 1979; Harburg et al. 1978). In some studies, this relationship was explained by socioeconomic status (Keil et al. 1981; Keil et al. 1977) or varied by SES, such that the skin color-health relationship was significant only among those of lower SES (Klag et al. 1991). More recent studies, however, have produced mixed results, with one study finding no relationship between skin color and self-rated health (Borrell et al. 2006), and another finding that hypertension prevalence varies by skin tone (Monk 2015). The current state of the literature is therefore missing a systematic examination of the

extent to which skin color shapes health, comprehensively measured, among African Americans. Focusing on the effects of skin tone on a single health outcome runs the risk of misclassifying individuals as "well" or "not ill" despite the fact that they may be sick according to another dimension or measure of health. Examining an array of health outcomes that represent multiple physiological systems allows for the investigation of the broad and simultaneous consequences of social factors (Aneshensel 2005), including skin color.

Mechanisms Linking Skin Tone and Health

Few studies have explicitly conceptualized and empirically tested the mechanisms through which skin tone affects various health outcomes. One potential, and likely critical, mechanism is socioeconomic status. Previous studies have documented a robust relationship between SES and health; those with fewer socioeconomic resources, including education, income, wealth, and marital status, tend to have worse health than their socioeconomically advantaged counterparts (Braveman et al. 2005; House, Lantz, and Herd 2005; Phelan, Link, and Tehranifar 2010). This SES-health gradient stems from the fact that those of higher SES have greater access to health promoting resources, such as healthy foods or quality health care and less exposure to health risk factors, such as stress or environmental toxins (Link and Phelan 1995). With regards to skin color, those with lighter skin shades are more likely to have higher levels of education, income, and occupational prestige, and are more likely to get married and have partners of higher SES compared to their darker-skinned counterparts (Hill 2000; Hughes and Hertel 1990; Keith and Herring 1991; Monk 2014). Given the associations between skin color and SES and the well-established SES-health relationship, African Americans with lighter skin likely experience better health than their darker-skinned counterparts as a consequence of their position in the socioeconomic hierarchy.

A second mechanism through which skin tone may shape health among African Americans is discrimination or unfair treatment by others. More specifically, skin tone may not only serve as a marker of social status, but as a symbol of the type of treatment one will receive from those within and outside the African American community. Pervasive social stereotypes presume that darker-skinned African Americans are more dangerous, and less intelligent and attractive than lighter-skinned African Americans (Brown 1998; Maddox and Gray 2002). Given that stereotypes and attitudes influence behavior automatically—often times unconsciously—(Bargh 1989; Bargh et al. 1992; Bargh, Chen, and Burrows 1996; Fazio et al. 1986; Pratto and Bargh 1991), darker-skinned individuals likely experience worse treatment from society as a whole. Indeed, modest evidence suggests that darker-skinned African Americans, primarily men, report more experiences of interpersonal discrimination than their lighter-skinned counterparts (e.g., Klonoff and Landrine 2000; Monk 2015). Other studies, however, find no direct link between skin color and reports of discriminatory experiences (e.g., Borrell et al. 2006).

Though several empirical studies and theories of colorism suggest that darker-skinned African Americans may experience more discrimination and unfair treatment from society, some research suggests that African Americans of lighter skin tones may also face unique disadvantages that affect their health. More specifically, lighter-skinned African Americans are less readily perceived as members of the black community (Brown 1998; Cunningham 1997), and thereby may be seen as less authentically black or less connected to the black experience (Hunter 2007). Identity scholars suggest that social cues and treatments by others that do not confirm personal identities can induce stress and behaviors that may jeopardize self-esteem and other psychosocial factors that may influence health behaviors (Burke 1991; Campbell and Troyer 2007; Veenstra 2011). Lighter-skinned African Americans who self-identify as black, yet

are socially identified or treated as nonblack may therefore experience obstacles to good health that result in health statuses comparable to their darker-skinned counterparts. As Cunningham (1997) cogently states: "the longing to be accepted, the sting of rejection: these may be the most pervasive and emotionally challenging components of the current light-skin Black experience" (p. 380). Consequently, it is plausible that these varying stereotypes and perceptions of African Americans of different skin tones may lead to disparate notions of appropriate treatment, with those of darker skin being treated more hostilely from those outside of the black community, yet more warmly by those within the black community compared to their lighter-skinned counterparts. Indeed, recent evidence suggests that both lighter- and darker-skinned African Americans perceive a considerable amount of discrimination from other blacks due to their skin color, while medium-skinned blacks perceive slightly less skin color discrimination from other blacks (Monk 2015). This same study also finds that skin color among African Americans has a positive, linear relationship to discrimination from whites based on their skin color, suggesting that the nature of skin color discrimination differs based on the source of the unfair treatment.

In sum, the majority of previous research on skin color and health has focused on specific markers of health (e.g., blood pressure), has traditionally conceptualized skin tone as indicative of genetic composition, and has produced mixed findings. Therefore, the extent to which skin color, more aptly conceptualized as a marker of status and social interaction, significantly affects an array of health outcomes is uncertain. This study aims to fill this crucial gap by examining the impact of skin color on multiple measures of health among African Americans. The present study also goes a step further to evaluate the extent to which measures of SES explain the relationship between skin color and health, as most studies examining the skin color-health relationship have not tested proposed mechanisms that link skin tone and health (see Monk 2015

for an exception). This study will be among the first to provide a comprehensive overview of the nature of skin color stratification in health among African Americans.

DATA AND METHODS

Data

Data from six waves of the Coronary Artery Risk Development in Young Adults (CARDIA) Study were used to address the research questions of this study. Sponsored by the National Heart, Lung, and Blood Institute of the National Institutes of Health, the CARDIA Study sampled black and white men and women aged 18-30 between 1985 and 1986 in four field centers: the University of Alabama at Birmingham (Birmingham, AL), the University of Minnesota (Minneapolis, MN), Northwestern University (Chicago, IL), and Kaiser Permanente (Oakland, CA) (N=5,115). In Birmingham, Chicago, and Minneapolis, participants were recruited by random-digit dialing from total communities or specific census tracts. In Oakland, participants were randomly selected from a health-care plan. Participants were selected so that there would be approximately equal numbers of individuals in each gender, age, race, and education subgroup. Follow-up data were collected in 1987-1988 (Year 2), 1990-1991 (Year 5), 1992-1993 (Year 7), 1995-1996 (Year 10), 2000-2001 (Year 15), 2005-2006 (Year 20), and 2010-2011 (Year 25). Response rates ranged from approximately 72-90%.

The CARDIA Study was designed to increase and enhance the understanding of risk factors for cardiovascular disease during a particularly important stage of the life course: the transition from young adulthood to middle age. The specific objectives of the study are to 1) document levels of risk factors for coronary artery disease and potential determinants of these risk factors in young adults; 2) examine the interrelationships of risk factors and lifestyles, and report behavioral and environmental changes during the transition from young adulthood to

middle age; 3) compare cross-sectional and longitudinal data on age-related trends in cardiovascular disease risk factors; and 4) compare levels of, and changes in, risk factors between gender, racial, and education groups. All analyses are restricted to respondents who self-identify as African American or Black and who are born in the U.S.

Dependent Variables

In this study, health is broadly defined to include both global and specific health conditions. The global health measures include allostatic load and self-rated health. Both outcomes are measured in Years 15, 20, and 25 of the study. *Allostatic load* is defined as the cumulative wear and tear on the body's systems owing to repeated exposure and adaptation to stressors (McEwen 1998). It is typically assessed by a combination of biomarkers that represent multiple biological subsystems (Geronimus et al. 2006). In this study, 8 biomarkers are considered: systolic and diastolic blood pressure, creatinine, HDL cholesterol, total cholesterol, triglycerides, body-mass index (BMI), and C-reactive protein (CRP). Consistent with prior research (e.g., Geronimus et al. 2006), a high-risk threshold is empirically determined for each biomarker based on its sample distribution. Participants receive a point for each biomarker that falls into the high-risk threshold, defined as above the 75^{th} percentile for all biomarkers except for HDL cholesterol, whose high-risk threshold is defined as below the 25^{th} percentile. The values are then summed across the eight components to create a continuous measure of allostatic load (Crimmins et al. 2003; Geronimus et al. 2006; Seeman et al. 2008). Given the distribution of the measure, values of 5 and above are truncated to be in the same category (range=0-5).

Self-rated health is measured by respondents' answer to the question: "In general, would you say your health is: excellent, very good, good, fair, or poor?" Responses ranged from 1 (excellent) to 5 (poor). This measurement of self-rated health is a reliable and valid measure of

general health status. It predicts morbidity (Ferraro, Farmer, and Wybraniec 1997), subsequent disability (Idler and Kasl 1995), health care utilization (Malmstrom, Sundquist and Johansson 1999), and mortality, even after accounting for demographic, social, and medical risk factors (DeSalvo et al. 2006; Franks, Gold, and Fiscella 2003; Idler and Kasl 1991; Idler and Benyamini 1997; Idler, Russell, and Davis 2000; Kaplan, Barell, and Lusky 1988). It also has similar predictive validity for mortality and objective health measures across population subgroups, including blacks and both genders (Kimbro, Gorman, and Schachter 2012; McGee et al. 1999).

Given that skin color may be understood as an indicator of exposures to non-racialized and racialized stressors, it is important to not only examine the relationship between skin color and global measures of health, but its association with conditions that may be particularly responsive to, or shaped by, stressors as well, such as chronic illnesses (Clark et al. 1999; Cohen, Janicki-Deverts, and Miller 2007; Lewis et al. 2009; Williams and Mohammed 2009). Therefore, this study additionally examines three chronic conditions that are impacted by exposure to stressors (Bhattacharyya and Steptoe 2007; Cohen et al. 2007; Davis et al. 2005; Roberts et al. 2007). *Hypertension*, *diabetes* and *heart disease* are measured in all eight waves of the study by answers to the question, "Has a doctor or nurse ever said that you have [condition]" (yes=1).

Independent Variables

The predictor of interest is skin tone. *Skin tone* is indexed by three dummy variables: light (yes=1), medium (yes=1), and dark (yes=1). It is measured in Year 7 with amber, blue, and green filters of a Photovolt 577 reflectance meter that provides readings from the upper arm. Values of the readings indicate the percentage of reflected light, ranging from 0 to 100. Lower values (low reflectance) indicate darker skin while higher values (high reflectance) indicate lighter skin. Consistent with previous studies using these data (e.g. Borell et al. 2006; Krieger,

Sidney, and Coakley 1998), only the amber reflectance readings are used given high collinearity between values of the amber, blue, and green filters. The three skin tone categories are based on the 25th and 75th percentiles of the amber filter distribution among African Americans. Respondents with values greater than the 75th percentile are considered "light", respondents with values between the 25th and 75th percentiles are considered "medium", and respondents with values lower than the 25th percentile are considered "dark". Light-skinned African Americans serve as the reference group.

Measures of education, income, and marital status are included to examine the extent to which socioeconomic resources explain the relationship between skin tone and health. *Education* is indexed by three dummy variables using reports of respondents' years of schooling: less than a high school education (yes=1), high school education (yes=1), and more than a high school education (yes=1). Having less than a high school education serves as the reference group. Respondents' combined family *income* is assessed with an ordinal variable: 1=less than $5,000; 2=$5,000-11,999; 3=$12,000-15,999; 4=$16,000-24,999; 5=$25,000-34,999; 6=$35,000-49,999; 7=$50,000-74,999; 8=$75,000 or higher. *Marital status* is measured by a dummy variable (0=not married; 1=married). Lastly, all models control for *age*, measured in years, as well as a measure of the proportion of waves a respondent was not interviewed to account for differential rates of *attrition due to dropout* (Brown et al. 2012). All models are stratified by *gender* (0=men; 1=women), while the self-rated health and chronic conditions models additionally control for whether the respondent has had *health insurance in the past two years* (1=yes).

Analytic Strategy

To address the research questions, this study uses multilevel models estimated within a mixed model framework. These models examine the effect of skin color on mean levels of health

over young adulthood and middle life. These types of models are optimal for panel data because they adjust for non-independence of observations and correlations within clusters (Raudenbush and Byrk 2002). Both fixed effects of covariates and random effects for the intercept are included in the model. Fixed effects models account for unobserved differences between individuals that are stable over time and not accounted for by the covariates. To evaluate the extent to which skin color may differentially impact health for men compared to women, all models are stratified by gender. The first set of models provides estimates of skin color differences in health net of control variables. The second set adjusts for socioeconomic resources. To investigate the extent to which SES may explain the skin tone-health relationship, the magnitude and statistical significance of the skin color coefficients are compared across the first and second set of models.

RESULTS

Table 1 presents means and proportions of all study variables at baseline by gender. Results from Table 1 indicate that health, skin color, and SES vary along gender lines among African Americans. More specifically, African American women report worse self-rated health, and have significantly higher prevalence rates of diabetes and heart disease at baseline compared to African American men. Women, however, have a lower allostatic load score than men. Additionally, a higher proportion of women have light or medium skin tones, while a higher proportion of men have a darker skin. Lastly, women tend to have higher levels of education, yet lower levels of income compared to men.

Table 1. Baseline Means and Proportions of Study Variables, by Gender[a]

	Men	Women
Allostatic Load	2.656	1.754*
Self-Rated Health	2.450	2.594*
Hypertension	.103	.119
Diabetes	.008	.033*
Heart Disease	.047	.099*
Skin Tone		
Light	.183	.292*
Medium	.461	.514*
Dark	.356	.195*
SES		
Less than High School	.095	.065*
High School	.353	.307*
More than High School	.552	.627*
Income	3.644	3.392*
Marital Status	.203	.217
Controls		
Age	29.383	29.501
Proportion of Waves Missing	.139	.103*
Insured	.828	.868*

[a] Based on information from respondents' baseline interview
* $p < .05$ significant difference between men and women

The Consequences of Skin Tone on Health Among African Americans

Table 2 presents multilevel models of various measures of health net of control variables using data from the CARDIA Study. Results from Table 2 suggest that skin color variations exist across an array of outcomes, mainly among women. Compared to their lighter-skinned counterparts, darker-skinned women have higher allostatic load scores, worse self-rated health, and are more likely to be hypertensive and diabetic in adulthood. For most outcomes, there is only a significant difference between women with "light" skin and women with "dark" skin. The exception is hypertension, in which both medium- and dark-skinned women are more likely to be hypertensive than light-skinned women. Specifically, light-skinned women have an allostatic load score of 1.533 and health rating of 2.384, while dark-skinned women have an allostatic load score of 1.901 and self-rated health of 2.613. Additionally, the odds of darker-skinned women

being hypertensive and diabetic are approximately 4.5 and 3.6 times the odds, respectively, of lighter-skinned women having those chronic conditions. Interestingly, there are no significant skin tone variations in health among African American men.

The Consequences of Skin Tone and SES on Health Among African Americans

Multilevel models presented in Table 3 add socioeconomic resources to the models in Table 2. Results suggest that socioeconomic resources are predictive of the general health measures (e.g., allostatic load and self-rated health) and hypertension. For example, among black men, higher levels of income are associated with higher allostatic load scores, while higher levels of education and income are associated with better reports of self-rated health. Additionally, black women with more than a high school education report having better health and lower odds of being hypertensive than black women with less than a high school education. Lastly, income is inversely related to allostatic load and self-rated health among African American women.

A comparison of results from Tables 2 and 3 also indicates that SES does not completely explain the association between skin color and health among women. Findings indicate that among women, income accounts for 9% of the light skinned-dark skinned disparity in allostatic load, while education and income explain approximately 21% of the light-dark disparity in self-rated health. Additionally, having higher levels of education explains about 4% of the disparity in the odds of hypertension between light-skinned and dark-skinned women. Lastly, controlling for SES exacerbates the hypertension gap between light- and medium skin women by about 7%, as well as the diabetes gap between light-skinned and dark-skinned women, as the coefficient for dark skin increases by about 8% when education and income are included in the model. Supplemental analyses (not shown but available upon request) indicate that results are largely similar when considering each socioeconomic resource individually.

Table 2. Multilevel Models of Skin Tone and Health Among African Americans

	Allostatic Load		Self-Rated Health		Hypertension		Diabetes		Heart Disease	
Fixed Effects [a]	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Intercept	2.748***	1.533***	2.290***	2.384***	.001***	.001***	0.000***	.000***	.001***	.003***
Skin Tone (ref. Light)										
Medium	-.054	.077	.003	.080	1.008	2.017*	4.069	1.244	2.618	.841
Dark	.023	.368**	-.014	.229***	1.688	4.455***	5.560	3.633**	2.108	.660
Random Effects										
Level 1 Residual	.917***	.917***	.611***	.574***	– –	– –	– –	– –	– –	– –
Level 2 Intercept	1.102***	1.100***	.708***	.653***	12.153***	12.769***	75.172	19.049***	28.314***	19.998***
-2 Log Likelihood	-2747	-4141	-2040	-2910	-1329	-2080	-448	-1119	-557	-1213
N[b]	694	985	696	983	807	1093	807	1093	805	1092

[a]All models control for age and proportion of waves missing; Self-rated health and chronic conditions models additionally control for health insurance

[b]Sample sizes vary given the use of different waves of data for each outcome

[t] p<.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 3. Multilevel Models of Skin Tone, SES, and Health Among African Americans

	Allostatic Load		Self-Rated Health		Hypertension		Diabetes		Heart Disease	
Fixed Effects [a]	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Intercept	2.274***	1.827***	2.926***	2.857***	.001***	.001***	.000***	.000***	.001***	.002***
Skin Tone (ref. Light)										
Medium	.005	.079	-.031	.074	.951	2.160**	3.517	1.303	2.471	.864
Dark	.114	.336**	-.098	.180**	1.538	4.290***	4.061	3.936***	2.018	.688
SES										
High School	.073	.121	-.351**	-.159	.898	.518	.421	.385	.520	1.136
More than High	.210	-.114	-.304**	-.319***	1.017	.377*	.607	.488	.866	1.300
Income	.048*	-.061***	-.070***	-.056***	.922	.927	.889	1.036	.901	.985
Marital Status	.268*	.255**	-.177*	.073	.718	1.895*	.336	1.668	1.071	1.458
Random Effects										
Level 1 Residual	.912***	.919***	.607***	.572***	– –	– –	– –	– –	– –	– –
Level 2 Intercept	1.091***	1.079***	.682***	.623***	12.536***	12.597***	70.452	19.161***	29.290***	20.009***
-2 Log Likelihood	-2659	-4047	-1968	-2822	-1290	-2037	-444	-1106	-541	-1197
N[b]	684	977	687	980	805	1089	805	1089	803	1088

[a] All models control for age and proportion of waves missing; Self-rated health and chronic conditions models additionally control for health insurance

[b] Sample sizes vary given the use of different waves of data for each outcome

[t] p<.10, * p < 0.05, ** p < 0.01, *** p < 0.001

DISCUSSION

To date, few studies have systematically investigated the relationship between skin tone and physical health among African Americans. Prior research on skin color stratification has focused on outcomes such as SES, identity formation processes, and specific, individual measures of health (Cunningham 1997; Hughes and Hertel 1990; Klag et al. 1991; Monk 2014, 2015). Furthermore, few studies have attempted to explore the mechanisms underlying skin color disparities in health. Rather, this small literature has generally documented the extent to which skin color predicts health without empirically testing pathways underlying this relationship (for an exception, see Monk 2015). Investigating the skin tone-health relationship and its underpinnings is becoming particularly important for understanding health inequality given population trends that are shifting the color line in the U.S. from a rigid bi-racial structure (e.g., white vs. black populations) to a more complex, and loosely-organized tri-racial hierarchy (e.g., whites, honorary whites, and collective blacks) that places more emphasis on skin color as a determinant of racial inequality (Bonilla-Silva 2004). It is therefore crucial to examine the implications of this shifting color line and the increasing importance of skin color for life chances among minority groups. This study addresses these gaps and contributes to our understanding of colorism and health in several important ways.

First, the present study is among the first to provide an extensive overview of skin tone stratification in health across an array of outcomes. The general and specific measures of health considered here go beyond what has typically been studied in the literature on skin tone and health (e.g., blood pressure/hypertension, self-rated physical and mental health). Examining multiple outcomes highlights how systems of stratification cumulatively and simultaneously combine to affect various life chances among social groups. Additionally, studies focusing on the

etiology of a single health outcome are likely to misclassify respondents as healthy, when the same individuals may be ill according to another indicator of health that is not under investigation. A comprehensive examination of how social factors "get under the skin" therefore requires an investigation of multiple health outcomes (Aneshensel 2005). Findings from this study suggest that, among African American women, skin color is a significant predictor of several indicators of health, including allostatic load, self-rated health, hypertension, and diabetes. These health outcomes represent multiple physiological systems, suggesting that skin color exerts a broad impact on the physical well-being of African American women. No significant relationships between skin tone and health were evident among men.

Results from this study suggest that the impact of skin color on health is gendered, which is consistent with prior literature that indicates that skin color is particularly consequential for the life chances of African American women (Keith and Herring 1991; Thompson and Keith 2001). These findings are also consistent with broader sociological and feminist theories that have posited that aesthetics are particularly consequential for the life chances of all women in a patriarchal society. The hegemonic and Eurocentric social construction of beauty, which tends to privilege white, middle-class women (Jeffreys 2005), teaches girls from an early age that their bodies will be evaluated based on their appearances and that beauty is an attribute of femininity that is to be pursued (Franzoi 1995; Rodin et al. 1984). Consequently, aesthetics confer specific advantages and resources for women deemed socially attractive, and can be used to accumulate these advantages over their lives (Anderson et al. 2010). Among African American women, lighter skin—which is considered more attractive and aesthetically pleasing in society than darker skin—embodies an additional form of capital for African American women that can be translated into socioeconomic and psychosocial resources (Hunter 2002). Indeed, some studies

have shown that skin color is associated with higher educational attainment, occupational status, family income, labor market preferences, and self-esteem among African American women (Goldman et al. 2007; Keith and Herring 1991; Thompson and Keith 2001).

A second way in which the present study extends prior research is through the examination of potential mechanisms underlying skin color disparities in health. More specifically, of the studies that have examined the relationship between skin color and health, few have gone beyond documenting this association to explore the specific pathways through which skin color becomes consequential for health. This study, however, examines the role of several socioeconomic resources in explaining skin color inequality in health. The findings indicate that education, income, and marital status do little to account for the light-dark inequalities in health among women. More specifically, the skin color disparities in health remain significant with the inclusion of socioeconomic resources. Furthermore, results from this study suggest that SES has more of an impact on general measures of health than specific chronic conditions.

The inability of SES to account for a substantial portion of skin color inequalities in health suggests that other socioeconomic and psychosocial factors not considered in this study may play a larger role in generating skin color disparities in health. However, supplemental analyses suggest that general stressors and experiences with unfair treatment based on race explain a minor proportion of the relationship between skin color and health, indicating a need to examine exposures and experiences other than traditional stressors. Unfair treatment based on one's skin color has received relatively little attention, but may be a key factor underlying the skin tone-health relationship. Theoretically, while darker-skinned African Americans may be discriminated against more frequently by society as a whole given the negative stereotypes and

attributes assigned to them, some studies suggest that those of light-skinned may experience more unfair treatment within the African American community. This unfair treatment stems from lighter-skinned African Americans being less readily perceived as members of the black community with which they identify (Brown 1998; Campbell and Troyer 2007; Cunningham 1997; Veenstra 2011). Indeed, recent research suggests that discrimination based on skin color is disproportionately experienced by dark- and light-skinned African Americans. Additionally, the nature of this discrimination depends on which group (e.g., whites or blacks) is enacting the unfair treatment (Monk 2015). Prior research therefore indicates that skin color discrimination may be a crucial pathway that links skin color to health. The data utilized in the present study, however, do not contain questions regarding social experiences and interactions attributable specifically to skin color, nor do they collect information on the race of the person committing the discriminatory act. Data collection efforts should be geared toward obtaining more specific information on individual's experiences with discrimination. Additionally, when possible, future studies should examine the effects of the unique experiences of lighter- versus darker-skinned African Americans, including discrimination, racial identity, and other individual- and community-level socioeconomic resources.

Lastly, skin tone is conceptualized not only as a symbol of status, but as a marker for the types of treatment one may expect to receive from those within and outside the black community. Explicit consideration of skin tone as a heuristic tool for how to interact with others in society rather than simply a proxy for black-white genetic admixture allows for a more complex investigation and theorization of heterogeneity within the black community. Consideration of this heterogeneity, which acts to hierarchize African Americans in ways that contradict the assumed monolithic social experiences among the black community, allows for the

recognition of differential pathways to health. Improving our understanding of the varied pathways to health within the African American community will aid research and policy efforts aimed at reducing health inequality.

This study is not without limitations. First, these data are not nationally representative, and the findings therefore cannot be generalized to all African Americans in the U.S. Second, this study is unable to examine whether the skin color-health relationship varies by ethnicity and nativity among African Americans. Prior research has shown that U.S.-born African Americans tend to have worse health than their U.S.- and foreign-born counterparts of African or West Indian ancestry (Jasso et al. 2004; Read and Emerson 2005; Read, Emerson, and Tarlov 2005). In addition to the consistent findings that health varies by ethnicity and nativity among African Americans, first and second generation Black immigrants likely grew up in or were raised by parents who came from countries that were majority black, which has implications for their exposure to specific types of race relations (Read and Emerson 2005). Given differences in historical and contemporary understandings of, and interactions with, racialized social structures, it is likely that the health consequences of skin color vary by ethnicity and nativity.

Third, skin color in this study is measured in an objective manner—with a reflectance meter that reports the percentage of light that is reflected off of the respondent's skin. While this type of measurement is valuable and has some beneficial attributes (e.g., standardization, objectivity), it lacks the subjectivity that is embedded in, and characteristic of, the appraisals and judgments made by others in society, which, in turn, are used to determine the types of interaction one has with society (Blair et al. 2002; Macrae and Bodenhausen 2001; Maddox 2004). Furthermore, it does not consider the effects of self-appraisals on respondents' health. A recent article by Monk (2015) shows that *self-rated* skin color represents an embodied social

status that directly affects the health of African Americans. Monk links this embodied status to the phenomenon of "reflected appraisals" (Mead 1934), which is posited to be an important mechanism of social inequality given the relational processes and dynamics of domination and power embedded in self-identification. Consequently, future research should evaluate the role of multiple measures of skin color, including self-ratings and interviewer-ratings.

Lastly, CARDIA only collects data on non-Hispanic white and black adults. As a result, this study is unable to examine the extent to which skin color may affect health among other minority populations. Importantly, prior research has provided compelling evidence for skin color stratification in health and other life chances among Latinos in the U.S. (Espino and Franz 2002; Gomez 2000; Murguia and Telles 1996; Telles and Murguia 1992; Ulmann et al. 2002). The rapid growth of this population subgroup in the U.S., in addition to increases in the proportions of multiracial populations, is changing the U.S. racial structure and altering skin color dynamics both between and within social groups (Bonilla-Silva and Dietrich 2010). This shift holds significant implications for the health of the nation in general, and among various minority groups in particular. Specifically, increases in particular immigrant populations are accompanied by differences in understandings of race and race relations. These differences, and subsequent attitudes and behaviors among racial/ethnic groups, may significantly affect the nature of, and pathways to, health disparities. As a result, the meanings, importance, and consequences of statuses such as skin color may vary by racial/ethnic groups and across time.

Despite these limitations, the present study shows that skin color significantly impacts the physical health of African Americans, particularly women. These findings provide more evidence for the existence of skin tone biases and the gendered nature of colorism in the U.S., as well as highlights pertinent sources of intragroup heterogeneity in pathways leading to health

among African Americans. Importantly, this study renders visible the unique disadvantages of darker-skinned African American women. The within-group approach utilized here provides a more nuanced understanding of health inequality that helps identify specific groups that may be overlooked in studies relying solely on between-group analyses—groups that may be key to helping explain disparities in health between and within social groups that are often erroneously treated as homogenous. Policies directed toward eradicating health inequality should be attentive to the differences in pathways to health within social groups, as these varied pathways may reflect the differential consequences of simultaneously experienced social statuses. Findings from this study therefore highlight the need for multifaceted, integrative approaches to eliminating health inequality.

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CHAPTER IV

What's Color Got to Do With It?: Examining the Joint Consequences of Skin Tone, Gender, and SES on BMI Trajectories Among African Americans

Abstract

A majority of the literature on health disparities has focused on how health varies along racial/ethnic, gender, and socioeconomic lines. While these between-group differences are informative and well-documented, the nature of within-group inequalities in health is less understood. A particularly understudied source of intragroup stratification, especially among African Americans, is skin tone. While scholars argue that population trends are shifting the color line in the U.S. and making skin color an increasingly important marker of inequality and status, relatively few studies have examined the extent to which skin color shapes life chances, including health. Furthermore, prior research has not systematically investigated the joint consequences of skin color and other systems of stratification on health, leaving uncertain the multifaceted nature of health inequality among African Americans. This study uses a multiple-hierarchy stratification approach and data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study to investigate the extent to which skin tone, gender, and SES combine to shape BMI trajectories from early adulthood to middle life among African Americans. Results indicate that skin tone inequality in BMI is greater among women, with medium- and dark-skinned women having a higher BMI than their light-skinned counterparts. Additionally, findings suggest that income is positively related to weight gain for men and women, while education is protective against weight gain for women only. The magnitudes of these relationships between SES and BMI, however, vary by skin tone and with age. Lastly, results suggest that the BMI gap between light- and dark-skinned women narrows with age, while the light-medium disparity in BMI among men emerges in young adulthood and converges with age. Results from the present study highlight the joint role of skin color, gender, and SES in differentiating pathways to health among African Americans, and, in turn, suggest the need for multifaceted approaches to addressing health inequality.

INTRODUCTION

Race/ethnicity, gender, and socioeconomic status (SES) are key dimensions of stratification that structure the unequal allocation of resources, power and exposure to risks, all of which are important for health and well-being. Indeed, most of the literature on health disparities has focused on racial/ethnic, gender, and socioeconomic inequality, generally finding that blacks, women, and those of lower SES have worse health than their more advantaged counterparts across an array of outcomes, including body-mass index (BMI) (Bird and Rieker 2008; Farmer and Ferraro 2005; Link and Phelan 1995; Ogden et al 2014; Pleis, Ward, and Lucas 2010; Read and Gorman 2010; Wang and Beydoun 2007). While between-group disparities along racial/ethnic, gender, and socioeconomic lines are well-documented, the nature of within-group health inequality based on other social statuses is less understood. Investigating intragroup heterogeneity challenges the assumed universal pathways to health among members of broadly defined social groups (e.g., African Americans) and highlights the consequences of multiply and simultaneously experienced social statuses (Schwartz and Meyer 2010). Incorporating a within-group approach to studies of health is therefore essential for understanding the full nature and extent of health inequality. One critical source of stratification among African Americans that has received scant attention is skin tone. Skin color has long acted as a marker of inequality and status in society, with social privileges afforded to those of lighter skin given their closer resemblance to Europeans. Skin tone is, furthermore, becoming an increasingly important dimension of stratification in the U.S. given recent population trends. More specifically, as rates of immigration and interracial unions rise, the U.S. racial system is relying more heavily on skin tone as an indicator of difference and determinant of life chances

(Bonilla-Silva 2004). This changing racial system has significant implications for the nature of within- and between-group health inequality.

Compounding the dearth of research on skin tone variation among African Americans is the lack of attention given to the joint consequences of skin color and other key dimensions of stratification on health. The handful of studies examining the skin color-health relationship has tended to focus on the independent effects of skin color, gender, and SES. This approach may lead to inaccurate conclusions regarding health inequality because it overlooks the unique and simultaneous positions of power and disadvantage within which an individual may be situated based on their embodiment of multiple social statuses. Moreover, scholars have not sufficiently examined how the independent and multiplicative effects of skin color and other social statuses may change over the life course. The implicit assumption that the effects of skin color, gender, and SES do not vary with age may limit our understanding of the dynamic nature of health disparities across ages. Multiple-hierarchy stratification perspectives, which seek to understand how social statuses interact over the life course to shape life chances, are likely to have considerable utility for providing a more nuanced understanding of social inequalities in health (Brown et al. 2016; Clark and Maddox 1992; Jeffries and Ransford 1980).

Given its historical and contemporary importance, skin color is a crucial dimension of stratification that should be systematically investigated both independently and in tandem with other central systems of inequality. The present study extends prior research by explicitly using a multiple-hierarchy stratification approach to investigate the joint consequences of skin tone, gender, and SES on BMI trajectories between early adulthood and mid-life. Three central research questions frame this study. First, does skin color impact BMI among African Americans? Second, if this relationship exists, to what extent are skin color inequalities in health

gendered and/or classed? Third, do the intersectional effects of skin color, gender, and SES differ as individuals age? To address these questions, I investigate skin color differences in BMI among African American men and women aged 25-55 using the Coronary Artery Risk Development in Young Adults (CARDIA) Study. BMI is a particularly important health outcome to investigate among African Americans given their high prevalence rates of being overweight or obese (Ogden et al. 2014). These high levels of weight gain are likely to be accompanied by elevated rates of various chronic conditions, mental disorders, and mortality, in addition to heavy economic tolls stemming from health care costs and loss of productivity attributed to being overweight or obese (Allison et al. 1999; Carr and Friedman 2005; Must et al. 1999; Onyike et al. 2003; Paeratakul et al. 2002; Wang et al. 2008; Wang et al. 2011). Understanding within-group differences in BMI among African Americans will help inform research and policy efforts aimed at reducing health inequality.

BACKGROUND

Changing Social Structures: The Evolution of the U.S Color Line

The "color line" is a term coined by Frederick Douglass and popularized by W.E.B. Du Bois that refers to the social separation of races in the U.S. (Du Bois 1903). Historically, the color line implied a black/white binary, wherein blacks were deemed socially and biologically inferior to whites, and, consequently, experienced social, economic, and political disadvantages. Black was defined by skin color, hair texture, and knowledge of one's ancestry. In particular, an individual was considered black if he or she had one drop of African blood in their genetic makeup, commonly known as the "one-drop rule". According to Bonilla-Silva (2004), this bi-racial order dominated the U.S. racial system through the Civil Rights period. The post-civil rights era, however, was characterized by several important population and social trends,

including increases in an array of socioeconomic resources for certain nonwhite groups (e.g., Asians), rising rates of interracial unions and non-white immigrant populations, and the increasingly popular notion that the significance of race is declining. This differentiation of groups who originally shared a position in the racial hierarchy is thought to have led to a more complex and loosely-organized tri-racial stratification system that places more emphasis on skin complexion (Bonilla-Silva 2004; Bonilla-Silva and Dietrich 2010). The new tri-racial hierarchy positions whites at the top, "honorary whites" in the middle, and the "collective black" or nonwhite group at the bottom. The intermediate group, which is posited to act as a buffer for racial conflict, will primarily consist of most Asians, multiracial individuals (Bonilla-Silva 2004), and, arguably, lighter-skinned minorities.

The shift to the tri-racial model would suggest that racial/ethnic inequality is becoming increasingly determined by skin color (Bonilla-Silva 2004). This change in the racial hierarchy and the ensuing importance of skin tone has significant implications for the nature of health inequality, especially among African Americans who are disadvantaged across most physical health outcomes. The use of a within-group approach is therefore necessary in order to gain a better understanding of the consequences of this changing social structure. Specifically, conceptualizing skin color as a pertinent source of heterogeneity will lead to greater specificity in the pathways to health among African Americans (Schwartz and Meyer 2010). This specificity will shed light on how African Americans are differentially affected by their varying and changing positions in the racial hierarchy and, in turn, can be used to better understand the nature of, and solutions to, between-group disparities in health.

Colorism: An Overview of Skin Tone Stratification

While some scholars suggest that the role of skin color in shaping life chances is increasing, it should be noted that skin tone has long been used as a source of differentiation that has heavily influenced the lived experiences and resources of African Americans. Stemming from European colonialism and slavery, colorism represents an ideological system of stratification that privileges minorities with lighter skin over their darker-skinned counterparts (Hunter 2007). This system affords advantages and opportunities to lighter-skinned individuals given their closer phenotypic resemblance and perceived blood ties to Europeans and, therefore, to Eurocentric standards of beauty, morality, intellect, and status (Hill 2002; Reuter 1918; Russell, Wilson, and Hall 1992). Indeed, blacks with lighter skin were often a direct result of sexual unions between white slave owners and black slaves, and were therefore considered more similar to whites both socially and biologically. This perceived affinity to whites gave lighter-skinned individuals greater access to socioeconomic resources and opportunities, including education, jobs, and job training (Frazier 1957; Keith and Herring 1991). The social and economic privileges of lighter-skinned blacks were also passed down through generations, leading to the emergence of an elite group of light-skinned African Americans. With the formation of this elite group came the increased implementation of exclusionary practices in efforts to maintain their privileged status, such as the use of "lightness tests" by many prominent African American clubs and organizations (Hill 2002; Russell et al. 1992). The continued differentiation of blacks based on skin tone led to growing social and economic divisions within the black community (Drake and Cayton 1993[1945]; Hall 2010; Keith and Herring 1991). This intragroup division exacerbated, as groups who immigrated and assimilated into the U.S. culture embraced ideologies of skin tone biases (Thompson and McDonald 2015). This, in turn,

contributed to the institutionalization of colorism in society and subsequent consequences for the lives of racial/ethnic minorities, particularly African Americans.

Skin Tone Stratification in Health: State of the Literature

Prior research highlights the significant social and economic consequences of colorism among African Americans in contemporary U.S. society. For example, compared to those with darker skin, lighter-skinned blacks tend to have higher levels of income, more years of schooling, work in higher status occupations, and are more likely to be married (Hill 2000; Hughes and Hertel 1990; Keith and Herring 1999; Monk 2014; Russell et al. 1992; Seltzer and Smith 1991). While socioeconomic inequality based on skin tone has been well-documented, considerably less is known about the extent to which skin color shapes health among African Americans. Older studies have generally found that darker-skinned blacks have worse health than their lighter-skinned counterparts, particularly with regard to high blood pressure and hypertension (Boyle 1970; Gillum 1979; Harburg et al. 1978; Keil et al. 1981; Keil et al. 1977; Klag et al. 1991). More recent studies, however, have provided mixed results, with one study finding no significant association between skin tone and self-rated physical and mental health (Borrell et al. 2006), and another reporting a significant relationship between skin color and hypertension (Monk 2015). Other measures of health have largely been absent from the literature, leaving uncertain the extent to which skin color may affect other indicators of health and well-being, including BMI. Virtually no studies to date have considered the relationship between skin tone and BMI among African Americans.

In addition to the limited findings of prior research, the degree to which multiple social statuses combine to shape health remains largely unknown. More specifically, past studies on the skin color-health relationship have focused on the independent or additive effects of skin tone,

gender, and SES on health, with little attention to how these social statuses may intersect to predict health. By overlooking the ways in which social categories jointly affect health, the prevailing assumption that dimensions of inequality are autonomous in nature remains. Multiple-hierarchy stratification perspectives, which posit that social statuses intersect to shape health across the life course (Clark and Maddox 1992; Jeffries and Ransford 1980), are likely to have considerable utility for addressing these limitations of prior research. A prominent correlate of the multiple-hierarchy stratification perspective is intersectionality theory, which contends that systems of oppression and inequality (e.g., race/ethnicity, skin color, gender, SES) interact in multiplicative ways to mutually construct one another and produce unique social contexts that affect the lived experiences and life chances of individuals situated within those contexts (Collins 2000; Crenshaw 1989; Dill and Zambrana 2009). Intersectionality further highlights the impacts of cumulative "interlocking systems of oppression" (Ore 2003) embedded in the simultaneity of social statuses (Crenshaw 1989; King 1988; Caldwell et al. 2006; Dill and Zambrana 2009), as well as the fluidity of boundaries and differential power relations between and within social groups. Consequently, intersectionality encourages the specification of pathways to health among individuals similarly positioned within the social structure.

By highlighting the simultaneous and multiplicative effects of social statuses, an intersectionality framework challenges the dominant paradigm in the existing health literature, which generally views social categories as having independent, additive effects. According to this dominant perspective, generally referred to as the multiple jeopardy hypothesis, the poor health of multiply disadvantaged individuals is due to the sum of disadvantages associated with each social status (e.g., Beal 1970). Dark-skinned African American women of low SES, for example, would have the worst health because of the disadvantages associated with being black,

a woman, poor, and having dark skin (e.g., Beal 1970). These additive approaches, however, view social statuses as having equally disadvantageous consequences among all individuals who embody a particular social status. As a result, additive approaches fail to consider pertinent differences in the contexts within which various systems of power and domination are experienced and the degree to which they are consequential for individuals (e.g., Weber 2010). For example, assuming that social statuses are additive in nature overlooks the ways in which forms and consequences of racism, sexism, and classism vary among women of different skin tones; racism, colorism, and classism vary among men and women; and racism, colorism, and sexism vary by social class. Moreover, the *a priori* assumption that the consequences of skin color, gender, and socioeconomic inequality are additive reinforces the notion that social statuses and identities are autonomous dimensions of stratification (King 1988). Additive approaches therefore ignore the joint consequences of social statuses on the likelihood of, and responses to, lived experiences.

To date, however, virtually no studies have examined the interactive effects of skin tone, gender, and SES on health among African Americans. Of the few studies that have considered joint effects of social statuses, most have focused on interactions between two categories. For example, prior research has examined the gendered nature of skin tone dynamics, finding that skin color is more consequential for the lives of black women than black men (Keith and Herring 1991; Thompson and Keith 2001). Given their greater resemblance to white women, fair-skinned black women are considered more feminine, beautiful, and virtuous than their darker-skinned counterparts (Hill 2002; Reuter 1918; Russell et al. 1992; Williamson 1980). The special privileges afforded to light-skinned black women, in addition to the positive characteristics bestowed upon them, allow these women to accumulate additional forms of capital that can be

used to increase social and economic resources that are relevant for health (Glenn 2009; Hunter 2002; Hunter 2005; Monk 2014). Indeed, several studies show that skin tone, among African American women, skin tone is a significant predictor of various social determinants of health, including education, income, marital status, occupation, and self-esteem (Craig 2002; Keith and Herring 1991; Perkins 1996; Thompson and Keith 2001).

Research suggests that several socioeconomic resources have independent effects on health among African Americas, as well as intersect with skin color to shape health and well-being. In particular, the independent effects of education and income on health across the life course are posited to operate through both shared and distinct mechanisms. More specifically, educational attainment, which is typically completed by early adulthood and stable thereafter, embodies an intrinsic resource that may impact psychosocial and social processes that are consequential for health. Higher levels of education, for example, may facilitate the development of an individual's sense of control over his or her life, increase health-promoting knowledge, encourage healthier behaviors and utilization of preventative and therapeutic health care, and shape choices of environments in which to interact (Herd et al. 2007; Ross and Mirowsky 2003).

Income, however, is an instrumental resource that represents the tangible means to act on knowledge gained from increased education. It enables direct access to health care, allows individuals to acquire material resources necessary for health promotion (e.g., healthy foods), and provides the means for reducing exposure to psychosocial toxins in work and home environments (Herd et al. 2007; House and Williams 2005). Additionally, income is more dynamic over the life course than education, generally growing in early adulthood to middle age, stabilizing, then declining in older age (Duncan 1988). The dynamic nature of income may

therefore result in a stronger impact on the progression or development of health issues for certain social groups.

A handful of studies have documented the extent to which education and income combine with skin color to shape health among African Americans. For example, Sweet and colleagues (2007) found a negative association between income and blood pressure among lighter-skinned blacks, with increases in income related to decreases in blood pressure. These scholars, however, found no significant association between skin color and income for darker-skinned blacks. Additionally, findings from Klag et al. (1991) indicated that the relationship between skin color and blood pressure was only significant among blacks of lower SES. Furthermore, Thompson and Keith (2001) found that skin color did not predict self-esteem for black women at the highest levels of income, and only weakly predicted self-esteem for women at middle levels of income. These scholars concluded that colorism was less consequential for black women of high SES.

It is also important to note that the literature has yielded mixed findings with regard to the relationship between income and health among African Americans. While most research indicates that higher levels of income are beneficial for health, other studies have found that income is positively related to BMI, particularly among black men (Chang and Lauderdale 2005; Mujahid et al. 2005; Zhang and Wang 2004). While the exact reasons for this association are unclear, several explanations have been posited. First, it is likely that those of lower SES, particularly men, hold occupations requiring manual labor, thereby increasing the amount of physical activity among lower SES individuals compared to their higher SES counterparts (Chang and Lauderdale 2005). The relatively high levels of physical activity that characterize lower-skilled manual labor jobs may facilitate fitness and thereby reduce the likelihood of

gaining weight. Second, some studies have found that the selection effect of obesity and overweight on SES, whereby those of higher BMI are less likely to acquire socioeconomic resources, is weaker for men in general and black men in particular (Averett and Korenman 1996; Gortmaker et al. 1993). That is, obesity in adolescence or early adulthood may not be as consequential for the socioeconomic success of black men, resulting in a relatively high proportion of overweight black men at higher levels of SES. Lastly, a recent hypothesis put forth by James Jackson and colleagues suggests that those who are exposed to chronic stress and live in poorer neighborhoods are more likely to engage in harmful coping behaviors, such as smoking, overeating, or alcohol use (Jackson and Knight 2006; Jackson, Knight, and Rafferty 2010; Krueger and Chang 2008; Mezuk et al 2010). Given that blacks of higher SES are likely to experience elevated levels of stress compared to their lower SES counterparts (Pearson 2008) and that, due to race-based segregation, they are likely to live in poorer neighborhoods than whites (Alba, Logan, and Stults 2000; Harris 1999; Williams and Collins 2001), it is possible that blacks of higher income cope with their stress and surroundings in ways that are deleterious for their physical health, including weight gain. These mixed findings in the literature, however, leave uncertain the extent to which skin color intersects with gender and SES to shape health.

Another limitation of prior research is the over-reliance on cross-sectional data, which has led to little consideration of how the effects of skin color may change with age. Age is an additional dimension of stratification that has been largely understudied in the health disparities literature (Riley et al. 1972). It is likely that health risk and protective factors accumulate or dissipate over the life course, thereby affecting the patterns and nature of health inequality across age (O'Rand 2001). Three hypotheses that describe patterns of intracohort inequality over time have been proposed, with previous studies providing different amounts of support for each

(Brown, O'Rand, and Adkins 2012). First, the *aging-as-leveler* hypothesis posits that the negative consequences of aging disproportionately impact the socially advantaged because the socially disadvantaged who survive to older ages are comprised of a selective, robust group (House et al. 1994; Preston, Hill, and Drevenstedt 1998; Yang and Lee 2009). This hypothesis therefore predicts that disparities in health will diminish with age. Second, the *persistent inequality* hypothesis asserts that health advantages/disadvantages stemming from sociodemographic and economic factors hold over time, with age doing little to either ameliorate or exacerbate the inequality (Ferraro and Farmer 1996). Consequently, persistent inequality predicts that disparities in health are stable across the life course. Third, the *cumulative disadvantage* hypothesis posits that individuals with advantages early in life accumulate more resources and opportunities over time that can be used to avoid or allay health risks (Dannefer 1987; DiPrete and Eirich 2006; Ferraro, Shippee, and Schafer 2009; O'Rand 1996; Willson, Shuey, and Elder 2007). Conversely, those who are initially disadvantaged acquire more disadvantages and risks as they age, resulting in a widening of health inequalities with age (O'Rand and Hamil-Luker 2005; Ferraro et al. 2009).

Given the limitations of prior research, the extent to which skin color, gender, SES, and age combine to shape health in general, and BMI trajectories in particular, remains unknown. The assumption that dimensions of inequality work independently to predict health overlooks the unique and simultaneous positions of power and disadvantage within which individuals are situated, and leads to erroneous conclusions regarding the nature of health inequalities. This study aims to fill these crucial gaps in the literature by investigating the ways in which skin color intersects with other prominent systems of stratification to shape BMI trajectories. By examining

the joint consequences of skin color, gender, SES, and age, the present study provides a more complete and accurate depiction of the nature of BMI inequality among African Americans.

DATA AND METHODS

Data

This study draws on six waves of panel data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study. The CARDIA study was originally designed as a prospective study of cardiovascular risk factors during the transitions from young adulthood to middle age. It sampled black and white men and women in four field centers: the University of Alabama at Birmingham (Birmingham, AL), the University of Minnesota (Minneapolis, MN), Northwestern University (Chicago, IL), and Kaiser Permanente (Oakland, CA). Baseline interviews where conducted between 1985 and 1986 when respondents were 18-30 years old (N=5,115). Participants were targeted for follow-up interviews seven times after the initial wave of data collection: 1987-1988 (Year 2), 1990-1991 (Year 5), 1992-1993 (Year 7), 1995-1996 (Year 10), 2000-2001 (Year 15), 2005-2006 (Year 20), and 2010-2011 (Year 25). At the Birmingham, Chicago, and Minneapolis field centers, participants were recruited by random-digit dialing from total communities or specific census tracts. In Oakland, participants were randomly selected from a health-care plan. Participants were selected so that there would be approximately equal amounts of individuals in each gender, age, race, and education subgroup. Response rates ranged from approximately 72-90% across the eight waves of data. All analyses are restricted to participants who self-identify as African American or black and were born in the U.S. Additionally, only data from Year 5 and beyond is used given that information on income was not collected until that year of data collection.

Dependent Variable

The outcome of interest is BMI. Standard protocols were used to measure respondent height and weight at each round of data collection. Weight was measured to the nearest .5 pound while participants wore light clothing and no shoes, and height was measured to the nearest .5 centimeter (Friedman et al. 1988). BMI was computed by the standard equation:

$$BMI = weight\ (kg) / [height\ (m)]^2.$$

Women who were pregnant were excluded for that particular age (Clarke et al. 2009).

Independent Variables

Three binary variables index *skin tone* among African Americans: light (yes=1), medium (yes=1), and dark (yes=1). Skin tone is measured in Year 7 with amber, blue, and green filters of a Photovolt 577 reflectance meter that provides readings from the upper arm (Krieger, Sidney, and Coakley 1998; Shriver and Parra 2000). Values of these meter readings indicate the percentage of reflected light, with lower values (low reflectance) indicating darker skin and higher values (high reflectance) indicating lighter skin (range: 0-100). Only the amber reflectance readings are used given high collinearity between values of the amber, blue, and green filters (Borell et al. 2006; Krieger et al. 1998). The three skin tone categories are created using the 25^{th} and 75^{th} percentiles of the amber filter readings. Respondents with values above the 75^{th} percentile are considered "light", respondents with values between the 25^{th} and 75^{th} percentiles are considered "medium", and respondents with values below the 25^{th} percentile are considered "dark". "Light" serves as the reference group. Supplemental analyses showed that the main findings were robust to different operationalizations of skin tone. *Gender* is measured at baseline, and is assessed with a dummy variable (0=men; 1=women). Socioeconomic status is comprised of education and income. *Education* is indexed by three dummy variables using

reports of respondents' years of schooling. These dummy variables include less than a high school education (yes=1), a high school education (yes=1), and more than a high school education (yes=1). Having less than a high school education serves as the reference group. In order to evaluate the effects of highest educational attainment, participants under the age of 25 are not included in the analyses. Family *income* is measured with an ordinal variable: 1=less than $5,000; 2=$5,000-11,999; 3=$12,000-15,999; 4=$16,000-24,999; 5=$25,000-34,999; 6=$35,000-49,999; 7=$50,000-74,999; 8=$75,000 or higher. Lastly, *age* is measured in years.

Control Variables. To account for differential rates of *attrition due to dropout*, a measure of the proportion of waves a respondent was not interviewed is included in the models (Brown et al. 2012).

Analytic Strategy

The research questions are addressed in two steps. First, multilevel models estimated within a mixed model framework examine the interactive effects of skin color, gender, and SES on the mean level of BMI among African Americans. These multilevel models are ideal for panel data because they adjust for non-independence of observations and correlations within clusters (Raudenbush and Byrk 2002). By estimating random effects for the intercept in addition to fixed effects of covariates, these models account for person-specific errors (or subject-specific deviations), which represent unobserved differences between individuals that are stable over time and not accounted for by the covariates. Main effects of, and interactions among, skin tone, gender, and SES on BMI are examined. A comparison of likelihood ratio tests (LRTs) indicated that including a quadratic term for age slightly improved the overall model fit. As a result, age and age-squared terms are included in each model. Additionally, all models are stratified by gender in order to make the interpretation of interactions among three variables more

comprehensible (Landry 2006). Chow tests are used to determine whether the effects of skin color and SES, along with their interactions, statistically differ for black men and women. Non-significant interactions among skin color, gender, and SES would suggest that the health consequences of these social statuses are independent of each other, and therefore, provide evidence supporting the multiple jeopardy hypothesis. Conversely, statistically significant interactions among skin color, gender, and SES would provide evidence of multiplicative effects among these social statuses, thereby constituting support for the intersectionality hypothesis.

Second, random coefficient growth curve models are used to examine inequalities in individual BMI trajectories from ages 25-55. Growth curve models estimate person-specific intercepts (initial value) and slopes (rates of change) that describe intra-individual patterns of change in health as a function of age. Similar to the multilevel models mentioned above, model fit indices suggested that a quadratic growth curve with random intercepts and random linear and quadratic slopes provided the best fit to the data. Further analyses indicated that the model fit did not improve when regressing predictors on quadratic slopes. Models are therefore stratified by gender, and coefficients for skin tone, SES, and skin tone x SES interactions are regressed on the intercepts and linear age slopes. Regressing skin tone, SES, and their interactions on the linear age slopes provides a formal test of the life course hypotheses. The persistent inequality hypothesis would be supported if age slopes were similar across skin color-gender-SES groups. Conversely, support for the aging-as-leveler or cumulative disadvantage hypotheses would come from results indicating that health inequalities narrow or widen with age, respectively.

RESULTS

Results presented in Table 1 show that BMI, skin tone, SES, and several control variables vary along gender lines among African Americans. More specifically, black women have a

higher BMI than men, and tend to be of lighter skin complexion compared to their male counterparts—that is, there are higher proportions of women with light and medium skin than men. Additionally, black women tend to have more education, yet less income compared to black men. Lastly, African American men also tend to be missing from more waves of data than African American women.

Table 1. Baseline Means and Proportions of Study Variables, by Gender[a]

	Men	Women
BMI	26.480	28.068*
Skin Tone		
Light	.183	.292*
Medium	.460	.516*
Dark	.357	.193*
SES		
Less than High School	.097	.064*
High School	.351	.308*
More than High School	.552	.628*
Income	3.633	3.384*
Marital Status	.199	.215
Controls		
Age	29.367	29.489
Proportion of Waves Missing	.139	.103*
N	720	1018

[a] Based on information from respondents' baseline interview
* $p < .05$ significant difference between men and women

Joint Consequences of Skin Tone, Gender, and Socioeconomic Status on Mean BMI

Table 2 presents multilevel models of BMI using data from the CARDIA Study. These models illustrate the extent to which skin color differences in health are gendered and/or classed. Model 1 regresses skin tone on the mean level of BMI across ages 25-55, while Model 2 adds socioeconomic resources, and Model 3 includes the main effects of skin color, SES, and their interactions. All models are stratified by gender and control for attrition. Results from Model 1 suggest that BMI varies by skin tone for African American women only. Women with dark skin

have a significantly higher BMI than their light-skinned counterparts. The significant Chow tests for the dark coefficient in all three models indicates that the magnitude of skin color inequality in BMI is greater among women than men, with dark-skinned women having the highest BMI of all skin color-gender groups.

Table 2. Multilevel Models of Skin Color, Gender, SES, and BMI Among African Americans

	Model 1			**M odel 2**			**M odel 3**		
Fixed Effects [a]	Men	Women	[b] m≠w	Men	Women	m≠w	Men	Women	m≠w
Constant	26.541***	27.543***		25.683***	27.333***	†	24.538***	27.518***	†
Skin Color (ref. Light)									
Medium	-.126	.772		-.054	.838[t]		1.222	.388	
Dark	.454	4.202***	†	.583	4.268***	†	1.958[t]	4.256***	†
SES									
High School				-.098	-.324		.841	-.941	
More than High School				-.080	-.684[t]		.639	-1.725*	†
Income				.197***	.160***		.285***	.306***	
Skin Color × SES									
Medium × High School							-.988	.888	
Dark × High School							-1.139	.701	
Medium × More than High							-.865	1.617	
Dark × More than High School							-.710	1.127	
Medium x Income							-.095	-.200**	
Dark x Income							-.129	-.218*	
Age	.412***	.723***	†	.348***	.666***	†	.350***	.659***	†
Age^2	-.003***	-.006***	†	-.002***	-.005***	†	-.002***	-.005***	†
Random Effects									
Level 1 Residual	1.198***	2.687***		1.903***	2.672***		1.901***	2.669***	
Level 2 Intercept	4.998***	6.875***		4.955***	6.908***		4.957***	6.906***	
-2 Log Likelihood	18530	30267		18071	29677		18066	29665	
N	804	1092		804	1088		804	1088	

[a] All models control for proportion of waves missing

[b] 'm≠w' indicates Chow tests for differences between men and women

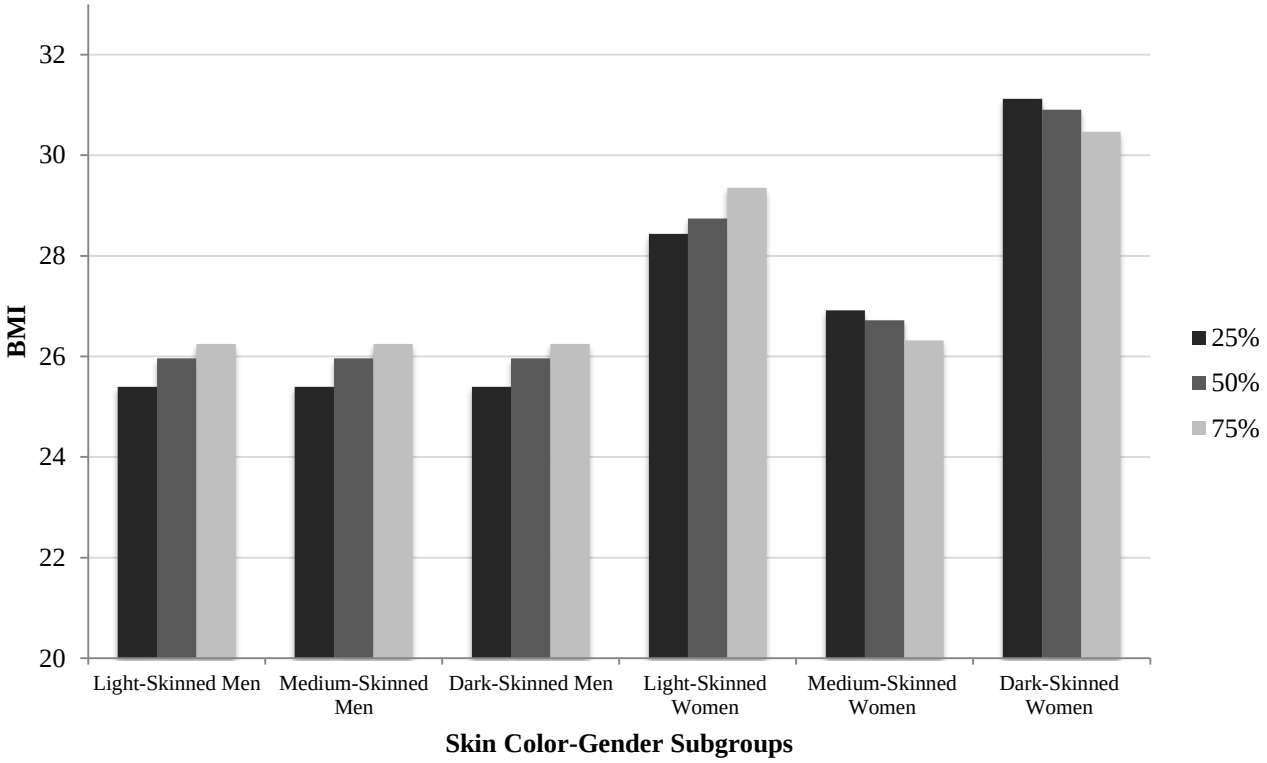
[t] $p<.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† indicates a statistically significant ($p< 0.05$) difference in coefficients for men and women

Model 2 adds education and income to Model 1. The inclusion of socioeconomic status slightly exacerbates the skin color gap in BMI for women, with the dark coefficient increasing by approximately 2%. Results from Model 2 also indicate that income is positively associated with BMI for both men and women. That is, increases in income are related to increases in BMI for

African Americans. Model 3 of Table 2 estimates the effect of skin color x gender x SES interactions on mean levels of BMI. Skin color continues to be significant among women, with dark-skinned women having a higher BMI than light-skinned women. Results from Model 3 also indicate that education is negatively related to mean levels of BMI for women, while income is positively related to BMI for both men and women. In particular, black women with more than a high school education have a lower BMI than black women with less than a high school education. Additionally, higher levels of income are predictive of higher BMI for men and women. Furthermore, the significant negative coefficients for interactions between skin color and income among women, in tandem with the significant positive coefficient for the main effect of income suggests that the positive income-BMI relationship is weaker for medium- and dark-skinned women compared to their light counterparts. This finding is displayed in Figure 1, which provides a graphical illustration of the joint consequences of skin color, gender, and income on BMI (based on estimates from Model 3 of Table 2). Figure 1 shows that higher levels of income are related to increases in BMI for all African American men and light-skinned African American women, yet decreases in BMI among medium- and dark-skinned women. Furthermore, while increased income is beneficial for BMI among non light-skinned women, dark-skinned women at each level of income have a higher BMI than their lighter-skinned counterparts. These relationships between income and BMI among women translate into the light-dark disparity in BMI being greatest at lower levels of income. Lastly, the significant Chow tests in each model of Table 2 for the linear and quadratic age coefficients indicate that BMI increases more rapidly with age for black women compared to black men, then levels off (for both genders) at older ages.

Figure 1. BMI by Skin Color, Gender, and Income Level Among African Americans



Joint Consequences of Skin Color, Gender, and Socioeconomic Status on BMI between Young Adulthood and Middle Life

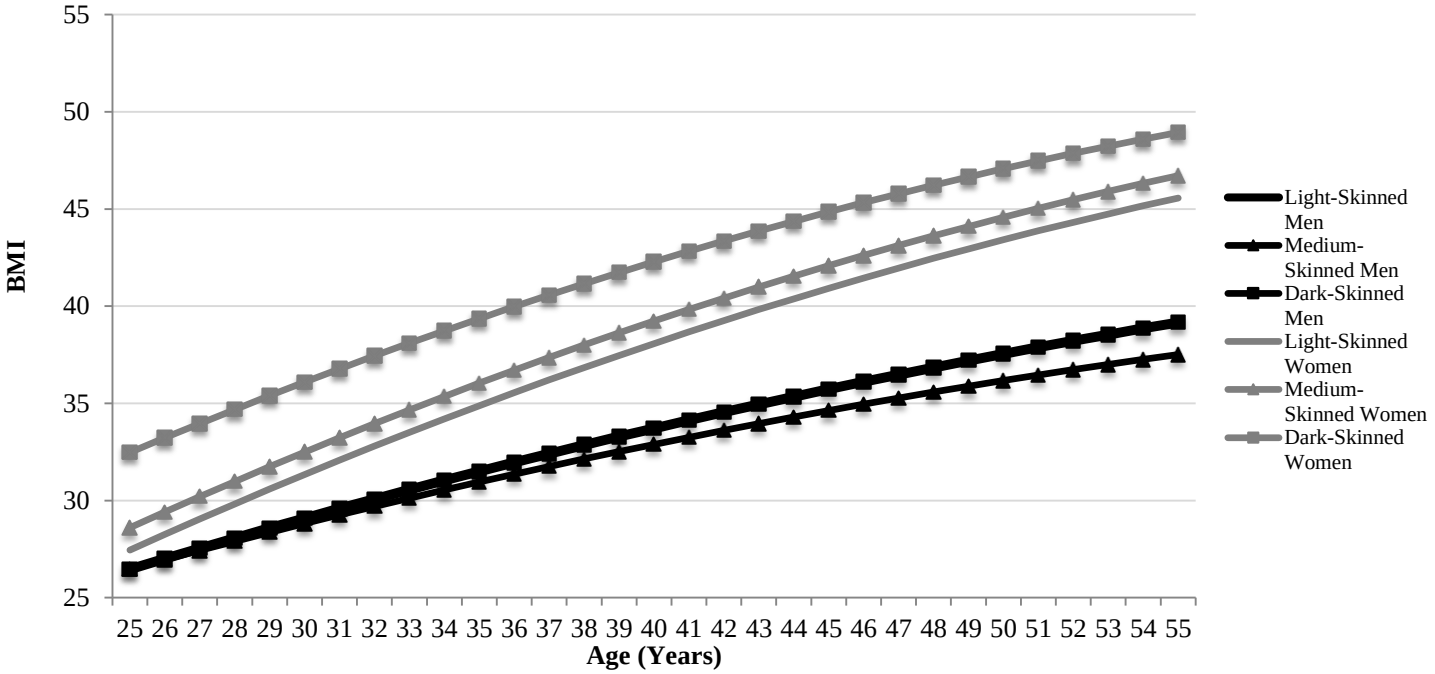
Table 3 presents growth curve models of BMI between ages 25 and 55. These models provide information regarding the extent to which skin tone-gender-SES combine to shape BMI intercepts (levels at age 25) and slopes (rates of change with age). All models control for attrition and are stratified by gender. Model 1 of Table 3 estimates skin color inequality in BMI trajectories. The significant positive coefficients for medium and dark skin among women on the BMI intercept indicates that medium-skinned and dark-skinned black women have a higher BMI at age 25 than light-skinned women, with dark-skinned women having the highest BMI. Additionally, the significant Chow test for the dark coefficient suggests that the magnitude of

skin color inequality in BMI at age 25 is greater among black women than black men. Furthermore, the significant negative coefficient for dark skin on the age slope suggests that the light-dark BMI disparity among women narrows between ages 25-55. Among men, there is a significant interaction between medium skin and age. More specifically, the significant negative coefficient for medium skin on the age slope suggests that a BMI gap between light-skinned and medium-skinned men emerges and widens between ages 25 and 55, providing support for the cumulative disadvantage hypothesis. Lastly, the significant Chow test for the linear age slope indicates that weight increases faster from age 25-55 among women, while the significant negative coefficient for the quadratic age slope in all models indicates that BMI levels are increasing with age at a decelerating rate. Weight gain is steeper at earlier ages for both men and women, though the rate of increase decelerates at later ages, particularly among women. These findings from Model 1 are illustrated in Figure 2—specifically, the widening trajectories between light- and medium-skinned men, yet converging trajectories between light- and dark-skinned women.

Model 2 adds education and income to the base model. Similar to the results in Table 2 the inclusion of SES slightly exacerbates the skin color gap in BMI among women. The coefficient for medium skin on the intercept increases by about 1%, while the coefficient for dark skin on the intercept among women increases by about 7% when SES is included in the model. Additionally, education is a significant predictor of the BMI intercept among black women. Black women with a high school education or more have a lower BMI at age 25 than women with less than a high school education. Furthermore, the negative coefficient for more than high school on the BMI intercept in conjunction with its positive coefficients on the age slope

suggests that the education gap among women narrows with age, with education becoming less protective of BMI for women between young adulthood and middle life.

Figure 2. Age-Trajectories of BMI by Skin Color and Gender Among African Americans



Model 3 includes interactions among skin color, gender, and SES on BMI intercepts and linear slopes. Results from this model indicate that black women with medium and dark skin have a higher BMI than their light-skinned counterparts at age 25, with the biggest gap being between dark and light women. Education no longer predicts higher BMI among women at age 25. The results also provide modest evidence that the gap between light- and medium-skinned women narrows with age, as indicated by the marginally significant negative coefficient for medium skin on the age slope, consistent with the aging-as-leveler hypothesis. Additionally, the interaction between medium skin and having more than a high school education on the age

slopes is marginally significant among women. This positive coefficient suggests that the BMI gap between medium- and light-skinned women does not narrow as quickly among women with more than a high school education. These results provide modest evidence that medium toned black women with more than a high school education experience steeper increases in BMI with age compared to light-skinned women with similar levels of education.

Table 3. Growth Curve Models of the Joint Consequences of Skin Color, Gender, SES, and Aging on BMI Among African Americans

	Model 1			Model 2			Model 3		
Fixed Effects [a]	Men	Women	[b] m≠w	Men	Women	m≠w	Men	Women	m≠w
Intercept	26.468***	27.441***		25.976***	28.192***	†	26.548***	27.422***	
Skin Color (ref. Light)									
Medium	.544	1.158*		.606	1.248*		-.303	3.055*	
Dark	.858[t]	5.029***	†	.915[t]	5.094***	†	.887	5.057***	†
SES									
High School				-.177	-1.045*		.340	-.715	
More than High School				-.041	-1.315**	†	.328	-.350	
Income				.087[t]	.083		-.107	.110	
Skin Color × SES									
Medium × High School							-.141	-1.116	
Dark × High School							-1.077	.447	
Medium × More than High School							-.002	-1.859	
Dark × More than High School							-.884	-.803	
Medium x Income							.246[t]	-.097	
Dark x Income							.204	.109	
Linear Slope (Age)	.543***	.814***	†	.463***	.693***	†	.386*	.742***	†
Skin Color (ref. Light)									
Medium	-.055*	-.027		-.052*	-.030		.045	-.146[t]	
Dark	-.026	-.055*		-.019	-.053*		.061	-.045	
SES									
High School				.016	.062[t]		.063	.033	
More than High School				.024	.071*		.052	-.013	
Income				-.004	-.003		.013[t]	-.005	
Skin Color × SES									
Medium × High School							-.072	.078	
Dark × High School							-.035	-.015	
Medium × More than High School							-.057	.154[t]	†
Dark × More than High School							-.001	.062	
Medium x Income							-.010	.000	
Dark x Income							-.014	-.010	
Quadratic Slope (Age^2)	-.004***	-.007***	†	-.004***	-.006***	†	-.004***	-.006***	
Random Effects									
Level 1 Residual	1.332***	1.905***		1.434***	1.906***		1.340***	1.906***	
Level 2 Age	.590***	.985***		.550***	.928***		.557***	.921***	
Level 2 Age^2	.006***	.012***		.006***	.012***		.006***	.012***	
Level 2 Intercept	6.036***	10.053***		5.942***	9.955***		5.911***	9.938***	
-2 Log Likelihood	17510	28785		17146	28515		17133	28504	
N	804	1092		804	1088		804	1088	

[a] All models control for proportion of waves missing

[b] 'm≠w' indicates Chow tests for differences between men and women

[t] $p<.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† indicates a statistically significant ($p< 0.05$) difference in coefficients for men and women

DISCUSSION

As rates of immigration and interracial unions rise, the racial hierarchy in the U.S. is dramatically changing. These population trends, which are projected to continue to increase, are shifting the color line, and thereby "darkening" the U.S. population (Bonilla-Silva 2004; Bonilla-Silva and Dietrich 2010). This shift in the color line from a bi-racial hierarchy to a more complex and loosely organized tri-racial hierarchy makes skin color an increasingly important dimension of inequality and status. It is therefore critical to improve our understanding of the role of skin color in shaping life chances among minority groups, especially African Americans. In addition to the limited research on the skin color-health relationship, there is often an underlying assumption in health disparities research that systems of inequality have independent, additive effects on health. This understanding of social statuses overlooks the unique and simultaneous positions of power in which individuals are situated, and leads to the tenuous assumption that dimensions of stratification are autonomous in nature. The present study addresses these limitations of prior research and contributes to our understanding of health inequality in several important ways.

First, this study is among the first to investigate the extent to which skin color intersects with other prominent dimensions of stratification to shape health across the life course. Prior studies have tended to use cross-sectional data to examine the independent effects of skin color and other social statuses on specific health outcomes (e.g., high blood pressure or hypertension), none of which included BMI (Boyle 1970; Harburg et al. 1978; Keil et al. 1981; Keil et al. 1977; Klag et al. 1991; Monk 2015). Much of this older research has produced mixed findings, and has generally overlooked how simultaneously experienced social statuses *multiplicatively* combine to affect health. This study extends previous research by utilizing a multiple-hierarchy stratification

perspective to investigate the joint consequences of skin color, gender, and SES on BMI trajectories. The findings provide support for the intersectionality hypothesis, as indicated by the gendered nature of skin color inequality in BMI. More specifically, dark-skinned African American women have a higher BMI than their light-skinned counterparts. This skin color disparity is not evident among men. Dark-skinned women, furthermore, have the highest BMI between early adulthood and mid-life compared to all other skin color-gender groups.

Interestingly, findings from this study indicate that education is protective of BMI for African American women only, and that income is positively related to BMI for both men and women. This income-health relationship, however, is weaker for medium- and dark-skinned women compared to their light-skinned counterparts. These results suggest that socioeconomic resources do not confer the same health benefits across race/ethnicity, skin color, and gender. Prior research has shown that socioeconomic mobility is not as advantageous for health among African Americans as it is for whites (Brown et al. 2016; Hargrove and Brown 2015). The diminishing returns of socioeconomic mobility to health among racial/ethnic minorities results from the restricted opportunities for economic success in the context of institutional and interpersonal racism, as well as increased stressors that may be accompanied by higher SES among racial/ethnic minorities (Pearson 2008). Findings from this study extend the literature on diminishing returns of SES by highlighting skin tone differences in the SES-health relationship among African Americans.

Moreover, the findings that the income-BMI relationship varies by skin color among African American women may be attributed to stressors specific to African Americans of varying skin tones and of particular socioeconomic statuses. More specifically, work by James Jackson and colleagues suggests that exposure to chronic stressors and living in a poorer

neighborhood may result in the increased likelihood of engaging in harmful coping behaviors, such as smoking, overeating, or alcohol use (Jackson and Knight 2006; Jackson, Knight, and Rafferty 2010; Krueger and Chang 2008; Lantz et al. 2005; Mezuk et al 2010). Given that high SES blacks are likely to experience elevated levels of stress compared to their lower SES counterparts (Pearson 2008) and live in relatively poorer neighborhoods (Alba, Logan, and Stults 2000; Harris 1999; Williams and Collins 2001), it is possible that blacks of higher incomes cope with these stressful environments in physically unhealthy ways that lead to weight gain. Previous research has also suggested that light-skinned blacks, particularly women, have a higher SES than their darker-skinned counterparts (e.g., Hughes and Herel 1991; Monk 2014). Taken together, these lines of research suggest that lighter-skinned African American women may engage in more physically harmful behaviors in efforts to cope with the effects of stressors at higher levels of SES on their mental and emotional well-being. This, in turn, may contribute to the especially strong relationship between income and BMI among light-skinned women.

Second, this study extends previous literature by combining multiple-stratification hierarchy and life course perspectives to investigate how age jointly combines with skin tone, gender, and SES to shape health across a substantial portion of the life course. Prior studies on health inequality, in general, and skin color health disparities, in particular, have given insufficient attention to the extent to which age intersects with social statuses to generate health disparities across the life course. The underlying implicit assumption that the effects of social statuses do not change with age limits our understanding of the dynamic nature of health inequality. The present study examines the extent to which the joint consequences of skin color, gender, and SES narrow, widen, or remain stable with age between young adulthood and middle life. Results indicate that the light-dark BMI disparity among women narrows with age, while the

light-medium BMI gap among men widens between ages 25 and 55. These findings are consistent with the aging-as-lever and cumulative disadvantage hypotheses, respectively. Furthermore, results suggest that education becomes less protective for African American women with age, and that this dynamic effect of education likely differs for women of varying skin tones. Specifically, modest evidence suggests that higher education may be particularly less protective for medium-skinned women compared to their light-skinned counterparts.

These relationships among skin tone, gender, SES, and age may be due to the cumulative and interactive effects of discrimination on the basis of skin color and other social statuses (e.g., gender and SES) that are experienced across the life course. Indeed, prior research suggests that skin tone may not only serve as a marker of social status, but as an indicator of the type of treatment one will receive from those within and outside the black community. Pervasive skin tone biases in society assign negative stereotypes to darker-skinned African Americans, such as being more dangerous, and less intelligent and attractive than lighter-skinned African Americans (Brown 1998; Maddox and Gray 2002). These stereotypes and attitudes influence behavior in ways that are often automatic and without conscious intention (Bargh 1989; Bargh et al. 1992; Bargh, Chen, and Burrows 1996; Fazio et al. 1986; Pratto and Bargh 1991), thereby increasing the likelihood that darker-skinned individuals will experience worse treatment from society as a whole. Furthermore, modest evidence suggests that darker-skinned African Americans, primarily men, report more experiences of interpersonal discrimination than their lighter-skinned counterparts (e.g., Klonoff and Landrine 2000; Monk 2015), though the findings are mixed (e.g., Borrell et al. 2006).

While the literature on the consequences of colorism suggests that darker-skinned African Americans may experience more discrimination and unfair treatment primarily from

non-black members of society, some research suggests that African Americans of lighter skin tones may face unique disadvantages that affect their health. More specifically, lighter-skinned African Americans are less readily perceived as members of the black community (Brown 1998; Cunningham 1997), and are therefore more likely to be seen as less authentically black or less connected to the black experience (e.g., Hunter 2007). Scholarship on identity formation and dynamics suggests that social cues and treatments by others that do not confirm personal identities can induce stress and influence behaviors and characteristics that are consequential for health behaviors, such as self-esteem (Burke 1991; Campbell and Troyer 2007; Veenstra 2011). Light-skinned African Americans who self-identify as black, yet are socially considered and treated as nonblack may therefore experience obstacles to good health. Consequently, varying stereotypes and perceptions of African Americans of different skin tones may lead to disparate notions of appropriate treatment, with those of darker skin being treated more hostilely from those outside of the black community, yet more warmly by those within the black community compared to their lighter-skinned counterparts. Indeed, findings from a recent study suggest that both light- and dark-skinned African Americans perceive a considerable amount of discrimination from other blacks because of their skin color, while medium-skinned blacks perceive less skin color discrimination from other blacks (Monk 2015). Additionally, this same study finds a linear relationship between skin color among African Americans and skin color discrimination from whites, with African Americans of darker skin experiencing more discrimination. These patterns suggest that the nature of discrimination attributable to skin tone differs based on the source of the unfair treatment. While the present study is unable to examine the role of discrimination in shaping the skin color-health relationship, future data collection

efforts should entail obtaining specific information on individuals' unique experiences with discrimination.

A third contribution of this study is the focus on an important outcome during a critical stage of the life course: the transition from young adulthood to mid-life. BMI is a particularly critical health outcome to investigate given current trends in weight gain and the negative effects of being overweight or obese on physical, mental, and emotional health (Allison et al. 1999; Carr and Friedman 2005; Must et al. 1999; Onyike et al. 2003; Paeratakul et al. 2002; Wang et al. 2011). More specifically, recent estimates suggest that more than two-thirds of adults in the U.S. are overweight or obese (Ogden et al. 2014). The adverse and accumulating consequences of being overweight or obese at a younger age have implications for the overall population, as projections suggest that by 2030, health care costs attributable to being overweight or obese will total over $800 billion, accounting for 16-18% of the total U.S. health care costs (Wang et al. 2008). Identifying the population subgroups that are most plagued by increasing BMI is critical for developing efficacious strategies to address health inequality.

This study is not without several limitations. First, the data used are not nationally representative, and the findings presented here are not generalizable to the overall African American population. Second, these data do not allow for the consideration of heterogeneity in the relationship between skin color and BMI by nativity and ethnicity among African Americans. Prior research has shown that U.S.-born African Americans have poorer health than their U.S.- and foreign-born counterparts from African or Caribbean countries across an array of outcomes, including BMI (Goel et al. 2004). Furthermore, the type, frequency, and consequences of exposure to race-based stressors may differ by ethnicity or nativity among African Americans. In particular, given variations in race relations and racial structures in the U.S. and African

diasporic nations—which also has implications for understandings of skin color hierarchies—, it is possible that perceptions of discrimination and resources to cope with such stressors may differ among blacks based on their ethnic identification and place of origin. Indeed, some research suggests that perceptions of discrimination and the discrimination-health relationship vary by ethnicity and nativity among blacks (e.g., Ryan, Gee, and Laflamme 2006; Viruell-Fuentes, Mirand, and Abdulrahim 2012). When possible, future research should consider how ethnicity and nativity combine with skin color to shape pathways to health.

A third limitation is the measurement of skin color. More specifically, these data measure skin color with a reflectance meter, which provides an objective rating of the hue of respondents' skin. While this measure of skin color is relatively objective and reliable, it does not take into account the subjective and arbitrary nature of social appraisals and judgments made by others in society (Blair et al. 2002; Macrae and Bodenhausen 2001; Maddox 2004). Moreover, these data do not include information on respondents' perceptions of their skin shade, thereby precluding the possibility of examining the effects of self-identification on health trajectories among African Americans. Prior research has shown that self-rated skin color represents an embodied social status that has direct effects on African Americans' health, and is an important mechanism of social inequality given the relational processes and dynamics of domination and power that are embedded in many self-identifications (Monk 2015). Given its multidimensional status and functionality, future research should evaluate the effects of several measures of skin color, including self- and interviewer-ratings.

Despite these limitations, this study shows that skin color plays an important role in shaping BMI trajectories among African Americans between young adulthood and middle age. These findings provide evidence of heterogeneity in pathways to health, as well as in the

relationships between gender, social class, and health based on skin tone. This study also highlights the unique advantages and disadvantages of members of a similar social group (e.g., African Americans) that may help inform interventions geared toward eliminating health inequality. More specifically, the results suggest that not all African Americans will benefit from one approach to addressing health disparities across a substantial portion of early and middle life. Consequently, policymakers should consider multifaceted approaches to addressing health inequality given differentiated pathways to health that reflect the consequences of varying positions in the social hierarchy based on simultaneously experienced social statuses.

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CHAPTER V

Conclusions

In this dissertation, I investigated the extent to which race/ethnicity, skin color, gender, and socioeconomic status (SES) intersect to shape age trajectories of health across adolescence, early adulthood, and mid-life. Although social disparities in health are well-documented, the majority of the population health literature has tended to focus on the independent or additive consequences of social statuses. This predominant perspective assumes that dimensions of stratification are autonomous structures of inequality that do not condition or influence the effects of each other on health. As a result, additive approaches overlook the consequences of the unique and simultaneous positions of power and disadvantage that are embedded in the experience of multiple social statuses and identities. Furthermore, prior research has given insufficient attention to the joint consequences of social statuses on health across different stages of the life course, as a majority of studies have generally focused on health in later adulthood.

Moreover, research on intersecting social statuses and health have concentrated primarily on the effects of race/ethnicity, gender, and social class. Other important dimensions of inequality, particularly skin color and age, have been examined less often as determinants that contribute to complex patterns of health inequality. The extent to which skin tone shapes health among African Americans is an especially crucial topic given population trends (e.g., rising rates of immigration and interracial unions) that are shifting the color line in the U.S., and making skin color an increasingly important marker of inequality and status (Bonilla-Silva 2004). This shift in the racial hierarchy and the ensuing importance of skin color has significant implications for health inequality. Additionally, while studies have shown age to be a significant factor in shaping

trajectories of health and well-being (e.g., House et al. 2005; Willson et al. 2007), a majority of prior research has not evaluated the extent to which *intersecting* inequalities in health change with age (for exceptions see Ailshire and House 2011; Brown et al. 2016). Consequently, the multifaceted nature of social disparities in health remains less understood. An improved and nuanced understanding of health inequality requires the incorporation of colorism/pigmentocratic and life course perspectives into studies of health that utilize multiple-hierarchy stratification approaches, which have considerable utility for understanding the complex relationships between social statuses and health (e.g., Brown et al. 2016; Clark and Maddox 1992).

This study drew on multiple-hierarchy stratification, colorism/pigmentocratic, and life course frameworks to address four research questions:

1. To what extent do race/ethnicity, gender, and SES intersect to shape health?
2. Do the intersectional effects of these social statuses widen, narrow, or remain stable with age?
3. Is there a systematic relationship between skin color and multiple measures of health among African Americans?
4. How does skin tone stratification in health vary by gender and change across the life course?

Chapter 2 addressed research questions 1 and 2 by investigating whether the effects of race/ethnicity, gender, SES of origin (measured by parental educational attainment and household income-to-poverty ratio), and age additively or multiplicatively combined to shape trajectories of body mass index (BMI) BMI among whites, African Americans, and Mexican Americans aged 13-31. I found that racial/ethnic inequality in BMI was gendered, with black-white disparities being greater among women than men. Black women also had the highest BMI

compared to all other racial/ethnic-gender groups, and SES of origin did not confer the same health benefits for Hispanic men and black men and women compared to their white counterparts. These results suggested that race/ethnicity, gender, and SES of origin combine multiplicatively to shape BMI, and thereby provided evidence for the intersectionality hypothesis. Results from growth curve models also supported the cumulative disadvantage and persistent inequality hypotheses. For example, black women experienced the greatest increases in BMI with age, which translated into widening BMI gaps between black and white women between adolescence and young adulthood. Findings also indicated that inequalities between Hispanic and white men widened with age, as did inequalities between men whose parents had higher versus lower levels of education. Furthermore, a significant three-way interaction between race/ethnicity, gender, and parental education suggested that, among Hispanic and white women, the health benefits of higher levels of parental education increased with age, supporting the cumulative disadvantage hypothesis. The black-white disparity in BMI among men, however, was found to remain stable from ages 13-31, as predicted by the persistent inequality hypothesis.

Chapter 4 addressed research question 4 by examining the intersecting consequences of skin color, gender, and SES (measured by respondent education and income) on age trajectories of BMI among African Americans aged 25-55. In this chapter, I found that skin color inequality was greater among women than men, with dark-skinned women having the highest BMI out of all skin color-gender groups. The results also indicated that socioeconomic resources differentially influenced BMI among skin color-gender groups. For example, education was protective of BMI for African American women, while income was inversely related to BMI among African American men and women. This income-health relationship was weaker for medium- and dark-skinned women compared to their light-skinned counterparts. The

multiplicative impacts of skin color, gender, and SES on health provided evidence for the intersectionality hypothesis. Moreover, results from Chapter 4 provided support for the aging-as-lever and cumulative disadvantage hypotheses. Findings from growth curve models indicated that BMI inequalities between light- and medium-skinned African American women narrowed with age, while the light-medium disparity in BMI among African American men widened with age.

Overall, findings from Chapters 2 and 4 suggest that social disparities in BMI between adolescence and mid-life tend to be greater among women, and change—usually widening or narrowing—with age, consistent with the cumulative disadvantage and aging-as-leveler hypotheses, respectively. These findings, which also provide modest support for the persistent inequality hypothesis, highlight the generally dynamic nature of intersecting inequalities in health. Results indicating that BMI inequalities widen with age are consistent with prior literature that has found health disparities between social groups to increase through midlife (e.g., House et al. 2005; Shuey and Willson 2008; Willson et al. 2007). Life course perspectives posit that adversity in early life tends to have deleterious effects on later life outcomes by placing individuals on varying social, economic, psychological, and behavioral trajectories (Hargrove and Brown 2015; Hayward and Gorman 2004; Warner and Hayward 2006). Fewer socioeconomic resources in childhood, for example, may negatively affect the subsequent accumulation of health-relevant forms of capital (e.g., education, income, wealth) and position individuals and their families on trajectories of increasing disadvantage compared to those with greater socioeconomic resources in childhood (O'Rand 2001; Shuey and Willson 2008). The early life social and economic adversities experienced by racial/ethnic minorities in general, and darker-skinned minorities in particular, may therefore contemporaneously and cumulatively

affect trajectories of health across the life course, resulting in widening health gaps between whites and African Americans or light-skinned and darker-skinned African Americans. Furthermore, the results that indicated BMI trajectories narrowed with age generally involved specific gender and SES combinations (e.g., income gaps among men in Chapter 2 and skin color and education gaps among women in Chapter 4). It is possible that specific advantages conferred by privileged statuses (e.g., being white/male, light-skinned, having higher levels of income and education) wane during early adulthood given increases in stressors that most young adults experience during this life stage. More specifically, major life transitions and expectations characterize the lives of individuals in their 20's or 30's, such as the completion of education, formation of an independent household, and establishment of one's own SES. Stressors and negative experiences that emanate from this stage of the life course—arguably one of the most stressful stages of the life course (e.g., Adkins et al. 2009)—may differentially impact members of social groups. For example, the effects of health-protective resources that are more readily available among advantaged individuals, such as higher levels of education and income, may erode or diminish with age given the onset and potentially rapid accumulation of social stressors. Further research is needed, however, to better understand why specific health disparities may or mat not change with age.

Additionally, results from Chapter 2 and 4 suggest that socioeconomic resources in early and later life have less beneficial effects on health among African Americans, particularly those of lighter skin tones, and Hispanics. These findings are consistent with prior literature on the diminishing returns hypothesis. Specifically, research on the SES-health relationship has found that socioeconomic mobility does not confer the same health benefits across racial/ethnic groups due to institutional and interpersonal racism—specifically, the restricted opportunities for

economic success and increased stressors that may be accompanied by higher SES among racial/ethnic minorities (Pearson 2008). The findings here go a step further to suggest that not only does one's own SES affect subsequent health outcomes, but that early life and familial socioeconomic circumstances have dynamic effects on health throughout adulthood. Moreover, Chapter 4 presents novel findings regarding the extent to which SES affects skin color disparities in BMI across young adulthood and mid-life. In particular, results indicated that the positive relationship between income and BMI among women was stronger for light-skinned women compared to their darker-skinned counterparts. This pattern brings attention to the consequences of intersections between SES, gender, and skin color among African Americans. More specifically, given that light-skinned women are more likely to be of higher SES than dark-skinned women (e.g., Monk 2014), it is possible that the stressors they experience at these higher socioeconomic levels may uniquely compound with stressors characteristic of women and lighter-skinned individuals to encourage the use of physically harmful coping behaviors. Future research, however, is needed to test this and similar hypotheses.

Chapter 3, which investigated the relationship between skin color and an array of objective and self-reported health outcomes among African Americans, addressed research question 3. Results indicated that dark-skinned African American women had worse health than light-skinned women, including higher allostatic load scores, worse reports of health, and higher likelihoods of being diabetic and hypertensive. The health outcomes examined in Chapter 3 represent multiple physiological systems in the body, thereby suggesting that skin color has a broad impact on the physical well-being of African American women in early adulthood and mid-life. Moreover, socioeconomic resources—namely education and income—did not explain these relationships, nor was skin color significantly related to health among African American

men. These findings are broadly consistent with the colorism literature. Specifically, prior research has shown that the effects of skin color are gendered such that skin tone is more consequential for the life chances of women. The gendered nature of colorism may be attributed to the social construction of beauty and its implications for life chances among women. Feminist theories have highlighted how physical characteristics that are consistent with hegemonic, Eurocentric notions of beauty confer special advantages and resources for women, which include or translate into forms of economic and social capital (Anderson et al. 2010; Jeffreys 2005). Given that light skin embodies a key Eurocentric standard of beauty in the U.S., lighter-skinned women are considered more attractive than their darker-skinned counterparts (Hill 2002; Hunter 2002), and are therefore likely to receive more socioeconomic and health-relevant resources than other African American women and men.

In addition to addressing the research questions discussed above, findings from this dissertation raise new questions regarding the social stratification of health. For example, the significant, intersecting effects of multiple social statuses on BMI found in Chapters 2 and 4 suggest that systems of stratification other than race/ethnicity, gender, and social class contribute to health inequality across the life course. These alternative systems of stratification, such as ethnicity and nativity, likely differentiate the meanings of social statuses and the lived experiences of broadly defined social groups (Waters and Kasinitz 2010). These differences are likely due to variations (e.g., by region, culture, historical time period) in racial/gender/socioeconomic structures, relations, and expectations (Read and Emerson 2005). Furthermore, results from Chapter 3, which demonstrate a robust relationship between skin tone and health among African American women, highlight the possibility that other dimensions of individual or group well-being may be affected by skin color or additional statuses unique to

population subgroups. It is plausible that skin color, for example, would intersect or combine with race/ethnicity, gender, and SES to shape mental health or the prevalence of comorbid disorders (e.g., Monk 2015). Lastly, the patterns of health inequality evident in these chapters beg the question of how social statuses "get under our skin" to impact health throughout the life course. It is possible that the unique stressors that emanate from simultaneous social statuses differentially alter physiological processes to produce complex patterns of disparities both between and within social groups. Theoretical or methodological approaches that assume lived experiences or stressors are similarly characteristic of, or consequential for, all members of broadly defined social groups may therefore not be sufficient for understanding health inequality.

While this dissertation project provides important insights regarding racial/ethnic, skin color, gender, and socioeconomic inequality in health, there is still much research needed on the social stratification of health throughout the life course. First, future research should examine the effects of skin color on health among a nationally representative sample of older adults. Life course perspectives highlight the fact that social factors collectively and cumulatively combine throughout one's life span to shape health (Elder, Johnson, and Crosnoe 2003; Thorpe and Kelley-Moore 2013). It is important to identify the lifelong and cumulative consequences of skin color in efforts to understand the degree and nature of health inequalities at older ages. Thus, data collection efforts should incorporate skin color information into longitudinal, nationally representative studies of older Americans.

Second, scholars should continue to investigate the extent to which skin color shapes a multitude of outcomes. Given that colorism structures access to important resources and opportunities, it is likely that skin tone impacts multiple physiological, psychological, and behavioral aspects of one's life. Additional indicators of socio-emotional and physical well-

being, for example, should be considered in the study of skin color and health. Furthermore, the changing racial structure of the U.S., in which we are moving from a rigid bi-racial to more loosely organized tri-racial hierarchy that places more emphasis on skin color (Bonilla-Silva 2004), calls for increased research on the study of skin color and life chances given its implications for understanding the nature of inequality among African Americans, Latinos, and other racial/ethnic subgroups.

Third, future studies should more seriously consider socio-historical and spatial influences on the nature of relationships between multiple social statuses and health. Specifically, the U.S. has experienced varying waves or streams of immigration that has altered the racial composition and social relations of society. For example, the early 20th century was characterized by an influx of immigrants from European countries, particularly those from eastern regions. Since 1965, when Congress passed the Immigration and Nationality Act, the U.S. has experienced a decrease in European immigrants and a large increase in the percentage of immigrants from Asian and Latin American countries (Krogstad and Lopez 2014; Portes and Zhou). The majority of immigrants today are of Latin American origin, with a large portion coming from Mexico. These changes in immigrant populations may impact health inequality given historical and regional differences in race relations. Furthermore, increases in particular immigrant populations may be accompanied by different understandings of race. The subsequent attitudes and behaviors toward racial/ethnic minority groups that stem from these different and evolving understandings may significantly affect pathways to health disparities. Moreover, changes in American attitudes toward racial/ethnic minorities and immigrants throughout time, in addition to regional differences in historic relations among races and immigrant groups may further alter the nature of health inequality. Consequently, the meanings and importance of

statuses such as skin color may vary by age, over time, and by region, resulting in dynamic effects on health.

Lastly, the unique and complex patterns of health inequality found in these dissertation chapters raise questions regarding the specific mechanisms that may be generating these trends. In particular, the results challenge presumed unidimensional mechanisms underlying health among social groups, such as socioeconomic status. This conclusion is broadly consistent with more recent social science research, which has increasingly focused on other factors that may account for racial/ethnic inequality in health. Accumulating evidence suggests that exposure to a variety of stressors, including chronic stressors, discrimination, and neighborhood conditions, helps explain a substantial portion of social disparities in health (Bratter and Gorman 2011; Brown, Hargrove, and Griffith 2015; Thoits 2010; Williams and Brabody Jackson 2005; Williams and Sternthal 2010). While these multilevel factors are extremely important and contribute to health disparities, the inability of a majority of prior research to completely explain the health disadvantages of racial/ethnic minorities and women necessitates the identification of interactive pathways to health among social, behavioral, and biological factors. One line of research that would provide a more holistic approach to the study of health inequality is the incorporation of social contexts into research on gene-environment interactions. It is likely that the experience and consequences of race/ethnicity, skin color, gender, and social class differ across settings and environments that define individuals' everyday interactions (e.g., Black and Veenstra 2011). Indeed, studies have provided evidence that factors such as school environments, family and neighborhood contexts, and stressors significantly interact with physiological processes to shape health and risk behaviors among social groups (e.g., Boardman et al. 2014; Guo et al. 2010; Levine et al. 2015; Repetti, Taylor, and Seeman 2002). There is,

however, limited research that takes this more integrative approach to understanding health, thereby limiting our knowledge on how social factors and spatial contexts influence the more proximate causes of health and well-being (Harris 2010). Exploring how additional social and environmental factors independently and *collectively* combine with physiological processes is likely to have considerable utility for identifying unique mechanisms underlying health inequality. In particular, integrating the role of spatial contexts into investigations of social statuses, biological processes, and health will reveal the multilevel and contextual influences of individuals' lives on health. Future research should therefore combine frameworks and methodologies from across the social and biomedical sciences to examine the extent to which biological factors and social environments combine to shape health over the life course.

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