Educational Parity, Health Disparities: Differential Health Returns to Education by Race/Ethnicity in Young Adulthood

DISSERTATION

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Abstract

Empirical evidence has repeatedly demonstrated that higher levels of educational attainment are associated with lower levels of morbidity and mortality (Conti, Heckman and Urzua 2010; Cutler and Lleras-Muney 2006; Elo and Preston 1996). The improvements in health associated with higher levels of educational attainment are called "health returns to education". It is also well documented that health returns to education vary significantly across racial/ethnic groups (Crimmins and Saito 2001; Ferraro and Farmer 2005; Masters, Hummer and Power 2011), although most of this literature focuses on middle-aged and older adults. Scholars have recently advocated for an investigation of mechanisms that contribute to these differential returns by assessing living and learning conditions *earlier* in the life course (Ferraro and Farmer 2005; Hayward et al 2000). Using multiple waves of the National Longitudinal Survey of Adolescent Health (Add Health), I assess whether there are racial/ethnic health returns to education for self-rated health, obesity and hypertension during the transition from adolescence to young adulthood. I also assess whether living and learning conditions significantly contribute to racial/ethnic disparities in health returns to education. I find differential health returns to education by race/ethnicity for *all* health indicators, although the extent and direction of the return varies by race/ethnic group and indicator. I also find that living and learning conditions in adolescence contribute to *widening*

racial/ethnic disparities in health returns for self-rated health, obesity and hypertension while living conditions in young adulthood *narrow* racial/ethnic disparities in health returns to education for self-rated health and obesity. This research highlights the need to investigate why processes linking living and learning conditions to health returns to education vary across race/ethnicity and health outcome. It also provides guidance to policymakers on how education policy can be used ass as health policy to improve population health.

Acknowledgments

I am indebted to my advisor, Reanne Frank, for not only her assistance, but also her persistence and belief in my ability to complete this dissertation. If it were not for Reanne, this document would not exist.

I also wish to thank my parents for believing that I could accomplish anything, but never telling me *what* I should accomplish.

Last, but never least, I want to thank my husband and children for their unconditional love and support.

Dedication

To my wonderful husband, John Jones

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Chapter 1: Introduction

The relationship between educational attainment and health is strikingly robust. Higher levels of educational attainment are associated with the delay, prevention and mitigation of numerous unfavorable health outcomes including infant, child (Gakiduo et al. 2010) and adult mortality (Lleras-Muney 2005; Rogers et al. 2010), disability (Fuller-Thomson et al. 2009; Latham 2012), cardiovascular disease (Vargas, Ingram and Gillum 2000; Lawlor et al. 2004) and cancers (Kinsey et al. 2008; Ward et al. 2008). The relationship between education and health is gradational whereby individuals with more years of formal schooling obtain more health benefits (Cutler and Lleras-Muney 2006). For example, those with some postsecondary education are in better health than those without a high school diploma, and those with a four-year degree experience better health outcomes than those with some postsecondary education but no four-year degree. Gains in health associated with an increase in educational attainment are called "health returns to education".

Nevertheless, research indicates that health returns to education are not equal across racial/ethnic groups. In comparison to non-Hispanic whites, African Americans have been found to obtain lower health returns to education at both low (Christenson and Johnson 1995; Crimmins and Saito 2001; Zajacova and Hummer 2009) and high

(Hayward et al. 2000; Jemal et al. 2008; Merara, Richards and Cutler 2008; Schoendorf 1992) levels of educational attainment for a variety of health indicators including mortality (Crimmins and Saito 2001; Jemal et al. 2008; Zajacova and Hummer 2009), obesity (Kimbro et al. 2008), hypertension (Hayward et al. 2000) and self-rated health (Ferraro and Farmer 2005; Shuey and Wilson 2008).

Some scholars find that racial/ethnic disparities in health returns to education are largest at *high* levels of education (Hayward et al. 2000; Jemal et al. 2008; Merara, Richards and Cutler 2008; Schoendorf 1992). For example, Jemal and colleagues find that that all-cause mortality among black and white women with less than 12 years of education have an age-adjusted death rate of 577.6 and 539.5 deaths per 100,000 persons, respectively (2008). However, among black and white females with at least 16 years of education, the age-adjusted death rate for all-cause mortality for black women (318.7) is over two-times higher than the rate for white women (147.4) indicating that college-educated black women obtained fewer health benefits to postsecondary education than their white counterparts. This finding supports what Ferraro and Farmer call "diminishing returns" to education (2005). "Diminishing returns" occurs when health returns to education increase at a decreasing rate at the high ends of the educational distribution creating larger disparities at higher levels of education.

In contrast, some research finds that health returns to education are largest at *lower* levels of education (Christenson and Johnson 1995; Crimmins and Saito 2001; Zajacova and Hummer 2009). For example, Crimmins and Saito (2001) find that among those aged thirty and over, black men with less than nine years of education are expected

to live seven fewer years than similarly educated white men. However, there were no significant black-white disparities in life expectancy among those with over 13 years of formal schooling. Read and Gorman also find that in a racial/ethnically diverse sample of adults, U.S. born Mexican Americans and Central/South Americans obtain higher returns to low levels of education than U.S. born Cubans and Puerto Ricans (2006).

The purpose of this dissertation is two-fold. The first goal is to assess whether health returns to education significantly vary for whites, blacks and Hispanics during the transition from adolescence to young adulthood. This objective also includes describing patterns of racial/ethnic differences in health returns to education across three health indicators measured in young adulthood: self-rated health, obesity and hypertension. The second aim of this research is to evaluate whether living and learning conditions in adolescence and young adulthood are mechanisms that contribute to racial/ethnic disparities in health returns to education among young adults. These aims address gaps in prior studies that assess racial/ethnic disparities in health returns to education. My dissertation will elucidate: 1) how health returns to education vary across racial/ethnic groups in *young adulthood*, 2) what *mechanisms* contribute to these disparities and 3) how racial/ethnic disparities in health returns to education vary *across health indicators*.

The transition from adolescence to young adulthood is critical for health since socioeconomic and health trajectories set in motion during this period have an enduring influence on morbidity and mortality in older adulthood (Pearlin et al. 2005). Compared to older cohorts, research finds that health returns to education are *increasing* among younger cohorts, creating large educational disparities at earlier ages (Lynch 2003;

Lauderdale 2001). This is especially concerning since educational health disparities tend to *increase* with age (Lynch 2003). These patterns suggest that disparities in health returns to education will be larger for future cohorts of older adults than for contemporary cohorts. This evidence supports the need to document disparities in younger cohorts and gain a better understanding of the mechanisms that contribute to these disparities in order to aid in the development of policies that aim to mitigate educational health disparities. To date, the majority of existing studies assess health returns to education *older* adults (Lynch 2003).

The *mechanisms* that contribute to racial/ethnic disparities in health returns to education are not clear. Several studies do not adjust for other indicators of socioeconomic status in adulthood such as income or wealth (Christenson and Johnson 1995; Crimmins and Saito 2001; Jemal et al. 2008; Kimbro et al. 2008; Meara, Richards and Cutler 2008). Other research finds that racial/ethnic disparities in health returns to education remain after controlling for these indicators (Farmer and Ferraro 2005; Hayward et al. 2000; Read and Gorman 2006). For example, Hayward and colleagues find that blacks were more likely to experience the onset of hypertension and diabetes at earlier ages than whites after controlling for income, employment status and wealth (2000). Read and Gorman also find racial/ethnic disparities in health returns in self-rated health and functional limitations after controlling for income, health behaviors and access to health services (2006). Some scholars suggest that minimizing racial/ethnic differences in living and learning conditions *early* in the life course may ameliorate racial/ethnic disparities in health returns to education in adulthood (Farmer and Ferraro

2005; Hayward et al. 2000; Kimbro et al. 2008); however, scholars have yet to test this hypothesis.

Finally, while research finds that health returns to education vary by race/ethnicity, less attention has been paid to systematically documenting how these disparities may vary across health outcomes. The size of racial/ethnic health disparities varies significantly by health outcome; therefore the magnitude of racial/ethnic disparities in health returns to education most likely varies by health outcome as well.

I address these gaps in the literature by: 1) focusing on a sample of students in 7th through 12th grade during the 1994-1995 school transitioning to young adulthood, 2) adjusting for multiple indicators of living and learning conditions early in the life course and 3) examining racial/ethnic disparities in health returns to education across three health outcomes.

This dissertation uses waves I, II, and IV of the National Longitudinal Survey of Adolescent Health (Add Health). Add Health is a racial/ethnically diverse, nationally representative, prospective survey that provides a unique opportunity to address these aims since it is the only data set that includes a wide variety of indicators of socioeconomic status, family relationships, school characteristics, and health at multiple points during the transition from adolescence to young adulthood. Empirical evidence suggests that racial/ethnic disparities in health returns to education are increasing (Masters, Hummer and Power 2011; Zajacova and Hummer 2009). Therefore, clarifying the mechanisms through which health returns to education vary by race/ethnicity and describing how these disparities vary across health indicators is especially critical to the

development of policies and programs to improve population health and ensure that individuals of all racial/ethnic backgrounds equally benefit from their human capital investments.

Outline of Research. I begin Chapter 2 by describing my conceptual model and discussing research that supports the importance of educational attainment for health. I then provide an in-depth description of findings from previous research that explores how health returns to education vary across race/ethnicity and how racial/ethnic disparities in health returns to education vary by level of education and across time. Finally, I utilize the fundamental cause theory and the lifecourse framework to explain how learning and living conditions in adolescence and young adulthood influence racial/ethnic disparities in health returns to education for self-rated health, obesity and hypertension in young adulthood. In Chapter 3, I describe my data, measures and analytical strategy.

Chapter 4 describes patterns in the relationship between educational attainment and health indicators for whites, blacks and Hispanics. I establish that the magnitude of racial/ethnic disparities in health returns to education varies substantially by health indicator. Chapter 5 examines whether socioeconomic status and family structure and family relationships in adolescence narrow racial/ethnic disparities in health returns to education described in Chapter 4. I test whether individual-level and school-level learning conditions in adolescence influence racial/ethnic disparities in health returns to education in Chapter 6. I also adjust for living conditions in adolescence and young adulthood in this chapter to examine whether living and learning conditions during the transition from adolescence to young adulthood significantly narrows racial/ethnic

disparities in health returns to education. In Chapter 7, I conclude by discussing the academic contributions, policy implications and limitations of this research.

Chapter 2: Literature Review

Because of the strong positive, gradational relationship between educational attainment and health, have suggested that education policy be utilized as health policy scholars (Cutler-Lleras Muney 2007; Mechanic 2005; Mirowsky and Ross 1998). Research from the U.S. and several other nations suggests that minimizing inequalities in educational attainment may significantly improve population health (Elo and Preston 1996; Elo 2009; Murphy et al 2006). However, policymakers in the U.S. have focused on increasing access to medical and hospital services and individual lifestyle factors such as exercise, diet and physical activity rather than leveling educational disparities to improve population health (Low et al. 2005).

Increased educational attainment is associated with a substantial decrease of morbidity and mortality. Using U.S. vital statistics data from 1996 to 2002, Woolf and colleagues estimated that correcting for educational disparities in the education-mortality relationship by applying the mortality rates of the college-educated to the entire U.S. population would have saved 1,369,335 lives from 1996 to 2002 (2007). In contrast, medical advances were estimated to prevent 178,193 deaths; an 8:1 ratio compared to deaths that could have been averted by giving everyone the life expectancy of the college educated. Jemal and colleagues also find that during 2001, nearly half (48%) of deaths

among men between the ages of 25 and 64 and 38% of deaths in women would have been avoided if all segments of the population experienced the mortality rates of the college educated (2008). These scholars also find that the life expectancy for a 25 year-old in 2000 is seven years longer for individuals who attended college compared to those with a high school education or less (2008). Crimmins and colleagues find that the onset for various chronic diseases such as cardiovascular diseases, diabetes and lung diseases, occurred five to fifteen years later among individuals with at least 16 years of formal schooling compared to those with eight years (2001).

Despite the abundance of data supporting the substantial health benefits—or "health returns"—to education, there are several gaps in the literature that need to be filled before policymakers can formulate more effective health policies: 1) *How* does education influence health? 2) Does this process *vary* across diverse populations? Attention has been given to the first inquiry; research addressing the second question is relatively new.

Growing evidence indicates that some racial/ethnic groups such as U.S. born Hispanics and non-Hispanics blacks have significantly poorer health outcomes than non-Hispanic whites (hereafter referred to as whites and blacks) with the same level of educational attainment. For example, in contrast to their similarly educated white peers, blacks have a higher probability of all-cause mortality and lower life expectancy (Christenson and Johnson 1995; Jemal et al. 2008; Zajacova and Hummer 2009) and are more likely to report fair or poor health (Farmer and Ferraro 2005; Shuey and Wilson

2008). U.S. born Hispanics are also more likely to describe their health as fair or poor compared to whites with the same level of educational attainment (Kimbro et al. 2008).

In the following paragraphs I provide detailed illustrations of racial/ethnic disparities in health returns to education, and discuss trends in these inequalities by level of educational attainment and over time. I also use fundamental cause theory and the life course framework to discuss mechanisms that may create and reproduce racial/ethnic disparities in health returns to education.

Racial/Ethnic Disparities in Health Returns to Education: The Empirical Evidence

A "health return" refers to the gains in health associated with increased exposure to formal schooling. The relationship between educational attainment and health is *positive* and *gradational* whereby each additional year of education or credential is associated with better health outcomes (Conti, Heckman and Urzua 2010). Thus, an individual with 13 years of schooling is expected to experience better health outcomes than someone with 12 years of schooling. A steep gradient in the education-health relationship indicates that there is a large health difference between those with the lowest and highest levels of education and that there are large health returns to education.

Several studies have indicated that health returns to education vary across racial/ethnic groups. Researchers conclude that health returns to education vary by race/ethnicity when: 1) there is a significant interaction between race/ethnicity and educational attainment in statistical models combining racial/ethnic groups (Farmer and

Ferraro 2005; Shuey and Wilson 2008), 2) a regression coefficient for educational attainment varies significantly across models separated by race/ethnicity (Hayward et al. 2000; Read and Gorman 2005) or 3) there are racial/ethnic differences in mortality rates or life expectancy when calculating life tables grouped by level of educational attainment (Crimmins and Saito 2001; Jemal et al. 2008).

In general, the empirical evidence indicates that the education-health gradient is *steeper* for whites than for blacks and Hispanics, suggesting that formal schooling is associated with larger gains in health for whites than for other racial/ethnic groups (Jemal et al. 2008; Kimbro et al. 2008). These differential health returns to education have been found for a variety of health indicators including adult (Crimmins and Saito 2001; Jemal et al. 2008) and infant (Schoendorf 1992) mortality, self-rated health (Ferraro and Farmer 2005; Shuey and Wilson, 2008), functional limitations (Read and Gorman, 2006) and diabetes (Hayward et al. 2000). However, the magnitude of these differences and the levels of education at which they occur vary across studies. In this next section, I summarize findings from the literature that test for educational health disparities by race/ethnicity and focus on similarities and differences across existing studies. I organize the discussion around three health endpoints: 1) mortality 2) self-rated health and 3) "other" health indicators.

Racial/Ethnic Disparities in Health Returns to Education—Mortality.

Racial/ethnic disparities in health returns to education for mortality are well documented. This literature primarily focuses on assessing how the risk of all-cause mortality, life

expectancy and death rates by educational group varies across racial/ethnic groups by calculating life tables and standardized mortality rates, and estimating predicted probabilities of mortality. Findings from these studies repeatedly show that the education-mortality gradient is less steep for blacks than it is for whites (Jemal et al. 2008; Masters, Hummer and Powers 2011; Montez et al. 2011; Zajacova and Hummer 2009) and that blacks have significantly lower life expectancies than similarly educated whites (Crimmins and Saito 2001), indicating that blacks obtain fewer health returns to educational attainment.

In the case of life expectancy, Crimmins and Saito (2001) find that at age 30, white men with at least 13 years of education can expect to live nearly three years longer than black men with the same level of education. These differences are more pronounced at *lower* levels of education; among those with less than nine years of formal schooling, white men are expected to live eight more years than black men. Results are similar when analyzing healthy life expectancy: at age 30, black men with zero to eight years of schooling can expect approximately seven fewer years of healthy life than their white counterparts. However, black-white disparities in healthy life expectancy nearly converge for both men and women among those with some postsecondary education.

In the case of mortality risk, research consistently shows that blacks are at an increased risk of all-cause mortality than their similarly educated white peers (Masters, Hummer and Powers 2011; Montez et al. 2011; Zajacova and Hummer 2009). For example, using pooled NHIS data linked to the national death index from 1986-2000, Zajacova and Hummer find that a one-year increase in educational attainment was

associated with a six percent decrease in the hazard of mortality for white men and a four percent decrease for blacks. When operationalizing educational attainment as a categorical indicator (0-8 years, 9-11 years, 13-15 years, 16 years and 17-20 years with 12 years as the reference category), these scholars find that blacks obtain one to five percent lower returns to each level of educational attainment than whites.

Schoendorf (1992) also finds racial/ethnic disparities in health returns to education for *infant* mortality. Black infants born to college educated parents have a nearly two-fold higher risk of mortality (IMR=10.2) compared to white infants (IMR=5.4) with a college educated parent. The higher incidence of low birth weight infants among college educated blacks relative to college-educated whites drove these findings.

Racial/Ethnic Disparities in Health Returns to Education—Self-Rated Health. Scholars have also found racial/ethnic disparities in health returns to education for self-rated health (Ferraro and Farmer 2000; Shuey and Wilson 2008). These investigations typically assess whether the odds of reporting fair or poor health by level of educational attainment significantly varies across racial/ethnic groups. These studies are both cross-sectional (Kimbro et al. 2008; Read and Gorman 2006) and longitudinal (Ferraro and Farmer 2005; Shuey and Wilson 2008).

Both Read and Gorman (2006) and Kimbro and colleagues (2008) examine the education gradient in self-rated health across a variety of racial/ethnic groups. Kimbro and colleagues estimate the relationship between education and self-rated health for

blacks, whites, Hispanics and Asians, separating the results by nativity within each group. Read and Gorman separate the heterogeneous Hispanic ethnic group by Mexican, Puerto Rican and Cuban ancestry. In contrast, both Ferraro and Farmer (2005) and Shuey and Wilson (2008) examine only black-white disparities. Read and Gorman (2006) and Kimbro and colleagues (2008) used the pooled National Health Interview Survey (NHIS) while the other two studies utilize the Panel Study of Income Dynamics (PSID).

In three of the four studies, whites obtain higher health returns to education than blacks and Hispanics. Using pooled NHIS data from 1997 to 2001, Read and Gorman find that for every one year increase in formal schooling the odds of reporting fair or poor health decrease by 9% for blacks and Puerto Ricans, 6% for Mexicans and 4% for Cubans, controlling for income and employment status. Both Shuey and Wilson (2008) and Farmer and Ferraro (2005) find a significant interaction between education and the black racial/ethnic group indicating that blacks obtain fewer health returns to education than whites at higher levels of education. On the other hand, Kimbro and colleagues find the difference in the predicted probability of reporting fair or poor health between those with a high school diploma and a college degree is largest for blacks indicating that the self-rated health-education gradient is *steeper* for blacks than for both whites and Hispanics. However, unlike Read and Gorman, who use the same data set, Kimbro and colleagues do not adjust for any indicators of socioeconomic status.

Racial/Ethnic Disparities in Health Returns to Education—Other Health Indicators. Research has also found racial/ethnic inequalities in health returns to

educational attainment for obesity (Kimbro et al. 2008), functional limitations (Read and Gorman 2006; Kimbro et al. 2008) and major chronic morbidities such as hypertension and diabetes (Hayward et al. 2000). In the case of functional limitations, Kimbro and colleagues find that the education-work limitations gradient is steepest among U.S. born blacks followed by U.S. born whites and Hispanics indicating that blacks obtain the highest health returns to education for work limitations. However, as is the case in their analysis of self-rated health, the study by Kimbro and colleagues did not control for any other socioeconomic indicators, possibly explaining their anomalous findings. In a different study, Read and Gorman control for several socioeconomic status indicators and find that whites obtain higher health returns to education for functional limitations than any other racial/ethnic group. Each one-year increase in educational attainment is associated with a six percent decrease in functional limitations for whites, five percent for Puerto Ricans, four percent for blacks and one percent for Mexicans. The relationship between education and functional limitations was not statistically significant for Cubans.

In the case of obesity, Kimbro and colleagues find that the education gradient is similar among U.S. born whites and Hispanics. The difference in obesity prevalence between those with a high school diploma and those with a college degree is approximately 10% for both whites and Hispanics, but only *three percent* for blacks. This suggests that the prevalence of obesity is relatively stable across levels of educational attainment for blacks and that blacks obtain few health returns to education for this health indicator.

In the case of chronic diseases, Hayward and colleagues use the Healthy Retirement Survey (HRS) to assess whether black-white disparities in leading causes of mortality are primarily due to differences in incidence or prevalence of disease. Controlling for numerous socioeconomic status indicators, these scholars find that educational attainment greatly reduces black-white inequalities in hypertension, stroke and diabetes; however, for some outcomes, blacks had to obtain higher levels of education to match the prevalence and incidence of morbidity for whites. For example, women with eight years of education were less likely to experience the onset of hypertension than black women with double the years of schooling (16 years). Nearly half (45%) of black women with 16 years of education are estimated to acquire hypertension by the age of 63, compared to 41.6% of white women with only eight years of schooling. Similar results were observed for diabetes. Nearly a quarter (22.7%) of black men with 16 years of education will acquire diabetes by age 63 compared to 27.3% of white men with eight years of formal schooling. However, no black-white disparities in health returns to education were found for cancer, COPD or stroke since these morbidities are thought to be more influenced by biological than social factors.

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Trends in Racial/Ethnic Disparities in Health Returns to Education by Level of Education. While empirical evidence suggests that health returns to education are unequal across racial/ethnic groups, findings from these studies disagree on whether these disparities occur at the higher or lower end of the educational distribution. Studies using only a continuous measure of educational attainment (i.e. Crimmins et al. 2001; Read and

Gorman 2006) cannot address this issue since these studies are concerned with modeling the monotonic linear relationship between education and health rather than testing if these differences are found at higher or lower levels of education.

Ferraro and Farmer find that black-white disparities in self-rated health exist at higher levels of education (2005). Using the PSID, these scholars find that blacks report slightly higher self-rated health than whites at lower levels of education; however, the relationship between education and self-rated health decreased among blacks with a four-year degree or higher. This research supports the "diminishing returns" hypothesis put forth by Ferraro and Farmer which suggests that the health of blacks improves at a slower rate compare to whites at higher levels of education (2005). Diminishing health returns to education for blacks were also found for mortality (Jemal et al. 2008; Shuey and Wilson, 2008), hypertension and diabetes (Hayward et al. 2000). College educated blacks are also nearly twice as likely to experience the death of an infant as college educated whites (Schoendorf et al. 1992).

Montez, Hummer and Hayward also find that black-white differences in health returns to education are larger at higher levels of education, supporting the "diminishing returns" hypothesis (2012). Using the National Longitudinal Mortality Study (NLMS), Montez, Hummer and Hayward focus on the functional form of the relationship between educational attainment and mortality across race/ethnic-gender-age subgroups. These authors find that in combined analyses (including blacks, whites, men and women aged 25 to 100 years); there is a modest linear decline in the log odds of mortality for those with zero to eleven years of education. Beyond eleven years of education there are large

"step-change" declines in the log odds of mortality from 12 to 16 and 16 to 20 years of education. This pattern holds up for whites, but for blacks, the decrease in the log odds of mortality at levels of education above a high school diploma are more modest and in some cases the log odds of mortality foes not decrease, but flattens out at higher levels of education. For example, for black females, no health returns to educational attainment for mortality are obtained above 16 years of education. Instead, the log odds of mortality increase for those with at least 16 years of education. For black males, declines in the log odds of mortality between 12 and 14 years of education and above 16 years of education are modest and are less steep than health returns for whites.

Other scholars find that the largest black-white gaps in educational health disparities occur at the *low* end of the educational distribution (Christenson and Johnson 1995; Zajacova and Hummer 2009). While "diminishing returns" to education are found for a variety of health indicators, research that finds racial/ethnic gaps in health returns to education at the bottom of the educational distribution only find this pattern for mortality. For example, Zajacova and Hummer find that, among those with less than a high school diploma, blacks experience a one to three percent increase in the hazard of all-cause mortality compared to whites (2009).

On the other hand, some research finds that *blacks* obtain higher returns to education than whites at both the lower (Barnes et al. 2011) and higher (Zajacova and Hummer 2009) ends of the educational distribution. For example, using the Chicago Healthy Aging Program, Barnes and colleagues find that blacks with more than a high school diploma experience smaller declines in physical and cognitive function with age

than whites, and that these disparities converge at approximately 24 years of schooling. In contrast, Zajacova and Hummer find that blacks with 13 to 16 years of education have a lower risk of all-cause mortality than whites with the same years of schooling.

Trends in Racial/Ethnic Disparities in Health Returns to Education across Time. . Recent studies suggest that differential health returns to education have become more pronounced with time. Shuey and Wilson find that black-white disparities in self-rated health increased between 1984 and 2001, and that the disparity in health returns to education between blacks and whites increased with age (2008). This inequality operated only at *higher* levels of education; blacks experienced a health deficit that increased with age for every one-year increase above the average level of education (approximately 13 years).

Masters, Hummer and Powers (2011) also find that the black-white disparity in health returns to education for mortality risk increases across the life course and across cohorts. This finding is driven by the convergence in mortality between those with less than a high school education and those with more than a high school education among older blacks. For whites, the difference between these two groups (those with less than a high school education and those with more than a high school education) increased with age. Furthermore, health returns to education for mortality increased for all cohorts between 1986 and 2006, but health returns to education were more modest for blacks than for whites. In a different study, Zajacova and Hummer also find that racial/ethnic differences in health returns to education for mortality are larger for the youngest cohort

in the NHANES data (1946-1965). These authors find that racial/ethnic disparities in health returns to education are present at both the lowest and highest levels of education. The hazard of mortality for those with less than eight years of schooling is 73% and 37% higher than those with a high school diploma among whites and blacks, respectively. Black-white disparities in the hazard of mortality between those with 16 years of schooling and those with a high school diploma were non-existent. However, at the highest level of education (17 to 20 years of schooling) the hazard of mortality relative to those with a high school diploma is 51% for whites and 62% for blacks.

Limitations of Existing Research. The findings discussed in this section indicate that: 1) there are significant racial/ethnic disparities in health returns to education for numerous health indicators including mortality, self-rated health, diabetes and hypertension at both high and low levels of education and 2) these disparities are larger in more recent cohorts and among the elderly. Much of the research assessing health returns to education across racial/ethnic groups focus on individuals well into adulthood. Focusing on aging populations and/or aggregating considerably older and younger cohorts may introduce selection and survivability bias and underestimate contemporary trends in racial/ethnic disparities in health returns to education. For example, between 1931 and 1941, only 40% of African American men survived to age 60, possibly leaving behind a healthier group of African Americans to participate in data collection efforts such as the Health and Retirement Study (HRS) (used by Hayward et al. 2000) and the Chicago Health and Aging Project (CHAP) (used by Barnes et al. 2011) (Shuey and

Wilson 2008). Furthermore, the relatively small number of blacks who managed to achieve high levels of educational attainment amid widespread racial/ethnic discrimination in the pre-Civil Rights Era may be considerably different from blacks attaining similar levels of education in recent times in ways not captured by data collection instruments.

The findings from previous empirical investigations discussed in this section motivate the hypothesis that:

Health returns to education in young adulthood vary across blacks, whites and Hispanics for self-rated health, obesity and hypertension.

The transition from adolescence to young adulthood is a stage in the life course that has critical implications for adult health. This transition is characterized by increased autonomy, personal responsibility and the development of health-related life-long habits (i.e. alcohol and tobacco use, physical activity) that are increasingly difficult to alter at older ages. Participation in health-deteriorating behaviors during this period can also trigger changes in brain functioning and physiological responses that endure well into adulthood (Ben-Schlomo 1997). The transition from adolescence to young adulthood is also a critical period in which socioeconomic trajectories are set in motion: educational attainment is completed, full-time employment is established, and new family and social ties are created.

Beyond the need to extend existing research on differential health returns to education by race/ethnicity to a younger cohort, more research is also needed to understand the mechanisms that reproduce racial/ethnic disparities in health returns to education. Some of the research presented here adjusted for socioeconomic status in adulthood (Hayward et al. 2000, Farmer and Ferraro 2005) and health behaviors and access to health services (Read and Gorman 2006). Nonetheless, racial/ethnic disparities in health returns to education persisted after adjusting for these indicators suggesting that further investigation of potential mechanisms that contribute to these inequalities is needed.

Several scholars (Farmer and Ferraro 2005; Hayward et al. 2000; Kimbro et al. 2008) have suggested that living and learning conditions in childhood and adolescence may contribute to racial/ethnic disparities in health returns to education since some racial/ethnic groups, such as blacks and Hispanics, are more likely to experience chronic economic deprivation and social marginalization which may attenuate the health benefits associated with higher levels of educational attainment.

Figure 1 presents the conceptual model that guides the following discussion on how living and learning conditions during the transition from adolescence to young adulthood may influence racial/ethnic disparities in health returns to educational attainment.

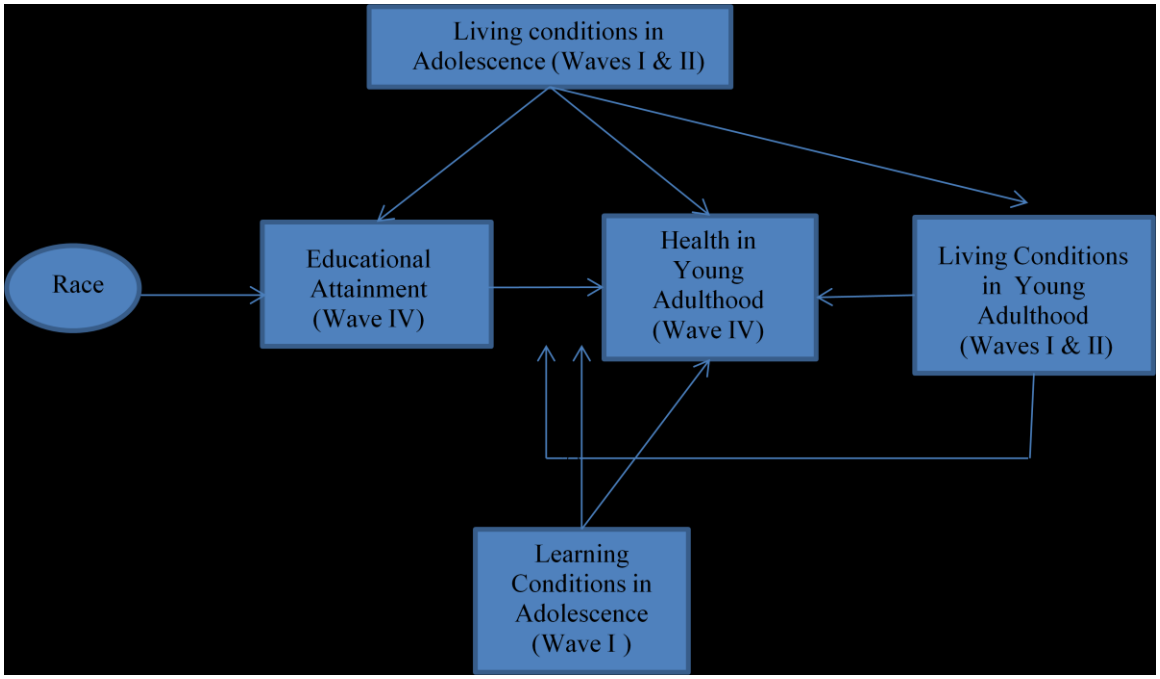

Figure 1. Conceptual Model

This model suggests that: (1) Living conditions in young adulthood (i.e. socioeconomic status, social relationships and family formation patterns) directly influence health and mediate the relationship between education and health. (2) Learning conditions in adolescence (i.e. school quality, teacher-student relationships) moderate the relationship between education and health. (3) Living conditions in adolescence confound the relationship between education and health by shaping both educational attainment and health outcomes in young adulthood and living conditions in young adulthood. Below I describe fundamental cause theory and life course theory. I will use these theoretical approaches as a framework to link living and learning

conditions in adolescence and young adulthood to racial/ethnic disparities in health returns to education.

Fundamental Cause Theory

Chronic morbidities such as cancer, stroke and cardiovascular disease have emerged as the primary causes of mortality in the U.S. accounting for 70% of all deaths among Americans (National Center for Chronic Disease Prevention and Health Promotion 2008). Since the specific biological agents that cause these chronic diseases are largely unknown, contemporary disease prevention efforts have focused on the modification of proximal individual-level health behaviors such as tobacco and alcohol use, physical activity and diet. However, several scholars are dissatisfied with such efforts since these approaches do not adequately address how *populations* become more or less susceptible to morbidity and mortality by failing to address socioeconomic, gender and race/ethnic stratification in participation of health behaviors (Krieger 1999; McMichael 1999; Sretzer 2003). In response to the proliferation of psychosocial and behavioral models of epidemiology that focus on health behaviors that put *individuals* at risk of morbidities Link and Phelan argue that research should concentrate on what puts *populations* "at risk of risks" (Link and Phelan 1995). This involves focusing on underlying or "upstream" determinants of health to understand the process through which *populations* become at risk for morbidity and mortality.

Link and Phelan argue that *social conditions* that affect access to knowledge, power and resources are the underlying causes of morbidity that put individuals at risk of more proximate determinants of health such as health behaviors. Social conditions are defined as "factors that involve a person's relationships to other people" (Link and Phelan 1995: 81). Thus, interpersonal relationships, stressful events, social support, and one's position within the social and economic sphere, among other factors, are considered social conditions. Furthermore, some social conditions such as socioeconomic status, social networks, race/ethnicity, and gender are deemed *fundamental causes*. These social conditions can be identified as fundamental causes since they: 1) affect multiple health outcomes and diseases through multiple risk factors; 2) are associated with mortality historically through the substitution of intervening mechanisms; 3) allow individuals to have access to and utilize resources that prevent risk factors for morbidity and/or mitigate any negative effects that result once the morbidity has occurred (Phelan et al. 2004).

Educational attainment illustrates the fundamental cause theory well due to its persistent link to health via a wide variety of mechanisms throughout time. Educational attainment, like all other fundamental causes, is a form of capital that can be used to "purchase" or gain access to other desirable goods or forms of capital that are associated with good health. For example, educational credentials can be used to gain access to economic capital through higher paying full-time employment, which can be used to purchase health-enhancing resources such as health insurance and nutritious foods and housing in salutogenic neighborhoods. In addition, those with higher levels of education

are less likely to work in health compromising environments and are more likely to evaluate their work positively (Ross and Wu 1995).

Formal schooling can also increase access to social capital. Those with higher levels of education are less likely to experience unemployment, which can result in a lack of social support and increased marital conflict. Those with more years of formal schooling are also more likely to marry and less likely to divorce (Fry 2010; Oppenheimer 1997). Married individuals are also generally healthier than divorce or never married individuals (Grahamn 2006; Johnson et al. 2000). Those with higher levels of educational attainment form friendships with other highly educated individuals creating socioeconomically advantaged social networks.

Finally, higher educational attainment is associated with an increase in problem-solving skills and overall cognitive ability (Blair 2006; Mirowsky and Ross 1998). Those with higher levels of education are more capable of finding, evaluating and acting upon information that may aid in improving and maintaining health.

However, both educational attainment and health status, along with the mechanisms that link education and health are influenced by living conditions in childhood and adolescence, potentially confounding the relationship between education and health. Those in socioeconomically advantaged family contexts during childhood and adolescence enjoy both higher levels of educational attainment and better adult health than those from more socioeconomically disadvantaged backgrounds (Hayward and Gorman 2004). Furthermore, those who are socioeconomically disadvantaged both during the early stages of the life course (i.e. childhood and adolescence) *and* adulthood

experience even poorer health than those who experienced intermittent socioeconomic disadvantage (James et al. 2006a, James et al. 2006b). The next section introduces a life course framework and makes the case for how utilizing this approach can aid in understanding the mechanisms generating racial/ethnic disparities in health returns to education.

Life Course Theory

Life course theory is a framework used to elucidate how biological, psychological and social contexts interact and unfold throughout the aging process. Life course theory posits that the *timing* of exposure to biopsychosocial conditions (i.e. poverty, infections, and injury) has implications for the health of individuals, generations and populations (Lynch and Davey-Smith 2005). When individuals are the unit of analysis, the exposures that occur at one stage of the life course (e.g. infancy, childhood, adolescence) are hypothesized to significantly influence the likelihood of morbidity or mortality in a later stage. Life course theory is especially useful in elucidating mechanisms that influence chronic disease due to the lengthy latency period of chronic morbidities. Environments and experiences occurring in utero through adolescence and young adulthood can have an enduring influence on the likelihood of experiencing chronic morbidities in later stages of the life course (Barker 1995, Ben-Schlomo 1997; Godfrey and Barker, 2000).

While fundamental cause theory posits that socioeconomic position is paramount to explaining variation in health status, proponents of life course theory focus on how the

timing and *length* of exposure to "fundamental causes" such as income, educational attainment, and employment also play a role in explaining health disparities (Masters and Power 2001). "Years of formal schooling" is not only a static attribute of adult socioeconomic status, but also represents a lengthy *process* that takes place from early childhood to adolescence or young adulthood. Throughout the period of acquiring a formal education, interactions within the school environment (Walseman and Geronimus 2008), the quality of the educational institution (Card and Krueger 1992; Dearden, Ferri and Meghir 2002; Frisvold and Golberstein 2010), and nonschool conditions (von Hippel et al. 2007) may work together to influence *both* highest educational credential earned and health status. These experiences and environments may place individuals on significantly different educational and/or health trajectories. Therefore, the relationship between education and health may be confounded in research that does not adjust for living and learning conditions in adolescence.

Because of significant racial/ethnic inequalities in socioeconomic position early in the life course, addressing living and learning conditions in childhood and adolescence is critical when addressing racial/ethnic disparities in health returns to education. During the early stages of the lifecourse when most individuals are undergoing formal schooling, some racial/ethnic groups such as blacks and Hispanics are more likely to experience living and learning conditions that are not conducive to attaining high levels of education or maintaining good health. For example, in 2011, one in six white children were in poverty compared to nearly half (46%) of black children (Kids Count 2011). Rector, Johnson and Fagin find that for black children, being in poverty is not a temporary

phenomenon (2001). Using the National Longitudinal Survey of Youth (NLSY), these scholars find that black children spend nearly half of their childhood (46.9%) in poverty. In comparison, white children spend 13% of their lives in poverty. This is in part due to large racial/ethnic differences in family structure. Single parent households are more likely to be in poverty, and nearly two-thirds of Black (66%), and 41% of Hispanic children grow up in families headed by one parent compared to 24% of white children (Kids Count 2011).

In comparison to white children, black and Hispanic children are also more likely to have parents with lower levels of educational attainment. For example, in 2010, 36% of Hispanic children's mothers and 38% of their fathers did not have a high school diploma compared to 14% of mothers and 9% of fathers of black children and 5% of mothers and 6% of fathers of white children (Child Trends 2012). In addition, over one-third of whites grew up in families with at least one parent with a bachelor's degree or higher while only 12% of Hispanics and 20% of black children have parents with a bachelor's degree (Child Trends 2012). These disparities continue into adulthood in which blacks and Hispanics continue to have a significantly lower levels of educational attainment (Kao and Thompson, 2003), income (Rhode and Guest 2012) and occupational attainment (Farley 2006; Reid 1998) than whites.

Three major conceptual models have been developed to describe how socioeconomic position throughout the life course influences the onset of chronic morbidities: 1) the "latency effects" or "biological chains of risk" model, 2) the "pathway" or "social chains of risk" model and 3) the "cumulative burden" or

"accumulation of risk" model (Hertzman and Power, 2001). The first model posits that socioeconomic status in early stages of the life course has an enduring influence on adult health that is independent of intervening changes in socioeconomic position. The "pathway" or "social chains of risk" model argues that the early life socioeconomic position is important for adult health, but that changes in socioeconomic position such as upward or downward social mobility can alter health trajectories started in early childhood. Lastly, the "cumulative burden/accumulation of risk" model suggests that the health-damaging effects of socioeconomic deprivation in both childhood and adulthood *aggregate* over the life course to significantly undermine health.

Research including both indicators of socioeconomic position during childhood and/or adolescence and adulthood often find support for the "pathway" or "social chains of risk" model (Hayward and Gorman 2004; Hertzman, Power, Matthews, and Manor, 2001; Wickrama, Conger, Wallace and Elder, 2003). Using path analysis, Wickrama, Conger, Wallace and Elder find that early socioeconomic position places individuals on different socioeconomic trajectories that influence adult health (2003). Being in single-parent household and having parents with lower levels of educational attainment set adolescents on a trajectory to young adulthood characterized by behavioral problems, school failure and truncated educational attainment. In turn, these characteristics were all negatively associated with a three-item measure of physical health in adulthood. Other research also finds that indicators of living conditions early in the lifecourse are significantly associated with adult health. However, after adjusting for living conditions in adulthood, early lifecourse factors are no longer significant indicating that living

conditions in childhood and adolescence influence adult health through their impact on adult socioeconomic status (Hayward and Gorman 2004; Hertzman, Power, Matthews, and Manor, 2001). Using the National Longitudinal Survey of Older Men, Hayward and Gorman find that indicators of early socioeconomic position such as occupation of head of household, family structure and parent's nativity are significantly associated with physical health in adulthood (2004). However, many of these indicators of living conditions early in the lifecourse are insignificant after adjusting for adult socioeconomic status, marital status and urbanicity of residence.

In the case of the "latency effects" or "biological chains of risk" model, Hertzman, Power, Matthews, and Manor find that the relationship between early life course factors (i.e. "socioe-eomtional" status, parental involvement) and self-rated health in adulthood remain significant after adjusting for indicators of socioeconomic position in adulthood in a 1958 birth cohort of children born in England, Wales and Scotland. In addition, although Hayward and Gorman find that several indicators of early life course conditions do not significantly predict mortality after adjusting for adult socioeconomic status, parent's occupation, family structure and parent's nativity remain significantly associated with adult health after controlling for adult socioeconomic status indicators (2004).

Finally, in the case of the "cumulative burden" or "accumulation of risk model", in a study of black men in the Pitt County (North Carolina) Study, James and colleagues compare the risk of hypertension among 379 black men who had 1) low socioeconomic position in both childhood and adulthood (low/low), 2) low socioeconomic position in

childhood and high socioeconomic position in adulthood (low/high), 3) high socioeconomic position in childhood and low socioeconomic position in adulthood (high/low) and 4) high socioeconomic position in both childhood and adulthood (high/high) (2006a). Results of this empirical investigation indicate that the odds of acquiring hypertension among men who had low socioeconomic position in both childhood and adulthood (low/low) was *seven* times larger than men of high socioeconomic position in both childhood and adulthood (high/high). Furthermore, the odds of hypertension among those who experienced upward social mobility (low/high) and downward social mobility (high/low) were four and six times higher, respectively than men who were socioeconomically advantaged in both childhood and adulthood. James and colleagues performed a similar study on women in the Pitt County Study for obesity and find similar results (2006b). The odds of obesity for females who were socioeconomically *disadvantaged* in both childhood and adulthood were two times higher than the odds of obesity for women who were socioeconomically *advantaged* in both childhood and adulthood.

While the "cumulative burden/accumulation of risk" model argues that the effect of socioeconomic position on adult health varies by *length* of exposure to low or high socioeconomic position, Arline Geronimus' "weathering hypothesis" posits that persistent exposure to socioeconomic hardship *and* social marginalization throughout the life course contributes to a process of accelerated aging (1996). The inclusion of "social marginalization" in this hypothesis extends the cumulative burden hypothesis to consider race/ethnicit*y* to understand how some racial/ethnic groups exhibit poorer health

outcomes even when adjusting for timing and length of exposure to socioeconomic position throughout the lifecourse.

For example, using NHANES data, Geronimus and colleagues find that blacks had higher scores on a measure of allostatic load—a measure of the physiological consequences of chronic stress—than whites at all ages, but were most marked between the ages of 35 and 64 (2006). These disparities varied by socioeconomic status whereby non-poor blacks experienced more stressful conditions than poor whites suggesting that racial/ethnic minority status *and* low socioeconomic position throughout the life course interact to deteriorate health at an accelerated rate.

In sum, the research discussed here finds that early life conditions (i.e. family structure, parental socioeconomic status and parental involvement) can influence adult health by 1) influencing adult socioeconomic trajectories 2) having an enduring influence on adult health net of adult socioeconomic status and 3) interacting with adult socioeconomic status and/or race/ethnicity to significantly improve or deteriorate adult health. These findings have implications for racial/ethnic health returns to education since living and learning conditions in adolescence—during which formal schooling is a primary activity—can confound the relationship between education and health. Research indicates that failing to adjust for living conditions in adolescence can lead to an overestimation of health returns to education. The health benefits of higher education may in part be due to differences in socioeconomic background rather than formal schooling. Furthermore, adjusting for living and learning conditions early in the lifecourse may reduce racial/ethnic differences in health returns to education due to

sizable differences in living and learning conditions during early stages of the lifecourse across racial/ethnic groups.

In the following section, I elaborate on how *specific* aspects of living and learning conditions in adolescence and young adulthood may create and reproduce racial/ethnic disparities in health returns to education. I discuss economic, social and cognitive mechanisms linking education and health focusing on distinct racial/ethnic disparities in these outcomes in the early stages of the lifecourse and in adulthood.

Potential Mechanisms Contributing to Racial/Ethnic Disparities in Health Returns to Education

Living and Learning Conditions Early in the Life Course. Life course theory reminds us that living and learning conditions early in the life course can also influence adult health directly and/or through its influence on or interaction with living conditions in adulthood. Early living and learning conditions can also influence educational attainment in young adulthood. Since socioeconomic position early in the life course can influence *both* educational attainment and health in adulthood, living and learning conditions in adolescence most likely confound the relationship between educational attainment and health in adulthood. Therefore, the health benefits associated with increased educational attainment in adulthood may in part be a result of the increased

propensity among those with a socioeconomically advantaged family background to have both higher levels of education and better health.

We have already examined racial/ethnic disparities in socioeconomic background early in the lifecourse in which blacks and Hispanics are located in more disadvantaged contexts than whites. Residential segregation is one mechanism that not only isolates racial/ethnic groups, but drives racial/ethnic disparities in health and socioeconomic status. Black youth are over-represented in lower quality neighborhoods with less green space, more violence, and fewer health-enhancing goods and services (Williams and Collins 2010). Blacks are also concentrated in these disadvantaged neighborhoods at all levels of socioeconomic status with poor whites residing in better neighborhoods than non-poor blacks (Massey 2004).

Because residence determines which institutions public school students attend, racial/ethnic segregation also has large implications for education-related outcomes. Black and Hispanic children are concentrated in lower quality schools with larger class sizes, less-experienced teachers, below-average test scores, elevated drop-out rates and limited curricula (Orfield and Eaton 1996). Black and Hispanic children are also more likely to report missing school due to fear of victimization in transport to school (YBRFSS 2009). Recent data shows that convergence in school quality can mitigate racial/ethnic health disparities. Frisvold and Golberstein find that convergence of black-white disparities in primary and secondary school quality diminished black-white disparities in self-rated health, body mass index (BMI) and disability in adulthood (2010). Other research reports similar findings with the black-white disparity in adult health by

equalizing per-pupil spending (Johnson 2010), pupil expulsion rate (Jones, Rice and Dias 2011) and class sizes (Johnson 2010; Jones, Rice, Dias 2012). The effects of increasing school quality are not negligible; Johnson finds that increasing per-pupil spending by 10% would have a larger impact on adult health than increasing the family income-to-needs ratio from half of the poverty line to one-and-a-half times the poverty line (Johnson 2010).

Several scholars suggest that schools of high quality create an environment that is more conducive to learning which may result in the attainment of more developed health-enhancing cognitive skills (Barnes et al. 2011; Mirowsky and Ross 2003; Walsemann, Geronimus and Gee 2008). Empirical evidence indicates that higher-order cognitive skills such as reasoning, problem-solving, critical thinking and planning are acquired independently from general intelligence (Blair 2006, Duncan, Burgess and Emslie 1995; Elsinger, Flahert-Craig and Benton 2004; Waltz et al. 1999) and that schooling is both monotonically and linearly associated with the development of such skills (Christian, Bachman and Morrison 2001; Cole 2003). These skills are also associated with improved risk-assessment and decision-making (De Bruine, Parker and Fischoff 2007; Peters et al. 2006) which have been emphasized as an important determinant of practicing health-enhancing behaviors (Lewis and Lewis 1982). Ross and Mirowsky claim that the process of working through increasingly complex problems develops the belief that "the impossible [can] become workable" resulting in "learned effectiveness" (1998). Learned effectiveness enables people to meet problems with attention, effort and perseverance, and is critical for managing a variety of defining and often stressful life events such as

timing of childbearing (Hansson, Myers and Ginsburg 1987; Plotnick 1992) coping with involuntary job loss (Price, Choi and Vinokur 2002) and initiating preventive health care (Seeman and Seeman 1983).

The ability to acquire, comprehend and act upon information is especially valuable for maintaining health due to the dynamic nature of information surrounding the causes of morbidities and mortality in modern society. As new medical information are disseminated, known risk factors and etiologies of disease change. Research suggests that some populations, namely those of higher socioeconomic status, are better able to act on this information (Link 2008; Mirowsky and Ross 2003; Phelan et al. 2004). Link uses the history of tobacco use as an example to illustrate how social conditions such as socioeconomic status are fundamental causes of health (2008). For example, recent research shows that those of higher socioeconomic status are less likely to smoke and are more successful in quitting the behavior compared to those of low socioeconomic status (Kandel, Griesler and Schaffran 2009; Underwood et al., 2008). However, when cigarettes and cigars were first introduced in the U.S., smoking was marketed as a status-enhancing behavior and those in the higher social strata with more expendable income quickly took up the behavior while those in the lower strata lagged behind. When evidence of the health deteriorating effects of smoking were discovered in the 1950s, the proportion of smokers with over sixteen years of education dropped dramatically by the late 1960s and early 1970s from 45.5% to 34.4% while these percentages remained relatively unchanged for those with less than sixteen years of education (Link 2008).

In addition, there was a clear educational gradient in the belief the smoking was a cause of lung cancer with nearly two-thirds (62.8%) of those with less than a high school education believing that smoking was a cause of lung cancer while 84.7% of those with at least a four year college degree believed this. By the 1990's this gap narrowed greatly. Nearly all individuals (96.8%) with a four-year college degree believed smoking is a cause of lung cancer compared to 86.6% of those without a high school diploma. Furthermore, while the mortality rate of lung cancer was higher for those of high socioeconomic status than for those of low socioeconomic status in the 1950s, by the 1970s this trend was completely reversed with lung cancer mortality rates being lower among those in the middle and lower socioeconomic strata.

Ross and Mirowsky suggest that school curricula play a central role in developing the ability to act on information (1998). Research on socioeconomic disparities in school readiness indicates that even at pre-school ages and younger, socioeconomically advantaged youth score higher on tests of potential academic achievement than socioeconomically disadvantaged youth (McLanahan et al. 2005). Therefore, Ross and Mirowsky hypothesize that schools with a large number of socioeconomically advantaged students implement more academically rigorous curricula than schools that accommodate more socioeconomically disadvantaged students. While Ross and Mirowsky did not address racial/ethnic disparities in this hypothesis, I argue that this theory has implications for racial/ethnic disparities in health returns to education given the close relationship between race/ethnicity and socioeconomic status and racial/ethnic disparities in school quality.

Family structure and familial relationships during childhood and adolescence also influence both educational attainment and health. Growing up in a two-parent household and having fewer siblings are associated with better educational outcomes (Coleman and Hoffer 1987; Teachman 1996; Teachman 1997) and better physical and social development (Furestenberg and Hughes 1995; Ryan et al. 1998). Children who have frequent social interactions with their parents are also less likely to drop out of high school (Coleman and Hoffer 1987; Teachman, Paasch and Carver, 1996; Teachman, 1997). Taylor, Repetti and Seeman also find that children whose relationships with their parents are characterized by conflict, a lack of warmth and emotional support, and subordination are associated with poor mental and physical health in adulthood (1997). Research investigating the link between familial relationships during childhood and adolescence and health in adulthood finds that these differences occur due to a stress response (Reptti, Taylor and Seeman 2002; Seeman et al. 1993). Adults who were exposed to families with high levels of conflict and low levels of nurturance during childhood are more likely to show greater cardiovascular and sympathetic nervous system reactivity to challenging situations than adults who grew up in nurturing families with low levels of conflict.

Living Conditions in Adulthood. Schooling is a focal activity during the transition from adolescence to young adulthood, especially given that pursuing postsecondary education is increasingly prevalent. Obtaining a college education is associated with upward social mobility for all racial/ethnic groups; however, research suggests that

blacks obtain fewer socioeconomic benefits from postsecondary education. For example, college-educated blacks are more likely to experience unemployment and to be exposed to hazards and carcinogens in the workplace when they are employed compared to similarly educated whites—even after adjusting for work experience (Carter 2007; Changing America 1998; Williams and Collins 1995). Black men with a Master's degree earn on average $27,000 less than white men, and both black and Hispanic women with a bachelor's degree earn less income than their white counterparts (US Census 2008). This is especially alarming since blacks have less purchasing power in their communities due to higher costs of numerous goods and services (Williams and Collins 1995). This racial/ethnic gap in economic compensation for educational credentials may result in disparate socioeconomic trajectories that contribute to growing racial/ethnic disparities in health returns to education throughout the life course (Shuey and Wilson 2008). Nonetheless, some research finds that racial/ethnic disparities in health returns to education persist even when adjusting for income and wealth (Farmer and Ferraro 2005; Hayward et al. 2000; Read and Gorman 2006, Zajacova and Hummer 2009) suggesting that non-material mechanisms may also contribute to explaining racial/ethnic disparities in health returns to education.

Social relationships are also mechanisms linking the fundamental relationship between education and health that significantly vary by race/ethnicity. Unmarried and more socially isolated individuals experience an increased prevalence of mortality and morbidity (House, Landis and Umberson 1998). Individuals with high levels of education are more likely to marry than those with lower levels of educational attainment

(Fry 2010). However, this pattern does not hold up for blacks (Maralani 2008). Black women are considerable educationally advantaged compared to black males (Buchmann and DiPrete 2006) leading to a discordance in the number of similarly educated blacks males and females at higher levels of education. Thus, black women with postsecondary education are less likely to marry than similarly educated white females. Furthermore, when these highly educated black women do marry, they are less likely than their white peers to enter a union with a male who has a commensurate level of education or higher.

Those in the upper strata of the educational distribution also tend to belong to social networks of other highly educated individuals, resulting in a concentration of socioeconomic advantage and disadvantage in social networks (McPherson, Smith-Lovin and Cook, 2001; Schwartz and Mare 2005). However, research suggests that social networks can be health compromising for blacks, especially among blacks experiencing upward social mobility. While friends and family are often cited as a source of support and motivation, obligations to members of these networks were also seen as a source of stress (Shaw and Coleman 2000). These networks can be "localized, insular and sometimes draining" (Dominguez and Watkins 2003). Research also finds that every level of education, blacks report considerable difficulty acculturating to the prevailing social norms of predominately white educational institutions and continue to feel a sense of "otherness" in their everyday interactions with peers, faculty and staff (Higginbotham and Weber 1992; Neckerman et al. 1999; Shaw and Coleman 2000). This feeling of exclusion can limit social networks that may directly influence health physical and psychological well-being.

Due to the sizable racial/ethnic differences in living and learning conditions in adolescence and adulthood discussed here, I hypothesize that:

Living and learning conditions in adolescence and young adulthood influence racial/ethnic disparities in health returns to education for self-rated health, hypertension and obesity.

I argue that racial/ethnic disparities in living and learning conditions during the transition from adolescence to young adulthood influence the relationship between education and health and are likely some of the mechanisms contributing to racial/ethnic disparities in health returns to education. I hypothesize that adjusting for these conditions will decrease racial/ethnic disparities in health returns to education.

Chapter 3: Data and Methods

Data

This analysis is based on multiple waves of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a longitudinal study of a nationally representative sample of students who were in grades seven to twelve in the 1994-1995 school year. Students were sampled from 80 high schools and 65 junior and middle schools yielding a sample of 90,118 respondents who were administered an in-school questionnaire. In addition, a random sample of adolescents (n=20,745) and their mothers or female head of household (n=17,760) were selected for in-depth interviews to obtain detailed data on students' family background, social and school life and general health status and health behaviors.

High school seniors in Wave I were not selected for follow-up for Wave II in 1996 but were re-interviewed in Wave III from 2001-2002. Wave III consists of 15,170 original Wave I respondents who were between the ages of 18 and 26. In Wave IV, respondents were re-interviewed from 2008 to 2009 at the ages of 24 to 32 as they were completing their transition to adulthood. Response rates for each wave of the study are

79% for Wave I, 88% for Wave II, 77.4% for Wave III and 80.3% for Wave IV. Black adolescents with college-educated parents and Hispanics were over-sampled in all waves. Add Health is particularly well suited for this research since it is the *only* nationally representative and longitudinal sample of racially/ethnically diverse population of adolescents who are transitioning to young adulthood that includes a variety of individual background indicators, health measures, and school-level characteristics at multiple points in time.

I reduce the original Add Health sample in a few important ways. First, since this research is focused on how living and learning conditions in *both* adolescence and young adulthood influence racial/ethnic disparities in health returns to education, only respondents who were initially interviewed in Waves I and II and re-interviewed in Wave IV were included in the analyses resulting in a loss of 6,280 respondents due to attrition. I use grand sample weights provided by Add Health to account for attrition from Wave I to Wave IV. I also exclude respondents with missing information on key independent variables. Those who did not identify as white, black or Hispanics (n=668) and respondents with missing educational attainment at Wave IV of data collection (n=2) were excluded from analysis.

Finally, this research uses multi-level modeling which requires a sufficient number of cases at the individual and school-level to obtain reliable estimates of coefficients and standard errors. Kreft suggests a rule of thumb of ensuring that a sample has at least 30 level 2 units with 30 level 1 units or more per group (1996). On the other hand, Bryk and Raudenbush suggest a sample size of 15 level 1 units per cluster (1992).

I take an approach somewhat in the middle of these suggestions and exclude all level-2 units (i.e. schools) that have less than 20 units per cluster. As a result, two level-2 units were dropped from analysis in models combining all racial/ethnic groups. More cases were dropped for separate racial/ethnic analyses. For the white only models, 249 respondents and 33 schools are omitted from the analysis, 425 respondents and 98 schools are excluded for the black only analyses and 479 respondents and 113 schools for the Hispanic only models.

The aforementioned exclusions result in 8,601 respondents in 130 schools when all racial/ethnic groups are combined. For separate racial/ethnic models, there are 4,960 respondents in 97 schools for the White only models, 1,952 respondents in 32 schools for the black only models and 961 respondents in 17 schools for the Hispanics only models. Since there are only 17 level-2 units (schools) for the Hispanics sample, the Hispanic-only models are excluded from analyses that estimate school-level coefficients in Chapter 6.

Measures

Dependent Variables

I evaluate three separate health indicators that gauge different aspects of physical health. They are: self-rated health, obesity and high blood pressure (hypertension). Previous research finds racial/ethnic disparities in health returns to education for self-rated health between blacks and whites among older adults (Farmer & Ferraro, 2005);

however it is not clear whether these disparities are present in young adulthood (and/or what contributes to them). Obesity is a critical indicator of physical health and is especially significant for examining differential health returns to education by race/ethnicity. Obesity is associated with an increase the risk of type 2 diabetes, myocardial infarction, and cerebrovascular disease (stroke)—which are leading causes of mortality in the U.S. Furthermore, one of the largest disparities in the leading causes of mortality between blacks and whites is diabetes-related deaths. The risk of dying from diabetes-related complications among blacks is more than twice than that for whites (Heron et al., 2006). There are also sizeable racial/ethnic disparities in death rates due to hypertension. In 2007, the overall death rate from hypertension was 18.3 per 100,000; however among black males, this figure was nearly two-and-a-half time higher at 50.3 deaths per 100,000 (Roger et al., 2012). The next section discusses how I measure each of these health indicators during Wave IV of data collection when respondents are between the ages of 24 and 32.

Self-Rated Health. This research follows the epidemiological literature in using self-rated health as an indicator of a person's overall subjective assessment of health. This indicator has been linked to a variety of morbidity and mortality measures (Idler & Benyamini, 1997) across racial/ethnic groups (Chandola & Jenkinson 2000). Self-rated health was measured using the following item in the fourth wave of data collection: "*In general, how is your health?"* Responses include excellent, very good, good, fair, and poor. This item was dichotomized so that those who report fair or poor health were

compared to those who report excellent, very good or good health. This distinction is a common method to dichotomize this measure and yields results that are similar to that of using a categorical measure of self-rated health (Manor, Matthews & Power, 2000).

Obesity. As is common in the epidemiological literature, this research uses body mass index (BMI) to measure obesity. Body mass index is calculated by dividing weight in kilograms by height in meters squared. Anthropomorphic measures of weight and height were taken by health professionals during the fourth wave of data collection and checked for any anomalous values. In accordance with standard weight status categories, respondents with a BMI of 30 or more are classified as obese. This health indicator is dichotomous and as such, does not include any separate indicators for those who are morbidly obese, overweight or underweight.

Hypertension. Blood pressure is measured from the respondent's right arm at 30-second intervals using an automatic oscillometric monitor in Wave IV of data collection. Blood pressure readings were measured three times, checked for discrepant entries and readings, and averaged. These readings were then classified according to the *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure*. Those with systolic blood pressure of at least 140 mm Hg or diastolic blood pressure of 100 mm Hg or higher are categorized as hypertensive. This health indicator is also dichotomous and does not include any other classifications such as "pre-hypertensive", or "stage 1" or "stage 2" hypertensive.

Key Independent Variables

Race/Ethnicity. This research focuses on health disparities and inequalities in living and learning conditions from adolescence to young adulthood among the three largest racial/ethnic groups in the U.S: whites, blacks and Hispanics. I exclude respondents who identify with a racial/ethnic group other than black, white or Hispanic from analyses since sample sizes are small for these groups and it is unsuitable to group the remaining racial/ethnic categories together due to distinct social and cultural histories[1].

Race/ethnicity is operationalized using three items in the first wave of data collection: The first item, "*Are you of Hispanic or Latino origin?"* is a dichotomous variable in which all respondents who answered "yes" were categorized as Hispanic. All respondents were also asked to self-report their race with the following item: "*What is your race?"* Respondents who answered "White" or "Black or African American" were categorized accordingly. Those who indicated that they were of any other race/ethnicity were excluded from analysis with the exception of those who marked "other". The third item, *"Which one category best describes your racial background?"* was asked of those respondents who indicated that they considered themselves to be "other" or of a race/ethnicity not included in the selection (i.e. not White, Black or African American, American Indian or Native American, nor Asian or other Pacific Islander). This item was

[1] There is also considerable diversity among the Hispanic sample used for this dissertation. Over half of

intended to give respondents who selected "other" the opportunity to choose a racial/ethnic group among those provided that they most *closely* identify with. Those who indicated that they most closely identified with Whites or Blacks/African Americans on this item were categorized accordingly and included in analysis. Hispanic, black or African American and White are mutually exclusive categories. This coding scheme allows for a comparison of Hispanics, non-Hispanic whites, and non-Hispanic blacks (hereafter referred to as Hispanics, whites and blacks, respectively).

Educational Attainment. Highest level of education is operationalized as a categorical variable. The fourth wave of data collection for Add Health does not include a continuous measure of educational attainment. Respondents were asked the following item during the fourth wave of data collection from 2008-2009: *What is the highest level of education that you have achieved to date?* This item includes 13 responses which are collapsed from thirteen categories into three categories: (1) less than high school (combines "eighth grade or less" and "less than high school"), (2) high school and some college (combines "high school graduate", "some vocational/technical training after high school", "completed vocational/technical training after high school", and "some college"), and (3) four-year degree and higher (combines "completed college-bachelor's degree", "beyond a bachelor's degree", "some graduate school" , "completed a master's degree", "some graduate training beyond a master's degree", and "completed a doctoral degree"). Those with a high school diploma or some college are the reference category for the analysis to highlight the presence or absence of the educational gradient across

racial/ethnic groups and health indicators. I choose this particular categorization for several reasons.

First, as noted above, Add Health does not include an indicator of years of education in Wave IV of data collection and as a result, I am unable to operationalize education as a continuous indicator. Secondly, Montez and colleagues find that the functional form of the relationship between education and mortality is characterized by steep declines in mortality at 12 to16 and 16 to 20 years of education, indicating that educational credentials are especially consequential for health (2011).

Living and Learning Conditions. This research evaluates how living and learning conditions in young adulthood contribute to differential health returns to education. I will briefly describe how these aspects are operationalized below. A more detailed description of each indicator and their distribution in the sample will be discussed in subsequent chapters that focus on the role of living and learning conditions in contributing to differential health returns to education.

Living Conditions in Adolescence. Living conditions in adolescence are gathered from parent and student interviews and operationalized using five items organized into two categories: (1) parental socioeconomic status and (2) family structure and cohesion. Family structure is operationalized with an indicator of household size and a dichotomous indicator of whether the respondent resided in a single parent family. Family cohesion is operationalized with a dichotomous variables and a four-item scale. The dummy variable

indicates whether the respondent had gone to a movie, play museum concert or sports event with a residential or non-residential parent within the past four weeks. Using factor analysis, and a four-item scale was created that measures respondents' perceptions of the closeness of their family (Cronbach's alpha= .758). Parental socioeconomic status is operationalized using highest level of education a parent has attained and a dichotomous variable indicating whether any parent had received government assistance at any time before the respondent was 18 years old.

Learning Conditions in Adolescence. Learning conditions include both individual and school-level indicators. Individual-level educational experiences were assessed using three scales created with factor analysis from a series of eight questions about respondents' perceptions and experiences with schoolwork, teachers, students and the general school environment (Cronbach's alpha=.774). These factors gauge school integration, student-teacher interaction and experiences with schoolwork. A dichotomous indicator of whether respondents report parental involvement in education activities and an ordinal variable measuring respondents' expectations of college attendance are also used to operationalize learning conditions at the individual-level.

Institutional-level or school-level indicators of learning conditions are operationalized with nine items. This information is collected from questionnaires completed by school administrators. Four measure general characteristics of schools such as urbanicity (rural, urban or suburban), size, affiliation (public or private), and racial/ethnic composition. The remainder of these items gauge what many would

consider "school quality": 1) average class size 2) percentage of teachers without previous teaching experience 3) percentage of teachers with at least a Master's degree 4) percentage of students whose parents are involved in the Parent-Teacher Association and 5) the percentage of 12th graders enrolled in college preparatory English courses.

Living Conditions in Young Adulthood. I also test whether differential health returns to education are associated with contemporaneous living conditions in young adulthood. These living conditions are measured during Wave IV of data collection and are organized into three categories: (1) socioeconomic status (2) family structure and (3) work-family conflict. Socioeconomic status is operationalized with five items. Two dichotomous indicators measure employment and whether the respondent has experienced financial difficulty within the last twelve months. I also include measures of wealth and an indicator of whether the respondent is currently enrolled as a student in a college or university. Lastly, I include a continuous indicator of the number months the respondent has spent in jail or prison since the age of 18.

Family structure is measures with two dichotomous variables indicating whether the respondent is the head of a single-parent family and whether he/she is currently married. Another continuous variable measures the number of children a respondent has in his/her care. Finally, work-family conflict is operationalized using three questions that measure how often respondents report being unable to fully fulfill both work and family obligations.

Control Variables. At the individual level I control for age at Wave IV (years) and if the respondent was born in the United States (1=yes, 0=no). Research finds that Hispanic adolescents born in the U.S. are more than twice as likely to be obese as foreign born citizens who have immigrated and were naturalized in the U.S. (Popkin and Udry 1997). I also control for gender since research indicates that obesity and hypertension can vary substantially by gender (Paeratakul et al. 2002; Wang and Beydoun 2007).

Sample Descriptives

Table 2 presents the descriptive statistics for the combined sample with all racial/ethnic groups (column 1), whites (column 2), blacks (column 3) and Hispanics (column 4). Percentages with superscript letters indicate significant racial/ethnic differences between a) whites and blacks b) whites and Hispanics and c) blacks and Hispanics.

Dependent Variables (Health Indicators). Overall, the prevalence of obesity, hypertension and reporting fair or poor self-rated health for young adults in this Add Health sample is similar to those found for this age group in other nationally representative data sets such as the Behavioral Risk Factor Surveillance Survey (BRFSS), National Health Interview Survey (NHIS), and the National Health and Nutrition Examination Survey (NHANES) (BRFSS, NHIS, author's calculations; Flegal et al. 2010). Patterns of racial/ethnic health disparities in these three health outcomes are also similar to those documented in these data sets.

Self-Rated Health. Nearly one in ten (9.57%) young adults in this sample report fair or poor health. However, whites have the lowest prevalence of reporting fair/poor health (7.7%) followed by blacks (13.1%) and Hispanics (15.7%). The 2010 BRFSS finds similar racial/ethnic disparities among a sample of 18 to 45 year-olds with 7.2% of Whites, 11.6% of Blacks and 17% of Hispanics reporting fair or poor health. In this Add Health sample, the disparities between blacks and whites ($p<.001$) and whites and Hispanics ($p<.001$) are statistically significant.

Obesity. There are significant racial/ethnic disparities in obesity between whites and blacks ($p<.001$) and whites and Hispanics ($p<.01$) in this Add Health sample. Nearly half of blacks (46.9%) and Hispanics (42.2%) are obese, yet only a little over one-third of whites (35.4%) are obese. A nationally representative sample of 20 to 39 year olds find similar racial/ethnic disparities with the prevalence of obesity highest among blacks (men: 34.7%; women: 47.2%), followed by Hispanics (men: 32.3%; women: 37.6%) and whites (men: 27.5%; women: 34%) (Flegal et al. 2010).

Hypertension. There is a disagreement in the literature surrounding the prevalence of hypertension in the young adult population. In this Add Health sample, nearly one in five (18.1%) of respondents report high blood pressure. This estimate is considerably higher than in other data sets such as the NHIS, which finds that only 11.1% of males and 6.8% of females between the ages of 20 and 34 report hypertension. The

higher prevalence found among Add Health respondents has been replicated in previous research (Chyu, McDade and Adam 2011; Nguyen et al 2011). Results indicate that the high prevalence of high blood pressure in Add Health is accurate and is not an artifact of survey design or data collection methods. Blacks have a slightly higher prevalence of hypertension (21.7%) than either whites (17.3%) or Hispanics (18.3%), but these differences are not statistically significant.

In summary, in this Add Health sample, and in other nationally representative data sets focused on the young adult demographic the general pattern indicates that: 1) whites have the lowest prevalence across *all* of the negative health indicators, 2) Blacks have the highest prevalence of obesity and hypertension and 3) Hispanics have the highest rates of reporting fair/poor health and the second highest prevalence of hypertension and obesity.

Key Independent Variables

Race/Ethnicity. Over sixty percent of the sample (60.6%) is white, nearly one-quarter (22%) is black and 16.7% is Hispanic.

Educational Attainment. The highest level of educational attainment for over half (60.1%) of this sample is a high school diploma or some college. Nearly one-third (30.8%) have attained a four year degree or higher and 9.2% have not attained a high

school diploma or GED. Whites have the highest levels of educational attainment with over one-third (34.4%) attaining a four-year degree or above compared to only 22.5% of blacks and 20.9% of Hispanics. Whites also have the lowest percentage of young adults without a high school diploma (7.47%) compared to 12.9% and 14% for blacks and Hispanics, respectively. The education distribution for Hispanics is similar to that of blacks; however, among Hispanics there are slightly fewer young adults with four-year degrees or above (Hispanics—20.9%; blacks—22.5%) and more young adults without a high school diploma (Hispanics—14.0%; blacks—12.87%); however these differences are not statistically significant.

This trend—in which whites have higher levels of educational attainment than both blacks and Hispanics, and Hispanics being the least likely to attain a high school diploma—is replicated in other nationally representative data. According to the U.S. Census, in 2010 more whites (30.3%) than blacks (19.8%) or Hispanics (13.9%) obtained a four-year degree or higher (2012). Furthermore, Hispanics has the lowest rate of high school completion with less than two-thirds (62.9%) attaining a high school diploma compared to over 80% for both whites (87.6%) and blacks (84.2%).

Demographics

The average age of this sample at Wave IV of this sample is approximately 28 years. There is also a fairly even distribution of males (49.7%) and females (50.3%). Only approximately 4% of the sample was born outside of the U.S. However, nearly all

whites and blacks are native to the U.S. while over in one in five (22.8%) of Hispanic respondents were born outside of the U.S.

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Analytical Plan

In the chapters that follow, I present the results from a series of multi-level regression models that use HLM 6.0 software to estimate differential health returns to education across the three racial/ethnic groups and to examine how living and learning conditions influence these returns during the transition from adolescence to young adulthood. Because all outcome measures are dichotomous, I use Bernouli logit models.

I use two-level logistic regression since standard regression techniques assume observations are independent. This assumption is clearly violated in this sample since schools are the primary sampling unit. As such, respondents in the same school may share values on many unobserved characteristics that can result in correlated error terms. Hierarchical linear modeling takes one more step toward ameliorating this issue since this method separates residual variance into two components—one at the individual level (level one) and one variance component that is random across level two units (schools) but constant across individuals within the same school.

Multiple Imputation. There is a sizable sample loss associated with this study due to attrition and item non-response. To retain as much of the sample as possible, information from multiple sources (parent, adolescent, Wave I and Wave II) was used if

available. For example, information on parental education was asked of the parent in the parent interview, and of the adolescent in both the Wave I and Wave II interviews. Thus, for parents' education, the parent's response was used, but if it was missing, the child's response at Wave I was used, and if still missing, the child's response at Wave II was used (since parental education likely did not change substantially in the one year between Waves I and II).

Nonetheless, a fair bit of sample loss remained after taking these steps. Although most variables had either no or small amounts of missing data (1-4%), over 20% of cases have missing information on at least one independent variable. Implementing list-wise deletion would result in the deletion of 1,849 cases. Furthermore, some of this missing data is at the school level. HLM software does not allow for missing data at the second level of analysis.

Thus, I utilize multiple imputation to replace missing data at both the individual and school levels using the "ICE" command within STATA (Royston 2005). Multiple imputation replaces missing values with predictions from information observed in the sample (Little and Rubin 1987). The "ICE" procedure uses a chained equations approach in which a conditional distribution for missing data for each variable, given all other data, is specified (logit for dichotomous variables, OLS for continuous variables and logit for ordered categorical variables) (Royston 2005). The imputation models contain all of the variables included in the empirical models, in addition to the sampling weights. I perform five cycles of multiple imputation resulting in five complete data sets. I then save these five separate data sets in a HLM readable format. The HLM software then

analyzes each of these imputed data sets separately and computes one estimate that represents the average of the coefficients and variance across these five complete imputed data sets.

Although list-wise deletion would result in an undesirable decrease in the sample size, it is the safest method for handling missing data (Allison 2012). Therefore, to test the robustness of the results estimated through multiple imputation, I will re-run all models using list-wise deletion and compare results with those obtained from multiple imputation.

Bivariate Analyses. At the end of this chapter and in Chapter 4, weighted means and standard errors for whites, blacks and Hispanics and all racial/ethnic groups combined are presented. These means are calculated using STATA's "svy" command suite that corrects for multiple stages of cluster sampling design and unequal probability of selection to produce nationally representative averages with unbiased standard errors. I also run weighted t-tests to determine significant differences in means across race/ethnicity and level of educational attainment.

Analysis Plan. My analytic strategy is to use multi-level modeling to 1) examine whether there are differential health returns to education across race/ethnicity and 2) test whether *living* conditions in adolescence contribute to these disparities 3) assess how *learning* conditions are associated with racial/ethnic disparities in health returns to education net of living conditions in young adulthood. I dedicate separate chapters to

each of the three research questions. Chapter 4 explores whether there are differential health returns to education across race/ethnicity by first describing racial/ethnic disparities in the prevalence of health indicators by level of educational attainment and gender. I then estimate logistic regression models that estimate the cross-sectional analysis of the relationship between educational attainment and health for three health indicators (Equation 1.1) and test whether this relationship varies by gender (Equation 1.2).

In chapter 5, I will examine whether *living conditions* in adolescence are associated with differential health returns to education across race/ethnicity. I will include indicators of parental socioeconomic status, family structure and family cohesion to operationalize living conditions in adolescence. All of the measures operationalizing living conditions are first added separately and then in a step-wise manner to test whether some aspects of living conditions are more influential on differential health returns than others.

Finally, I will test whether *learning conditions* in adolescence contribute to differential health returns to education in Chapter 6. I first add institution-level and individual-level indicators of learning conditions to the relationship between education and health. Then I add learning conditions in adolescence to estimate their contributions to differential health returns in adulthood. The final model estimates the influence of adolescent learning conditions and living conditions on differential health returns *net* of living conditions in young adulthood.

The next section describes the models I will use in the subsequent chapters. For each of the three dichotomous health indicators (self-rated health, obesity and hypertension) I estimate a set of models for (1) all racial/ethnic groups combined, (2) whites only, (3) blacks only, (4) and Hispanics only. Models are run separately to assess how the relationship between education, health and indicators of living and learning conditions vary across racial/ethnic groups. Due to a small number of level 2 units (schools) for Hispanics, models including school-level characteristics cannot be estimated for this racial/ethnic group due to low reliability of standard errors. The equations presented below are random-intercept multi-level models with random effects that include information from both levels 1 and level 2 units in separate equations.

Research Question 1: *Do health returns to education vary by race/ethnicity?*

To analyze this research question, I estimate a logistic regression model with a trichotomous variables measuring educational attainment at Wave IV. Respondents who have indicated that their highest level of education is a high school diploma or some college are the reference category to highlight the absence or presence of a gradational relationship between education and health. For an education gradient to be present, those with less than high school should have significantly poorer health outcomes than those with high school/some college and those with at least a four-year degree should have significantly better health indicators than those with a high school degree/some college. Separate logistic regression models are run for the entire sample and for each

racial/ethnic group across all three health indicators. To test whether health returns to education significantly vary by race/ethnicity, I calculate two-sample t-tests comparing (1) whites and blacks (2) whites and Hispanics and (3) blacks and Hispanics.

Equation 1.1:

Level 1: —

Level 2:

Since analyses of descriptives indicate that health returns may vary by gender, Equation 1.2 adds these demographic characteristics into the previous equation (1.1).

Equation 1.2:

Level 1: —

Level 2:

Research Question 2: *Do living conditions in adolescence contribute to differences in health returns to education across race/ethnicity?*

This research question is not only interested in the *overall* impact of living conditions in adolescence and young adulthood on differential health returns to education by race/ethnicity, but also whether some aspects of living conditions are more consequential for differential health returns for some racial/ethnic groups (as opposed to others). Thus, aspects of living conditions will be added by category (parental socioeconomic status, family organization and family cohesion) separately. Then all categories are added in a step-wise manner to result in a full model that accounts for all living conditions in adolescence in Equation 2.

For parental socioeconomic status, respondents whose parent's highest level of education is a four-year degree or higher and did not receive welfare payments are the reference categories. Household size and the family relationship factor are grand mean centered. Respondents who were raised in a two-parent home are the reference category and compared to those raised in a single parent family. Lastly, those who *do not* report engaging in any cultural activities with at least one parent are a reference to those who have engaged in at least one of these activities with their parents. I also include control variables for age and foreign-born status.

Equation 2[2]:

Level 1: —

Level 2:

Research Question 3*: Do learning conditions in adolescence contribute to racial/ethnic disparities in health returns to education?*

Measures of learning conditions at both the individual and school level are added to Model 1.2 to obtain a baseline measure of the impact of learning conditions on differential health returns to education across racial/ethnic groups. First, school characteristics are added at the school-level including: (1) a dichotomous indicator of

[2] "Living Conditions in Adolescence" in this equation represent a *group* of six variables that are described in the previous paragraph. Notation for *each* variable used to operationalize "living conditions in adolescence" is not included for brevity.

school affiliation (reference is private), (2) a binary variable indicating school size (large is reference), (3) a trichotomous variable for urbanicity (urban is reference), (4) a categorical variable for region (south is reference) and (5) racial composition of students (majority white is reference). I then add school-level predictors that gauge school quality. All of these variables are grand mean centered (percent of teachers with no prior teaching experience, percent of teachers with at least a Master's degree, percent of parents involved in the school's Parent-Teacher Association, percent of seniors taking college preparatory English courses and average class size). Lastly, individual-level learning conditions are added to the model including (1) three educational experience factors ("school integration", "student-teacher interaction", and "engagement with schoolwork"), (2) expectations of college graduation (grand-mean centered), and (3) a dummy variable indicating parental involvement in educational activities (reference category is at least some involvement in educational activities from parents).

Equation 3.1[3]:

Level 1: —

Level 2:

[3] "Individual Living Conditions" and "Institutional Living Conditions" in this equation represent two *groups* of variables that are described in the previous paragraph. Notation for *each* variable used to operationalize each of these concepts (institutional and individual learning conditions) is not included for brevity.

I then add indicators of living conditions from Equation 2 to estimate the contribution of learning conditions in adolescence net of living conditions in adolescence. This model is a means-as-outcomes fixed effects logistic regression that estimates the influence of secondary school characteristics on health returns to education in young adulthood net of living conditions in adolescence (Equation 3.2).

Equation 3.2[4]:

Level 1: —

7 +

Level 2:

[4] "Individual Living Conditions" and "Institutional Living Conditions" and "Living Conditions in Adolescence" in this equation represent three *groups* of variables that are described in previous paragraphs. Notation for *each* variable used to operationalize each of these concepts (institutional and individual learning conditions and living conditions in adolescence) is not included for brevity.

Finally, I control for living conditions in *adulthood* to estimate the influence of learning and living conditions on differential health returns to education controlling for living conditions in adulthood (Equation 3.3). I include three aspects of living conditions in adulthood: (1) socioeconomic status (2) family structure and (3) family-work conflict. Adult socioeconomic status includes wealth (positive wealth is reference), financial hardship (no financial hardship is reference), employment status (unemployed is reference), current enrollment in a college/university (no enrollment is reference) and total months spent in jail or prison (continuous). Family structure in adulthood includes two dummy variables indicating whether the respondent is married (not married is reference) and if he/she is the head of a single parent family (no is reference) including a continuous indicator of the number of children a respondent has in his/her care. Three ordinal level variables measure work-family conflict (grand mean centered).

Equation 3.3[5]:

Level 1: —

7 + 8 (

Level 2:

[5] "Individual Living Conditions" and "Institutional Living Conditions", "Living Conditions in Adolescence" and "Living Conditions in Young Adulthood in this equation represent four *groups* of variables that are described in previous paragraphs. Notation for *each* variable used to operationalize each of these concepts (institutional and individual learning conditions and living conditions in adolescence and young adulthood) is not included for brevity.

	Less than High School	High School or Some College	Four-Year Degree & Above	*Total*
White	**355**	**2,996**	**1,858**	**5,209**
row %	(6.82%)	(57.3%)	(35.7%)	(100%)
column %	*(52.3%)*	*(58.3)*	*(66.7%)*	*(60.6%)*
Black	**171**	**1,185**	**596**	**1,952**
row %	(8.76%)	(60.7%)	(30.5%)	(100%)
column %	*(25.2%)*	*(23.1%)*	*(21.4%)*	*(22.7%)*
Hispanic	**153**	**956**	**331**	**1,440**
row %	(10.6%)	(66.4%)	(22.9%)	(100%)
column %	*(22.6%)*	*(23.1%)*	*(11.9%)*	*(16.7%)*
Total	**679**	**5,137**	**2,785**	**8,601**
row %	**(7.89%)**	**(59.7%)**	**(32.3%)**	**100%**
column %	***(100%)***	***(100%)***	***(100%)***	***(100%)***

Table 1. Distribution of Highest Level of Educational Attainment at Wave IV by Race/Ethnicity

	All *n=8,601*	**White** *n=5,209*	**Black** *n=1,952*	**Hispanic** *n=961*
Health Indicators (%)				
Fair/Poor Health	9.55 (0.294)	7.66[b, c] (0.246)	13.13[a] (0.398)	15.69[a] (0.417)
Obese	38.11 (0.486)	35.39[b, c] (0.442)	46.90[a] (0.589)	42.16[a] (0.566)
Hypertensive	18.1 (0.18)	17.3[b] (0.35)	21.7[a] (0.49)	18.3 (0.44)
Key Independent Variables (%)				
Race/Ethnicity	100	60.56 (0.452)	22.70 (0.368)	16.74 (0.332)
Educational Attainment				
Less than high school	9.17 (0.289)	7.47[b, c] (0.243)	12.87[a] (0.395)	14.02[a] (0.398)
HS/Some college	60.05 (0.489)	58.13[b, c] (0.456)	64.63%[a] (0.564)	65.03[a] (0.546)
College degree & above	30.78 (0.462)	34.39[b, c] (0.439)	22.50[a] (0.492)	20.94[a] (0.466)
Demographics				
Age at Wave IV (years)	27.89 (1.67)	27.82 (1.52)	28.11 (1.98)	28.01 (1.98)
Gender (% Female)	50.3 (0.500)	50.3 (0.462)	51.5 (0.587)	48.8 (0.572)
Nativity (% foreign born)	3.96 (0.195)	1.21[c] (0.100)	1.21[c] (0.129)	22.8[a, b] (0.480)

Table 2. Sample Characteristics by Race/Ethnicity (%)

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [c] significant difference between blacks and Hispanics

Chapter 4: Racial/Ethnic and Gender Disparities in Health Returns to Education

Research indicates that disparities in *health returns to education* vary significantly by race/ethnicity (Farmer and Ferraro 2005; Hayward et al. 2000; Shuey and Wilson 2008). However, there is considerable disagreement in findings concerning the level of education at which these disparities occur. Some research indicates that disparities are magnified at lower levels of education (Christenson and Johnson 1995; Zajacova and Hummer 2009), while other research finds these disparities are larger among those who have completed at least a Bachelor's degree (Farmer and Ferraro 2005; Schoendorf et al. 1992; Shuey and Wilson 2008). For example using the National Health and Nutrition Examination Survey (NHANES), Farmer and Ferraro (2005) find that the education-self-rated health slope for whites is positive while this slope is zero for blacks. This suggests that African American health is not responsive to educational attainment in this sample, and that black-white inequalities in self-rated health are starkest at higher levels of education. On the other hand, Zajacova and Hummer find that, among those with less than a high school diploma, blacks experience a one to three percent increase in the hazard of all-cause mortality compared to whites (2009). However, blacks with 13 to 16 years of education experienced a lower hazard of mortality than similarly educated whites (2009).

Furthermore, it is unclear how health returns to education vary across *younger* cohorts and whether these disparities vary across health indicators. Research that finds racial/ethnic disparities in adulthood tends to focus on mortality (Crimmins and Saito 2001; Jemal et al. 2008; Zajacova and Hummer 2009) and self-rated health (Farmer and Ferraro 2005; Shuey and Wilson 2008) among cohorts that are in mid to late adulthood. However, research indicates that socioeconomic health disparities in education are *widening* among younger cohorts (Lynch 2003) and that some health indicators such as obesity and hypertension are becoming *more* prevalent at younger ages (Healthy People 2010). These findings suggest a need to examine trends in racial/ethnic disparities in health returns to education among young adults for a wider array of health outcomes.

This chapter will focus on describing patterns of racial/ethnic disparities in self-rated health, hypertension and obesity. I will begin by discussing how *means* of health indicators vary across race/ethnicity, gender and level of educational attainment. I will then present results from logistic regression analyses that test for differential health returns to education across race/ethnicity, and examine whether they vary by gender

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Means of Health Indicators across Race/Ethnicity and Gender

This research is primarily interested in investigating whether health returns to education significantly varies across racial/ethnic groups. Tables 3, 5 and 7 exhibit how the means of poor or fair self-rated health, obesity and hypertension vary by race/ethnicity, educational attainment and gender. The top row of each table represents

the means of the health indicator across racial/ethnic groups. The grayed rows represent the means of the health indicator by level of educational attainment across racial/ethnic groups. The white rows represent the means of health indicators by gender and level of educational attainment across racial/ethnic groups. All means and standard deviations are estimated using STATA's "svy" command suite to adjust for Add Health's complex sampling design.

Differential Health Returns to Education by Race/Ethnicity (Sample Means)

The improvement in health status that is associated with an increase in educational attainment is termed a "health return". Research consistently finds health returns to subsequent years and credentials of education when analyzing all racial/ethnic groups together. However, when racial/ethnic groups are analyzed separately, some groups obtain more health returns than other groups. (i.e., the decrease in the prevalence of morbidity associated with an increase in educational attainment is larger for one group than another group) (Jemal et al. 2008; Kimbro et al. 2008). Still some racial/ethnic groups obtain no health returns to education at certain levels of education (Farmer and Ferraro 2005; Shuey and Wilson 2008). Both are evidence of a "differential (health) return".

Tables 4, 6 and 8 present "health returns" or mathematically speaking, the difference in the prevalence of a health outcome of two adjacent levels of educational attainment (i.e. the difference in prevalence between the less than high school and high school or some college categories). For example, for Table 4, the first row presents the

difference in the prevalence ("health return") of reporting fair or poor health between those with less than high school and those with high school and/or some college for 1) the entire sample, 2) whites, 3) blacks and 4) Hispanics. The white rows below present the same information for both women and men. The fourth row of the table (gray) presents health returns to a four-year degree or above (compared to a high school diploma or some college). Negative numbers indicate that for a particular group, obtaining higher education is associated with a health "deficit" rather than a health gain. I calculate Wald's tests to examine whether a) the difference in the prevalence between two adjacent educational categories is statistically different from zero and b) health returns significantly vary by race/ethnicity.

Self-Rated Health. Table 3 demonstrates that the prevalence of reporting fair/poor health decreases with each additional increase in educational credentials for all racial/ethnic groups indicating that all racial/ethnic groups obtain health returns to education. For example, for the entire sample (column 1), the prevalence of reporting fair or poor health is almost one in five (19.2%) for those with less than a high school diploma, 11.3% for those with a high school diploma or some college and 3.54% among those with four year degrees or higher. This pattern, in which higher levels of education are associated with fewer respondents reporting fair/poor health, is evident across racial/ethnic groups. For example, over one-quarter (26.8%) of blacks without a high school diploma report fair/poor health. This prevalence decreases to 13% and 5.6% for

those who have a high school diploma or some college or at least a four year degree, respectively.

Nonetheless, the gradient is steeper for some racial/ethnic groups. For example, Table 4—which quantifies the differential "health returns"—demonstrates that the health returns to a high school diploma or some college is approximately 7% for whites, 13.8% for blacks and only 2% for Hispanics. This difference is statistically significant for whites ($p<.001$) and blacks ($p<.01$), but not Hispanics. In contrast, there are sizeable health returns to a four-year degree or higher for *all* racial/ethnic groups: 6.6% for whites, 7.4% for blacks and 9.1% for Hispanics. These difference are statistically for all racial/ethnic groups (whites: $p<.001$; blacks ($p<.001$); Hispanics: $p<.05$). Data from the BRFSS supports this result and demonstrates that there is a strong education gradient for self-rated health when educational attainment is operationalized as a continuous variable (author's own calculations). Furthermore, this gradient was found to be strongest among whites and weaker among blacks and Hispanics. This analysis suggests that for self-rated health, all racial/ethnic groups obtain health returns to a four-year degree or above, but only blacks and whites obtain health returns to a high school diploma or some college. However, analyses indicate that these racial/ethnic disparities are *not* statistically significant.

Obesity. Unlike in the case of self-rated health, there is not a clear educational gradient for obesity for any racial/ethnic group. For all groups, the prevalence of obesity is *lower* among those without a high school diploma than those with a diploma and/or

some college indicating that respondents obtain a "health deficit" rather than a health return to obtaining a high school diploma or some college for obesity. For example, for the entire sample (Table 5, column 1) 40.1% of those without a high school diploma are obese while 42.9% of those with a high school diploma or some college are obese. This is also evident by observing the negative numbers in the first row of Table 6. This finding is corroborated in a NHANES sample of 20 to 39 year olds (author's own calculations).

Table 5demonstrates that when examined separately by race, whites and Hispanics reap large health returns to a four year degree or above. Completing a four year degree or higher is associated with 15.9% decrease ($p<.001$) in the prevalence of obesity for whites and a 17.9% decrease ($p<.001$) for Hispanics. On the other hand, similarly educated blacks only experience a 3.5% decrease in the prevalence of obesity, and this difference is not statistically significant. Again, this pattern supports findings from a NHANES sample of 20-39 year olds which indicates that white and Mexican American four-year degree graduates have significantly lower rates of obesity than Blacks with the same level of education (author's own calculations). In the NHANES data, the prevalence of obesity for those with at least a four-year degree among whites (23.4%), Mexican Americans (25.2%) and blacks (42.2%) is similar to this Add Health sample (whites--25.3%; Hispanics--28.6%; blacks—44.8%). The health data demonstrate that the small and insignificant health return to a four-year degree among blacks for obesity is statistically different than health returns obtained by whites ($p<.01$)

and Hispanics ($p<.01$) who have attained a similar level of education suggesting "differential returns" to a four-year degree for obesity across race/ethnicity.

Hypertension. When all racial/ethnic groups are combined, it appears that there is a modest educational gradient for hypertension. For the entire sample (Table 7 column 1), 22.8% of those without a high school diploma have high blood pressure, while 18.9% and 15.3% of those with a high school diploma or some college and a four-year degree or higher, respectively have hypertension. However, for blacks, the prevalence of hypertension is similar across levels of education indicating that blacks do not obtain health returns to education for hypertension: less than high school—21.9%, high school or some college—22.4% and four year degree or above—20.7% (Table 7). For Hispanics, the prevalence of hypertension is *higher* for those with a four-year degree or higher (19.9%) compared to those with a high school diploma or some college (16.6%) indicating a health deficit rather than a return to a four year degree or higher.

When all racial/ethnic groups are combined, health returns to high school or some college and a four-year degree are similar at 3.9% and 3.6% respectively (Table 8, column 1). However, health returns to a four year degree are statistically significant ($p<.001$) while returns to high school or some college are not. When racial/ethnic groups are analyzed separately, it is clear that only whites obtain health returns to education for hypertension, and only for a four-year degree or higher. For whites, the prevalence of hypertension decreases approximately 4.6% among those with a four year degree or more compared to those with a high school diploma or some college ($p<.001$). Hispanics

obtain sizeable (7.3%) yet insignificant health returns to a high school diploma or some college; and as mentioned above obtain negative health returns or a health "deficit" to a four-year degree or higher.

In summary, obesity is the only health indicator in which there are statistically significant differential health returns to education across race/ethnicity. This difference is only evident for health returns to a four-year degree or higher for this outcome since the prevalence of obesity is *higher* among those with a high school diploma or some college than those without a high school diploma across all racial/ethnic groups. The significant differential returns to a four-year degree or above for obesity is driven by the small health return blacks obtain from a four-year degree or higher for obesity. For self-rated health, all racial/ethnic groups obtain health returns to both a high school diploma or some college and a four-year degree or higher with the exception of Hispanics who do not obtain significant health returns to a high school diploma or some college. This difference is not statistically significant. Finally, whites are the only racial/ethnic group to obtain health returns to hypertension, and this finding is only true for health returns to a four year degree or above. There does not appear to be a strong negative relationship between educational attainment and hypertension for blacks and Hispanics.
Next I will discuss how these results vary by gender.

Health Returns to Education by Race/Ethnicity and Gender. White rows in Tables 3, 5 and 7 present health returns to education for self-rated health, obesity and hypertension,

respectively by gender. Again, "health returns" for this section are operationalized as the mathematical difference of the prevalence of a health indicator between two adjacent levels of education (i.e. less than high school and a high school diploma or some college). Negative numbers indicate a "health deficit", meaning that the higher level of education is associated with a higher prevalence of a health indicator. I compute Wald's tests to examine whether men and women obtain similar health returns to education across race/ethnicity.

Descriptive statistics indicate that some health indicators--namely obesity and hypertension--vary considerably by gender leaving females at an advantage for hypertension, and a disadvantage for obesity. These gender differences are more pronounced among blacks than whites or Hispanics.

Self-Rated Health. There are minimal differences between males and females in the prevalence of reporting fair or poor health for whites or Hispanics. For these racial/ethnic groups, females have a 2-3% higher prevalence of reporting fair or poor health than men for each level of educational attainment. In terms of health returns, white males obtain slightly higher health returns to a high school diploma or some college (7.8%) than women (5.6%). Yet white women obtain higher health returns to a four year degree or higher (7.3%) than men (4.4%). These health returns are statistically significant for both white men and women. For blacks, gender differences in health returns to education are considerably more pronounced. For example, like whites, black males obtain higher health returns to a high school diploma or some college than females,

but the gender difference is much larger (2.5% for females versus 11.6% for males). This sizeable gender disparity is also observed for health returns to a four year degree (15.6% for females and -2.3% for males). On the other hand, gender differences in health returns to education for Hispanics are negligible. For example, health returns to a high school diploma or some college is 2.4% for females and 2.1% for males and there is only a one percent difference between men and women for health returns to a four year degree. These patterns suggest that gender may be a more important determinant of self-rated health for blacks than whites or Hispanics.

Obesity. When all racial/ethnic groups are combined, men have a slightly lower prevalence of obesity than women at every level of education (approximately 5-9% lower). This male advantage holds true for all racial/ethnic groups but is smallest for whites and largest for blacks. For example, among those without a high school diploma, white males have a 3.7% lower prevalence of obesity than white women, and Hispanic men have a 7.2% lower prevalence of obesity their female counterparts. However, among blacks with this same level of education, black women have *over double* the prevalence of obesity (70.3%) than black men (32.9%). This dramatic gender difference among blacks continues for each level of educational attainment and is primarily driven by very high prevalence of obesity among black females at every level of education. However, black females are the only group to obtain health returns to *both* a high school diploma or some college and a four year degree or higher. Black women with a high school diploma or some college have a 10.2% lower prevalence of obesity than their

counterparts without a high school diploma. All other racial/ethnic-gender groups experience a "health deficit" to a high school diploma or some college for obesity. Nonetheless, black women also obtain the *lowest* health returns to a four-year degree or higher (10.6%) and black men with a four year degree are the only group to have a higher prevalence of obesity than their peers with a high school diploma or some college (-4.5%). Finally, Hispanics are similar to whites in that there are small gender differences in health returns to education for obesity. For example, Hispanics females with a four-year degree have a 19.3% decrease in obesity compared to Hispanic females with a high school diploma or some college. Among Hispanic males, this health return is 17.8%.

Hypertension. There are sizeable gender differences in hypertension across racial/ethnic groups. The prevalence of high blood pressure among women is 10-15% lower than for men at all levels of educational attainment. However, gender differences are largest among Hispanics with at least a four-year degree. Among this group, the prevalence of hypertension for men (26.8%) is over four times higher than for women (9.4%). Interestingly, while Hispanic men with at least a four-year degree have the highest prevalence of hypertension than any other race/ethnic-education-gender subgroup, similarly educated Hispanic women have the *lowest* prevalence of hypertension than any other group. This suggests that the relationship between education and hypertension may be operating quite differently between Hispanic men and women.

Gender differences in health returns to a high school diploma or some college are minimal across racial/ethnic groups yet more marked when examining health returns to a four year degree or higher. These differences are largest among Hispanics in which Hispanic males experience a "health deficit" of 13.1% compared to a health return of 1.8% for similarly educated Hispanic females. Black men also experience a health deficit to a four year degree or higher (-2.1%) while black women experience a health return of 2.5%. However, among whites, both men and women obtain health returns, and men obtain higher returns (8.7%) than women (2.6%). In addition, few of these health returns are statistically significant across racial/ethnic groups. Only the return for white males and the deficit for black males for a four year degree or higher is statistically significant ($p<.05$).

In summary, these results suggest that gender differences in the prevalence of health indicators and health returns varies considerably across level of education, health indicator and racial/ethnic group/ For example, women generally have lower levels of hypertension and higher levels of obesity across racial/ethnic groups; however, when examining health returns, gender differences are less pronounced for these outcomes. Gender differences in health returns are most pronounced among blacks for self-rated health and obesity. Gender differences are also quite marked among Hispanics with at least a four-year degree for hypertension. These results indicate that gender will influence education and health differently across racial/ethnic groups and health indicators in the bivariate regression models.

Logistic Regression Models

The goal of this research is to investigate whether there is a gradational relationship between education and health, and whether this gradient varies by race/ethnicity. I estimate bivariate regression models to assess the relationship between education and health across racial/ethnic groups and health indicators. Tables 9, 10 and 11 present the results of the multi-level logistic regression models to estimate the relationship between education and health indicators. In these models the middle credential—a high school diploma or some college—is the reference category (and is therefore omitted from analysis).

A health return to a high school diploma or some college is present when the odds ratio for the less than high school category is significant and greater than one. This indicates that the odds of a poor health indicator are significantly higher among those with less than high school compared to those with a high school diploma or some college. For example, in Table 9, those without a high school diploma have nearly two and half times higher odds of reporting fair or poor health compared to those with a high school diploma or more (OR=2.42). A health return to a four year degree or more is present when the odds ratio for the four year degree and up category is less than one and significant indicating that the odds of a poor health indicator is significantly lower among those with less than a four year degree compares to those with a high school diploma or some college. I test for differential health returns by race/ethnicity by calculating t-tests

comparing the odds ratios for a level of education across racial/ethnic groups. Since some health indicators—especially hypertension—appeared to be differentially distributed by gender in the descriptive statistics, I estimate these bivariate models including gender to examine whether health returns to education are modified.

I will now discuss the results of these analyses in more detail presented in Tables 9 through 11.

Self-Rated Health. There is a clear education gradient when all racial/ethnic groups are combined for self-rated health (Table 9). Those without a high school diploma have nearly two and a half times higher odds of reporting fair or poor health of those with a high school diploma or some college (OR=2.42). Those with at least a four-year degree have 60% lower odds of the odds of reporting fair or poor health than someone who has completed a high school degree and/or some college (OR=0.404).

This gradient is also present for whites and blacks. However, blacks obtain higher returns to *both* a four-year degree or higher and a high school diploma or some college than whites. Blacks without a high school diploma have over two and a half times higher odds of reporting fair or poor health than their counterparts with a high school diploma or some college (OR=2.53) while whites without a high school diploma have nearly two times higher odds of reporting fair or poor health compared to whites with a high school diploma or some college (OR=1.96). In contrast, Hispanics do not obtain any health returns to a high school diploma or some college for self-rated health, but obtain the largest health returns to a four-year degree or higher. Hispanics with at

least a four year degree have 75% lower odds of reporting fair or poor health than Hispanics with a high school diploma or some college (OR=0.243).

Adding gender to these models increases the odds of reporting fair or poor health among those without a high school diploma relative to those with a high school diploma or some college for all racial/ethnic groups and decrease the odds among those with a four-year college degree or higher. However, gender did not have a significant influence on self-rated health. This suggests that gender moderates the relationship between education and health only, strengthening the educational gradient for this health indicator.

Obesity. With all racial/ethnic groups combined, there is not an education gradient for obesity (Table 10). Those without a high school diploma do not have a statistically significant difference in the odds of obesity from those with a high school diploma or some college. However, those with a four-year degree or higher have 37.7% lower odds of obesity than those with a high school diploma or some college (OR=0.623). Adding gender to this model decreases this odds ratio, strengthening the educational health disparity. Gender also has a significant influence on obesity. Women have 21% higher odds of obesity than men (OR=1.21).

When racial/ethnic groups are analyzed separately, whites and Hispanics also obtain health returns to a four-year degree or higher for obesity, but blacks do not. This return is also higher for Hispanics than whites. Hispanics with a four-year degree or higher have less than half (45.6%) of the odds of obesity as Hispanics with a high school diploma or some college. In contrast, whites with at least a four-year degree have 42.9%

lower odds of obesity than their counterparts with a high school diploma or some college (OR=0.581). Furthermore, for Hispanics and whites, gender does not have a significant influence on obesity and has a negligible impact on educational differences in obesity. This is in direct contrast to the pattern observed for blacks wherein there are no significant educational differences in obesity; yet gender has a direct influence on the odds of obesity for blacks. Black females have almost two times the odds of the obesity for black males (OR=1.96).

Hypertension. With whites, blacks and Hispanics combined, there are health returns to a four-year degree or higher for hypertension, but no returns to a high school diploma or some college (Table 11). Young adults with at least a four-year degree have 40.6% lower odds of high blood pressure than those with a high school diploma or some college (OR=0.594). However, when gender is included in the model, this health return slightly decreases indicating that gender moderates the relationship between education and hypertension. Gender also directly influences the odds of hypertension; women have less than half of the odds of hypertension of men, controlling for educational attainment (OR=0.449).

Whites are the only racial/ethnic group to obtain any health returns to education for hypertension; however, this group only obtains health returns to a four hear degree or higher. Whites with a four-year degree or higher have 29.6% lower odds of reporting fair or poor health than whites with a high school diploma or some college (OR=0.704).

Although the education gradient is not present for any racial/ethnic group for hypertension, gender has a significant influence on the odds of hypertension for *all* racial/ethnic groups. The influence/effect of gender is strongest for Hispanics wherein females have 77.9% lower odds of hypertension than males (OR=0.221). White females have 74.6% lower odds of hypertension than white males (OR=0.254) and black females (the least advantaged group of females) have 64.5% lower odds of hypertension than their male counterparts (OR=0.355). Furthermore, while gender increased the education gradient for self-rated health, adding gender to these models decreased educational differences in hypertension (although these differences remained insignificant for all racial/ethnic groups except for whites with at least a four-year degree).

Summary. In review, there are racial/ethnic disparities in health returns to education for all three health indicators. For self-rated health, differential returns to a high school diploma or some college are marked (Table 9). Blacks and whites obtain health returns to a high school diploma while Hispanics do not, and blacks obtain higher returns to a high school diploma or some college (OR=2.57) than whites (OR=1.97). For obesity, Hispanics (OR=0.444) and whites (OR=0.592) obtain quite sizeable health returns to a four-year degree or higher, yet for blacks, there are no statistically significant differences in the odds of obesity by level of education (Table 10). For hypertension, whites are the only racial/ethnic group to obtain health returns to education. Gender also varies in its influence on both educational differences and the health indicator itself

across racial/ethnic groups. There are larger gender differences in health returns to education for blacks than for any other racial/ethnic group (Table 11).

The following chapter will examine how living conditions in adolescence contribute to the differential health returns to education by race/ethnicity explored in this chapter.

	All *n=8601*	White *n=5,209*	Black *n=1,952*	Hispanic *n=961*
All	**9.57** ***(.29)***	**7.66** ***(.25)***[a,b]	**13.0** ***(.39)***[a]	**15.7** ***(.42)***[b]
Female	9.87 *(.31)*	7.72 *(.26)*	14.4 *(.44)*	17.2 *(.45)*
Male	9.27 *(.28)*	7.6 *(.24)*	11.7 *(.35)*	14.3 *(.39)*
Less Than High School	**19.2** ***(.36)***	**16.5** ***(.32)***	**26.8** ***(.43)***	**19.3** ***(.39)***
Female	20.9 *(.39)*	15.9 *(.33)*	20.2 *(.44)*	20.9 *(.47)*
Male	17.9 *(.34)*	14.9 *(.32)*	19.1 *(.35)*	18.5 *(.35)*
High School/Some College	**11.3** ***(.31)***	**9.41** ***(.27)***	**13.02** ***(.39)***	**17.3** ***(.44)***
Female	12.3 *(.34)*	10.3 *(.29)*	17.7 *(.48)*	18.5 *(.44)*
Male	10.4 *(.29)*	7.07 *(.23)*	7.46 *(.29)*	16.4 *(.42)*
Four-Year Degree and Up	**3.54** ***(.19)***	**2.77** ***(.16)***	**5.61** ***(.32)***	**8.16** ***(.33)***
Female	3.43 *(.19)*	3.02 *(.17)*	2.15 *(.22)*	9.88 *(.36)*
Male	3.7 *(.19)*	2.67 *(.15)*	9.71 *(.39)*	6.78 *(.29)*

Table 3. Prevalence of Reporting Fair or Poor Health by Race/Ethnicity, Educational Attainment and Gender (%)

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [c] significant difference between blacks and Hispanics

	All *n=8601*	White *n=5,209*	Black *n=1,952*	Hispanic *n=961*
Less Than High School v. High School/Some College	**7.9%*****	**7.1%*****	**13.8****	**2.0%**
Female	8.6%*	5.6%*	2.5%	2.4%
Male	7.5%**	7.8%*	11.6%	2.1%
High School/Some College v. Four-Year Degree	**7.8%*****	**6.6%*****	**7.4%*****	**9.14%***
Female	8.9%***	7.3%***	15.6%***	8.6%
Male	6.7%***	4.4%***	-2.3%	9.6%

Table 4. Health Returns to Education for Reporting Fair or Poor Health by Race/Ethnicity and Gender (%)

***p<.001; **p<.01; *p<.05; †p<.10

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [c] significant difference between blacks and Hispanics

	All *n=8601*	White *n=5,209*	Black *n=1,952*	Hispanic *n=1,440*
All	**37.9 *(.49)***	**35.4 *(.44)*[a,b]**	**47.3 *(.59)*[a]**	**42.2 *(.57)*[b]**
Female	39.2 *(.51)*	35.4 *(.46)*	56.5 *(.63)*	*43.7 (.48)*
Male	36.5 *(.45)*	35.5 *(.43)*	37.8 *(.52)*	39.4 *(.54)*
Less Than High School	**40.1 *(.45)***	**36.9 *(.42)***	**43.3 *(.48)***	**42.2 *(.49)***
Female	45.0 *(.48)*	38.1 *(.43)*	70.3 *(.5)*	44.9 *(.57)*
Male	36.7 *(.42)*	34.4 *(.42)*	32.9 *(.42)*	37.7 *(.43)*
High School/Some College	**42.9 *(.45)***	**41.2 *(.4)***	**48.3 *(.57)***	**46.5 *(.55)***
Female	45.5 *(.51)*	39.9 *(.47)*	60.1 *(.61)*	45.7 *(.57)*
Male	40.3 *(.47)*	40.2 *(.44)*	24.1 *(.54)*	41.6 *(.56)*
Four-Year Degree and Up	**27.4 *(.46)***	**25.3 *(.41)*[a]**	**44.8 *(.57)*[a,c]**	**28.6 *(.58)*[c]**
Female	21.2 *(.48)*	21.3 *(.42)*	49.5 *(.75)*	26.4 *(.52)*
Male	27.8 *(.44)*	17.3 *(.34)*	28.6 *(.59)*	23.8 *(.54)*

Table 5. Prevalence of Obesity by Race/Ethnicity, Educational Attainment and Gender

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [a] significant difference between blacks and Hispanics

	All	White	Black	Hispanic
Less Than High School v. High School /Some College	**-2.8%**	**-4.3%**	**-5.0%**	**-4.3%**
Female	-.50%	-1.8%	10.2%	-.80%
Male	-3.6%	-5.8%	8.8%	-3.9%
High School/Some College v. Four-Year Degree	**15.5%*****	**15.9%^{***a}**	**3.5%^{a,c}**	**17.9%^{***c}**
Female	24.3%***	18.6%***	10.6%**	19.3***
Male	12.5%***	22.9%***	-4.5%	17.8*

Table 6. Health Returns to Education for Obesity by Race/Ethnicity and Gender

***p<.001; **p<.01; *p<.05; †p<.10

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [c] significant difference between blacks and Hispanics

	All *n=8,601*	White *n=5,209*	Black *n=1,952*	Hispanic *n=1,440*
All	**18.1** ***(.18)***	**17.3** ***(.35)***	***21.7*** **(.49)**	**18.3** ***(.44)***
Female	10.8 *(.26)*	*9.75* (.28)	*16.2* (.47)	*9.4* (.35)
Male	25.5 *(.11)*	*24.9* (.38)	*27.6* (.48)	*26.8* (.49)
Less Than High School	**22.8** ***(.39)***	***22.7*** **(.37)**	***21.9*** **(.40)**	***23.9*** **(.43)**
Female	*13.9* (.34)	14.2 *(.32)*	*13.9* (.37)	*12.8* (.37)
Male	*28.9* (.39)	*29.4* (.37)	*27.4* (.41)	*29.3* (.42)
High School/Some College	**18.9** ***(.39)***	***18.5*** **(.36)**	***22.4*** **(.48)**	***16.6*** **(.43)**
Female	*11.6* (.33)	*10.5* (.29)	*17.4* (.46)	*9.56* (.34)
Male	*28.9* (.42)	*26.1* (.37)	*27.5* (.48)	*23.5* (.48)
Four-Year Degree and Up	***15.3*** **(.37)**	***13.9*** **(.33)**	***20.7*** **(.55)**	***19.9*** **(.48)**
Female	*8.79* (.31)	*7.91* (.27)	14.9 *(.51)*	*7.75* (.34)
Male	*23.4* (.41)	*17.4* (.46)	*29.6* (.57)	*36.3* (.54)

Table 7. Prevalence of Hypertension by Race/Ethnicity, Educational Attainment, and Gender

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [a] significant difference between blacks and Hispanics

	All	White	Black	Hispanic
Less Than High School v. High School/Some College	**3.9%**	**4.2%**	**-0.50%**	**7.3%**
Female	2.3%	3.7%	-3.5%	3.24%
Male	0.0%	3.3%	-0.50%	5.8%
High School/Some College v. Four-Year Degree	**3.6%*****	**4.6%*****	**1.7%**	**-3.3%**
Female	2.81%*	2.6%	2.5%	1.81%
Male	5.5%	8.7%*	-2.1%*	-13.1%

Table 8. Health Returns to Education for Hypertension by Race/Ethnicity and Gender

***p<.001; **p<.01; *p<.05; †p<.10

[a] significant difference between whites and blacks, [b] significant difference between whites and Hispanics, [c] significant difference between blacks and Hispanics;

	All *n=8601*		**White** *n=5,209*		**Black** *n=1,952*		**Hispanic** *n=1,440*	
Intercept	0.106***	.096***	0.097***	0.089***	0.127***	0.107***	0.538	0.519
	(0.107)	(.095)	(.094)	(.111)	(.140)	(.206)	(.840)	(.813)
Less than High School	2.421**	2.463***	1.957***	1.979***	2.529**	2.624***	0.702	0.708
	(0.272)	(0.271)	(.181)	(.183)	(.318)	(.324)	(.648)	(.652)
Four-Year Degree & Up	0.404***	0.398***	0.360***	0.356***	0.327***	0.308***	0.243*	0.242*
	(0.249)	(0.242)	(.266)	(.264)	(.264)	(.284)	(.569)	(.578)
Female		1.235†		1.193		1.437		1.055
		(0.118)		(.136)		(.222)		(.295)

Table 9. Bivariate Logistic Regression Models: Health Returns to Education for Reporting Fair or Poor Health by Race/Ethnicity—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

	All *n=8,601*		***White*** *n=5,209*		***Black*** *n=1,952*		***Hispanic*** *n=1,440*	
Intercept	0.670***	0.610***	0.692***	0.696***	0.876	0.646†	1.070	1.021
	(.099)	(0.101)	(0.084)	(0.096)	(0.103)	(0.151)	(0.127)	(0.216)
Less than High School	0.903	0.918	0.793†	0.793†	0.679	0.719	0.769	0.779
	(0.169)	(0.173)	(0.126)	(0.127)	(0.262)	(0.258)	(0.215)	(0.216)
Four-Year Degree & Up	0.623***	0.613***	0.581***	0.582***	0.837	0.746	0.456***	0.455***
	(0.069)	(0.069)	(0.121)	(0.101)	(0.184)	(0.177)	(0.201)	(0.195)
Female		1.210**		0.988		1.960***		1.099
		(0.068)		(0.091)		(0.145)		(0.301)

Table 10. Bivariate Logistic Regression Models: Health Returns to Education for Obesity by Race/Ethnicity—Odds Ratios (Standard Errors)

*p***p<.001; **p<.01; *p<.05; † p<.10

	All *n=8,601*		***White*** *n=5,209*		***Black*** *n=1,952*		***Hispanic*** *n=1,440*	
Intercept	0.116***	0.161***	0.176***	0.297***	0.208	0.306***	0.182***	0.332***
	(0.078)	(0.123)	(0.079)	(0.101)	(0.205)	(0.253)	(0.297)	(0.238)
Less than High School	1.079	1.009	1.326	1.246	0.936	0.869	0.837	0.702
	(0.169)	(0.167)	(0.269)	(0.269)	(0.341)	(0.367)	(0.297)	(0.304)
Four-Year Degree & Up	0.594***	0.624**	0.659**	0.704*	0.569	0.659	1.120	1.171
	(0.141)	(0.142)	(0.150)	(0.156)	(0.544)	(0.517)	(0.389)	(0.306)
Female		0.449***		0.254***		0.355***		0.221***
		(0.168)		(0.156)		(0.238)		(0.263)

Table 11. Bivariate Logistic Regression Models: Health Returns to Education for Hypertension by Race/Ethnicity—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

Chapter 5: Living Conditions in Adolescence and Racial/Ethnic Disparities in Health Returns to Education

While numerous studies have indicated that health returns to education are not equal across racial/ethnic groups (Ferraro & Farmer 2005; Hayward et al. 2000; Master, Hummer and Powers 2011), fewer studies have systematically investigated the mechanisms that contribute to this phenomenon. Some research controls for socioeconomic status in adulthood (Farmer & Ferraro 2005; Hayward et al 2000; Read & Gorman, 2006), however; these studies do not consistently find that controlling for these covariates explains racial/ethnic disparities in health returns to education. These scholars suggest that racial/ethnic inequalities in health returns to education would converge if blacks and whites attained equal incomes, wealth, and occupational prestige in adulthood. However, other research finds that these inequalities *persist* when adult socioeconomic indicators are adjusted for (Farmer and Ferraro 2005; Shuey and Wilson 2008; Zajacova and Hummer 2009). Nonetheless, several scholars agree that racial/ethnic differences in learning and living conditions early in the life course may contribute to racial/ethnic inequalities in health returns to education (Farmer and Ferraro 2005; Hayward et al. 2000; Kimbro et al. 2008).

Living conditions in adolescence (i.e. socioeconomic background, social relationships) can influence health returns to education through a variety of pathways (see Figure 1). Both economic and sociological literatures find that socioeconomic background explains between 40%-60% of the variation in adult socioeconomic status (Haas 2006), and adult socioeconomic status mediates the relationship between educational attainment and health (Hayward et al. 2000, Mirowsky and Ross 1998). Research also indicates that living with two parents and fewer siblings (Furstenberg and Hughes 1995; Ryan et al. 1998), and having nurturing relationships with caregivers during childhood (Coleman and Hoffer 1987; Taylor, Repetti and Seeman 1997; Teachmen, Paasch and Carver, 1996; Teachman 1997) is associated with attaining higher levels of educational attainment and favorable health outcomes.

This chapter assesses whether living conditions in adolescence contribute to differential health returns to education. First, I will describe how I operationalize living conditions in adolescence. I use Table 12 to discuss how indicators of living conditions in this sample are distributed with a focus on how they vary across race/ethnicity and educational attainment. Finally, I will present results from logistic regression analysis that evaluate whether living conditions in adolescence—more specifically parental socioeconomic status and family structure and cohesion—influence differential health returns to education across race/ethnicity

Measuring Living Conditions in Adolescence

Living conditions in adolescence are operationalized with eight items that are organized into two categories: (1) parental socioeconomic status and (2) family structure and cohesion. All indicators are measured in the first wave of data collection from parent and respondent interviews. If data were missing in Wave I of data collection, information from Wave II was used.

Parental socioeconomic status is operationalized with an indicator of parent's highest educational attainment and welfare receipt status. Highest level of educational attainment is operationalized as the highest credential a residential or non-residential parent has attained. If a respondent has more than one parent, then the education level of the parent with the highest level of education is operationalized as parent's highest level of education. For example, if a respondent has one residential/non-residential parent with a high school diploma, and a residential/non-residential parent with a college degree, then "college degree" would be considered the highest level of education a parent as attained. This variable was constructed by using parent's reports of educational attainment in the Wave I parent interview survey, and when not available, student's report of parental education in Waves I and II of data collection. Parental education is categorized similarly to respondent's highest level of educational attainment yielding three groups: (1) less than high school (2) high school and some college and (3) four-year degree and above. Respondents whose parent's highest level of educational attainment is a four-year degree of higher are used as the reference group. Parental welfare receipt is also

measured by parents' responses in the Wave I parent interview survey. When parental reports were not available, respondents' reports in Waves I and II are used.

Family structure and cohesion gauge the organization and relationship quality of the respondent's family. Family structure is operationalized as (1) household size and (2) presence or absence of two residential parents. Both indicators were measured using the household roster administered in the initial interview during Wave I or Wave II of data collection. Household size is calculated by summing all family members in a household. A dichotomous single parent indicator was also created to indicate whether the household included one residential parent. Respondents with two parents and those who did not live with any parents are the reference group. Grandmothers, uncles or other extended family members were not counted as mothers or fathers; however, stepmothers and stepfathers were categorized as a residential parent.

Familial cohesion was assessed using a scale created via principal component factor analysis from four questions that measure perceptions of the closeness of the respondents' family (Cronbach's $\alpha = .758$). These items were measured at Wave I; however when this data was unavailable, Wave II data were used. The survey questions and factor loadings are detailed in Table X. For all items, adolescents respond on a 5-point scale: (1) "not at all", (2) "very little", (3) "somewhat", (4) "quite a bit", and (5) "very much". Higher scores indicate more family cohesion. I compute factor scores by multiplying the individual factor weight by the response value on that measure for each respondent.

I used principal component factor analysis with orthogonal varimax rotation to simplify the factor structure and make interpretation more simple and reliable (Abdi, 2003). I determined the factor structure using the Kaiser-Gutmman rule which states that the number of factors should be equal to the number of factors with an eigenvalue greater than 1.0 (Jolliffe 2002). I also examined the scree plot to visualize the increase in the amount of variance explained with the inclusion of additional factors. Using these criteria, only one factor emerged which explained 58.5% of the variance in this scale. All items load on this factor at .59 or higher. Higher scores indicate more family cohesion.

A final family cohesion indicator is a dummy variable indicating whether the respondent had gone to a movie, play, museum, concert or sports event with a residential or non-residential parent within the past four weeks of the interview. This measure is intended to not only tap into time spent with parents but to also roughly gauge the respondent's recent exposure to cultural events that may translate into a form of cultural capital.

Sample Descriptives

Table 12 presents the distribution of the indicators of living conditions in adolescence by race/ethnicity and educational attainment. This table facilitates the discussion of how living conditions in adolescence vary across race/ethnicity, educational attainment and racial/ethnic-educational attainment subgroups. The columns present means and standard deviations for indicators by race/ethnicity for 1) the entire sample, 2) whites, 3) blacks and 4) Hispanics. The rows present means and standard deviations for

indicators by respondent's educational attainment in Wave IV of data collection for 1) the entire sample, and for respondents with 2) less than a high school diploma 3) a high school diploma or some college and 4) at least a four-year degree. Two-tailed adjusted Wald tests were also run to test for significant differences between racial/ethnic groups.

Presenting the sample descriptives in this manner permits an evaluation of how family background characteristics of similarly educated respondents of different racial/ethnic groups vary. For example, for the first indicator in Table 12 ("Parent—Less than High School), the first cell indicates that for 10.4% of respondents, no parent has attained a high school diploma. However, when moving across columns within this row from left to right, it is clear that the parents of Hispanics have a significantly higher prevalence of not completing high school (31.7%) than both blacks (10.4%) and whites (6.64%). Furthermore, observing the rows below, it is clear that for all racial/ethnic groups, as respondent's educational attainment increases, the percentage of respondents' whose parents' highest level of education is less than a high school diploma decreases. For example, for whites (column 2), almost one-third (29.9%) of respondents with who did not graduate from high school also have parents whose highest level of educational attainment is less than a high school diploma. This percentage steadily decreases as the respondents level of educational attainment increases to 7.32% for whites with a high school diploma or some college and less than 1% among those with a four-year degree or higher. Racial/ethnic disparities for this indicator persist at every level of respondent educational attainment with blacks and Hispanics having less educated parents than

Whites. Below I discuss and describe patterns for parental socioeconomic status and family structure and relationships presented in Table 12.

Parental Socioeconomic Status

Parent's highest level of education. Nearly 90% of all respondents have at least one parent who graduated from high school, and over one-third (36.2%) of respondents have at least one parent who attained a four-year degree or higher. However, the parents of white respondents have higher levels of educational attainment than their black and Hispanic counterparts. While over 40% of whites have at least one parent with a four-year degree or higher, only 30% of blacks and 20% of Hispanics have similarly educated parents. The difference between whites and blacks, whites and Hispanics and blacks and Hispanics are all statistically significant ($p<.05$). Furthermore, nearly one-third (31.7%) of Hispanics grew up in a home in which no parent had graduated from high school compared to only 10.4% of blacks and 6.6% of whites.

When comparing respondents' level of educational attainment with parent's educational attainment, we see that higher levels of parental educational attainment are associated with higher levels of respondent's educational attainment for all racial/ethnic groups. However, large racial/ethnic disparities persist when comparing similarly educated whites, blacks and Hispanics with blacks and Hispanics having less educated parents at even at the highest levels of educational attainment. For example, among those with at least a four-year degree, less than 1% of whites and 2.3% of blacks report less than high school as their parent's highest level of education. However, nearly one in five

Hispanics (17.4%) with a four-year degree or higher report that the highest level of education attained by their parents is less than a high school diploma. Furthermore, among respondents who have attained this same level of education (a four-year degree or higher), nearly two-thirds (64.9%) of whites had at least one parent who also graduated from a college or university with a four-year degree. In comparison, more than half of blacks (53.1%) and only 36.6% of Hispanics indicate that they have at least one parent who had a four year degree or higher. The difference between blacks and whites, blacks and Hispanics, and whites and Hispanics are statistically significant. These descriptives indicate that the parents of white respondents are significantly more educated that the parents of blacks and Hispanics at every level of respondent's educational attainment.

Parent's welfare receipt. Nearly 15% of respondents' parents received government aid when the respondent was under the age of 18. This percentage varies significantly across race/ethnicity. While 10.5% of white respondents grew up in a household in which at least one parent received welfare, over one-quarter of blacks (27.6%) and over one-fifth of Hispanics (21.35%) grew up in a similar socioeconomic condition.

The percentage of respondents who report that their parents had received government aid decreases as respondent's educational attainment increases for all racial/ethnic groups, but as observed with parent's educational attainment, racial/ethnic disparities persist at nearly every level of educational attainment (with the exception of the less than high school category). For example, among respondents with a high school

diploma or some college, 12% of whites, 22.2% of Hispanics and almost one-third (30.8%) of blacks had a parent that received welfare. These racial/ethnic differences are all statistically significant. There are also significant racial/ethnic disparities among those with a four-year degree or higher (whites—3.5%, blacks—12.9%, Hispanics—14.5%); however, the difference between blacks and Hispanics is not statistically significant. In sum, whites resided in more financially advantaged homes than either blacks or Hispanics. This difference was statistically significant among respondents with the two highest levels of education (i.e. high school or some college and a four-year degree and above). For these educational categories, blacks are two-to-three times more likely to have grown up in a family that received government aid than whites.

Family Structure and Cohesion

Family Structure. This group of indicators gauges organizational aspects of the respondent's family during adolescence including the number of household residents, and whether one or two parents headed the family. For the entire sample, the average household size is 4.51 persons and nearly one-quarter of respondent (24.9%) resided in a home with only one residential parent. There are significant differences between blacks and whites, whites and Hispanics and blacks and Hispanics for both of these indicators. Hispanics report growing up in larger families (5.25 persons) than both blacks (4.75) and whites (4.33). Nearly half (48.3%) of blacks report growing up in a single-headed household, which is over two-times higher than the prevalence for whites (19.8%) and nearly two-times that for Hispanics (24.5%). The prevalence of both indicators (single-

parent family and household size) decreases for all racial/ethnic groups as educational attainment increases; however, significant racial/ethnic disparities persist.

Hispanics grow up in significantly larger families than whites do at *every* level of educational attainment with the average Hispanic household containing almost one more person than the average white household. Blacks reside in larger families than whites, but smaller families than Hispanics. However, the difference between blacks and whites is only statistically significant for those with a high school diploma and/or some college. The difference in household size between blacks and Hispanics is statistically significant among those with a high school diploma and some college and those with at least a four-year degree. Blacks are significantly more likely to live in a single-headed household than either whites or Hispanics at *every* level of education. This disparity is quite stark. For example, the prevalence of growing up in a single-parent family *decreases* as educational attainment increases for all racial/ethnic groups. Yet, at the highest level of educational attainment, the percentage of blacks residing in a single parent family during adolescence (38.6%) is *higher* than the prevalence of single parent families among Hispanics (31.6%) and whites (33.1%) *without a high school diploma*. (Over half (58.4%) of blacks without a high school diploma resided in a single-headed household).

Family Cohesion. Family cohesion indicators are intended to measure the respondent's perception of the closeness of his/her family during adolescence rather than the structure of the family. A family relationship scale was created using factor analysis. This scale uses four items: "How much do you feel…" 1) that your parents care about

you? 2) How much do you feel that your family understands you? 3) How much do you feel that you and your family have fun together? 4) How much do you feel that our family pays attention to you?" Responses vary from 1) not at all 2) very little 3) somewhat 4) quite a bit 5) very much. For the family relationship scale, higher scores represent increased familial intimacy. Since this variable is a factor, the family relationship scale is normalized to have a mean of zero and a standard deviation of one. The family relationship scale ranges from nearly three standard deviations below the mean (-2.95) indicating *low* family closeness to nearly one-and-a-half standard deviations above the mean (1.42). When all racial/ethnic groups are combined, respondents with higher levels of educational attainment report increased closeness/intimacy of family relationships. For example, for the entire sample, scores for the family relationship scale increase from -.05 for those with less than high school to -.02 and 0.16 for those with a high school diploma or some college and a four-year degree, respectively.

There are no significant racial/ethnic differences for the family closeness scale when all educational categories are combined. However, racial/ethnic disparities occur when comparing similarly educated respondents across racial/ethnic groups. Among respondents without a high school diploma and those with a high school diploma or some college, blacks report significantly higher levels of familial intimacy than whites However, this pattern reverses among whites and blacks with a four-year degree or higher with whites reporting higher levels of familial cohesion than blacks. Interestingly, the relationship between educational attainment and familial cohesion in adolescence is positive for both whites and Hispanics positive, but negative for blacks. For blacks,

reports of family intimacy are highest among those without a high school diploma and lowest among those with at least a four-year degree while the reverse is true for whites and blacks.

Family cohesion is also measured with a binary indicator of whether respondents went to a movie, play, museum, concert or sports event with a residential or non-residential parent within the last month of the date of interview. Nearly one in five (18.45%) of respondents did not report participation in any of these activities with a parent. This indicator of familial closeness significantly differs across race/ethnicity when all educational groups are combined wherein white respondents spend less time at these events with their parents than blacks or Hispanics. However, this relationship is only significant among those with the highest level of education with 78.5% of whites reporting recent engagement in these activities with their parents compared to 86.2% of blacks and 85% of Hispanics.

Summary. In general, white respondents are more likely to have grown up in two-parent, socioeconomically advantaged homes than blacks or Hispanics. Parents of Hispanic respondents have significantly lower levels of educational attainment than both blacks and whites and grow up in larger households. Blacks were significantly more likely than Hispanics and whites to grow up in households in families headed by one residential parent and in which at last one parent received welfare. Racial/ethnic disparities for these indicators are less pronounced among respondents without a high school diploma and more pronounced at higher levels of education.

Racial/ethnic differences in indicators of family intimacy are less clear. For example, blacks report significantly higher levels of familial intimacy than whites at lower levels of education do; however, among those with at least a four-year degree, whites report higher levels of familial intimacy than blacks. Interestingly these descriptives also indicate that the relationship between familial intimacy and educational attainment is positive for both whites and Hispanics (i.e. those with higher levels of familial cohesion in adolescence report higher levels of educational attainment in young adulthood) but negative for blacks. Furthermore, although whites with at least a four-year degree report the highest levels of familial closeness in adolescence, this group also had the lowest prevalence of spending time with a parent at a sporting event, museum, movie or play.

Table 12 suggests that Hispanics, blacks and whites experienced significantly different living conditions in adolescence. Now I will evaluate whether these disparate living environments contribute to differential health returns across race/ethnicity with multivariate logistic regression.

Logistic Regression Models

The analyses presented in this section test whether living conditions in adolescence contribute to racial/ethnic disparities in health returns to education. Tables 14, 16, and 18 present the results of multivariate logistic regression models for self-rated health, obesity and hypertension for 1) the combined sample 2) whites 3) blacks and 4)

Hispanics. The "high school/some college" category is the reference group for all analyses. An educational gradient is present when the odds of a health indicator for the "less than high school diploma" category and significantly *lower* than the odds of the "highs school/some college" category *and* the odds for the "four year degree and up" group are significantly *higher* than the odds for the "high school/some college" category. Living conditions in adolescence are expected to directly influence health indicators measured in young adulthood and through its impact on educational attainment.

The goal of this chapter is to evaluate whether living conditions in adolescence contribute to observed differential health returns to education across race/ethnicity in young adulthood. This requires a comparison of health returns to education across models that control for living conditions in adolescence and those that do not control for these indicators. Tables 15, 17 and 19 facilitate this discussion by presenting the odds ratios for the less than high school and four-year degree and up categories (with high school diploma/some college as the reference category) for 1) the entire sample 2) whites 3) blacks and 4) Hispanics. Model 1 (column 1) presents odds ratios from the cross-sectional relationship between educational attainment and health described in Chapter 4. Model 2 controls for demographic characteristics (gender, age, and foreign-born status) to Model 1. Model 3 adjusts for living conditions in addition to demographic controls.

Below I discuss, for each health outcome separately 1) whether there is an education-health gradient 2) significant predictors of health and how they vary across racial/ethnic groups and 3) how the education-health gradient changes after controlling for indicators of living conditions in adolescence.

Self-Rated Health. The clear educational gradient that was observed for self-rated health in the descriptive statistics and multivariate models and descriptive statistics presented in Chapter 4 persist after adjusting for demographic controls and indicators of living conditions in adolescence. For the combined sample (Table 14, column1), those without a high school diploma have over a two-fold higher odds of reporting fair or poor health compared to those with a high school diploma or some college (OR=2.219) net of demographic controls and indicators of living conditions in adolescence. Those with at least a four-year degree have over two-thirds lower odds of reporting fair or poor health compared to those with a high school diploma or some college (OR=0.426). Blacks obtain the highest health returns to a high school diploma or some college (OR=2.625). Hispanics do not obtain *any* health returns to a high school diploma or some college, but obtain *higher* health returns to a four-year degree or higher than whites and blacks. (Hispanics: OR=0.246; whites: OR=.377; blacks: OR=0.321).

Table 14 indicates that, net of individual educational attainment, living conditions in adolescence do not have much predictive power in determining the odds of poor self-rated health for the combined sample or for the separate racial/ethnic groups. For the combined sample, the family relationship scale was the only significant predictor of self-rated health in which higher levels of family cohesion were associated with lower levels of self-rated health (OR=0.793). In separate racial/ethnic group analysis, living conditions in adolescence influenced the odds of reporting fair/poor health only for

Hispanics. Several indicators of living conditions in adolescence are significantly associated with self-rated health for Hispanics; however, only one indicator of living conditions in adolescence are significantly associated with the self-rated health of whites and no indicators is significantly associated with this health indicator for blacks. For whites, increased family cohesion--as measured with the family relationship scale--is associated with a decrease in the odds of reporting fair or poor health (OR=0.772).

Hispanics whose parents' highest level of education is a high school diploma or some college have a 85.4% increase in the odds of reporting fair or poor health compared to Hispanics with parents who have completed at least a four-year degree (OR=1.854). Hispanics who grew up in a single parent family have 29.3% higher odds of reporting fair/poor health than Hispanics who grew up in two-parent households (OR=1.293). Interestingly, Hispanics who report that they had attended a sports event, concert, museum, movie or play with their parents as an adolescent have a two-fold increase in the odds of reporting fair or poor health compared to Hispanics who participate in such activities with their parents (OR=2.263).

Differential Health Returns to Education for Self-Rated Health: the role of living conditions. Table 15 begins to evaluate whether living conditions in adolescence contribute to observed differential health returns to education across race/ethnicity in young adulthood by presenting a comparison of health returns to education across models (i.e. those that control for living conditions and those that do not). Table 15 presents the odds ratios for the "less than high school" group and the "four-year degree and up" categories for 1) the entire sample 2) whites 3) blacks and 4) Hispanics. Model 1

controls only for educational attainment. Model 2 controls for demographic characteristics (age, gender, and nativity). Model 3 controls for living conditions in adolescence.

The first row of Table 14 (Model 1) shows that for the entire sample, those without a high school diploma have a nearly two-and-a-half increase in the odds of reporting fair/poor health compared to those without a high school diploma or some college (OR=2.42). Controlling for demographic characteristics does not alter this disadvantage for those without a high school diploma in Model 2 (OR=2.45). However, when living conditions in adolescence are added to the model (Model 3), health returns to a high school diploma or some college decreased (i.e. the disparity between these two groups decreases (OR=2.22). The reduction in the odds for the high school diploma or some college group suggests that living conditions in adolescence contributes to explaining health returns to a high school diploma or some college for self-rated health for the combined sample.

Looking by racial/ethnic group, controlling for living conditions in adolescence also decreases health returns to a high school diploma or some college for whites. In Model 1 (controlling only for educational attainment), whites without a high school diploma have nearly two times the odds of reporting fair or poor health than whites with a high school diploma or some college (OR=1.957). However, after controlling for living conditions in adolescence, the health advantage of whites with a high school diploma or some college decrease (OR=1.78). In contrast, health returns to a high school diploma or some college *slightly* increase after controlling for living conditions in adolescence for

blacks; the odds ratio for the ”less than high school” group is 2.53 without any controls and 2.63 after controlling for living conditions in adolescence. Hispanics do not obtain health returns to a high school diploma or some college for self-rated health.

For Hispanics, the odds of reporting fair or poor health decrease after controlling for demographics. In Model 1, the odds ratio for the “four-year degree and up” group is 0.243; however, after adjusting for demographics, the odds decrease to 0.339. After controlling for living conditions in adolescence, the health advantage for Hispanics with at least a four-year degree compares to those with a high school diploma or some college increases (OR=0.249).

Racial/Ethnic Differences across Models**.** The “racial/ethnic differences” portion of Tables 15, 17 and 19 (bottom portion) facilitate a discussion about whether living conditions in adolescence contribute to racial/ethnic disparities in health returns to education. This portion of the tables present the difference in health returns to education between 1) whites and blacks 2) whites and Hispanics and 3) blacks and Hispanics. The values presented in columns 1 through 3 present the difference in odds ratios for the levels of educational attainment (health returns to education) *within* models between two racial/ethnic groups. The letter following each value in every cell indicates which racial/ethnic group obtains *higher* health returns to that level of education for the model. (“W” for whites, “B” for blacks and “H” for Hispanics). For example, Table 15, column 1 (Model 1) presents the difference in odds ratios of reporting fair or poor health among those without a high school diploma and those with a high school diploma or some college in the model 1 between whites and blacks. The value “0.572” indicates that the

health returns to a high school diploma or some college is 57.2% higher for blacks than whites. The "B" indicates that blacks are the racial/ethnic group that are at an advantage in this comparison—blacks obtain *higher* health returns to a high school diploma or some college than whites for self-rated health. We can see this by looking in the table above: for blacks the odds ratio for this level of education is 2.53, for whites the odds ratio is 1.957.

Moving across to Model 2 (column 2), we see the black-white difference in health returns to a high school diploma or some college is barely changed when controlling for demographic characteristics (0.57 to 0.60). This difference increases after controlling for living conditions in adolescence to 0.846 (column 3). These results indicate that living conditions in adolescence modestly *magnify* racial/ethnic differences in health returns to education in the case of self-rated health.

Since Hispanics do not obtain significant health returns to a high school diploma or some college, I will not discuss white-Hispanics and black-Hispanic differences in health returns to education. However, for health returns to a four-year degree or above, adjusting for living conditions *marginally* increase white-black, white-Hispanic and black-Hispanic differences in health returns to education. The differences were largest for the black-Hispanic and white-Hispanic differences since controlling for living conditions in adolescence increase health returns to a four-year degree more for Hispanics than blacks or whites. This mirrors the results from the logistic regression results in that living conditions in adolescence were only significantly associates with the self-rated health of Hispanics.

Obesity. Because the prevalence of obesity is highest among those with a high school diploma or some college across all racial/ethnic groups, there is not a clear educational gradient for obesity when controlling for living conditions in adolescence for the combined sample or for separate racial/ethnic group analyses (Table 16). For the entire sample, those with a four-year degree or higher have 35.2% lower odds of obesity than someone with a high school diploma or some college (OR=0.648). There are no health returns to a high school diploma or some college for the combined sample. Hispanics obtain the highest health returns to a four-year degree or higher. Hispanics with at least a four-year degree have nearly 52.8% lower odds of obesity than their counterparts with a high school diploma or some college (OR=0.472). Whites with a four-year degree or higher have 38.2% lower odds of obesity compared to their counterparts with a high school diploma or some college (OR=0.618). Whites are the only racial/ethnic group to obtain a significant "health deficit" to a high school diploma or some college. Whites without a high school diploma have 22.8% lower odds of obesity than whites with a high school diploma or some college. In contrast, blacks do not obtain health returns to *any* level of education (OR=0.772).

As we observed in the case for self-rated health, living conditions for not have a lot of explanatory power in predicting the odds of obesity. For the combined sample, no indicator of living conditions in adolescence is significantly associated with obesity when individual educational attainment is included in the model. For separate racial/ethnic group analyses, living conditions in adolescence are not significantly associated with the

odds of obesity for whites, and no indicators of parental socioeconomic status are significantly associated with the odds of obesity for any racial/ethnic group. However, some indicators of family organization are significant for blacks and Hispanics. For blacks, each additional household member above the average household size is associated with an 8.1% decrease in the odds of obesity (OR=0.919). Hispanics who grew up in single parent families during adolescence have two times the risk of obesity (OR=2.01) compared to Hispanics who grew up in a household with two married residential parents or no residential parents.

For the combined sample, women have 20.2% higher odds of obesity than men. This gender difference was driven by blacks since gender was only significantly associated with the odds of obesity for this racial/ethnic group net of respondent's own educational attainment. Black women have almost twice the odds of obesity than black males (OR=1.879). Age is also a significant predictor of obesity for blacks and whites only; however, older age is associated with *higher* odds of obesity for whites and *lower* odds of obesity for blacks. For blacks, the odds of obesity *decrease* by 14.5% for every one-year increase in age above the mean age (28 years). For whites, the odds of obesity *increase* by 7.8% for every one-year increase in age above the mean age.

Differential Health returns to Education for obesity: the role of living conditions: Because 1) whites are the only group in which the odds of obesity significantly varies between those without a high school diploma and those with a high school diploma or some college and 2) blacks do not obtain significant health returns to a four-year degree or higher, I will only discuss how adjusting for living conditions in adolescence

contributes to racial/ethnic differences in health returns to education for whites and Hispanics with at least a four-year degree. The odds of obesity among those without a high school diploma compared to those with a high school diploma or some college decreases after controlling for living conditions in adolescence for all racial/ethnic groups (Table 17, Model 3); however only whites obtain significant health returns to this credential. When only demographic controls are present, the odds of obesity for whites without a high school diploma is 20.8% lower than the odds for whites with a high school diploma or some college (OR=0.792); however this difference is not statistically significant at traditional cut-off levels ($p<.10$). After controlling for living conditions in adolescence this difference is significant and the odds of obesity for whites without a high school diploma is now 22.8% lower than whites with a high school diploma or some college.

Whites and Hispanics obtain significant health returns to a four-year degree or higher and adjusting for living conditions in adolescence *slightly* decreases health returns to this credential for both groups. For example, whites with at least a four-year degree have 40.8% lower odds of obesity compared to whites with a high school diploma or some college when adjusting for only age, gender and nativity (OR=0.592). After controlling for living conditions in adolescence, whites with a four-year degree or higher have 38.2% lower odds of obesity than their counterparts with a high school diploma (OR=0.618). Adjusting for living conditions in adolescence did little to alter racial/ethnic differences in health returns to education for obesity. Comparing Model 1 to Model 3 (in

Table 17) we observe that adjusting for health returns has a small influence on white-Hispanic differences in health returns to a four-year degree or higher.

Hypertension. Table 16 indicates that when all racial/ethnic groups are combined, there are only health returns to a four-year degree or higher. Young adults with at least a four-year degree have 73.4% lower odds of hypertension than those with a high school diploma or some college. After controlling for living conditions in adolescence for separate racial/ethnic group analyses, there is not a clear educational gradient for hypertension for any racial/ethnic group. Whites are the only group to obtain health returns to a four-year degree. Whites with at least a four-year degree have 28.7% lower odds of hypertension than those with high school diploma or some college (OR=0.713). Rather than obtaining a health return, Hispanics are the only racial/ethnic group to experience a "health deficit" to higher levels of education for hypertension. Hispanics *without* a high school diploma have nearly half the odds of hypertension than those with a high school diploma or some college (OR=0.524). Educational attainment is not significantly associated with hypertension for blacks.

When all racial/ethnic groups are combined, respondents who reported growing up in a single parent family have 26% higher odds of hypertension compared to those who were in a two-parent household (OR=1.26). None of the indicators of parental socioeconomic status is significantly associated with hypertension for any racial/ethnic group. This is also true of indicators of family structure and cohesion with the exception of the family relationship scale for whites, and this indicator is operating in the opposite

direction than hypothesized. Interestingly, whites who report *more* familial closeness have *higher* odds of hypertension (OR=1.171).

Women have significantly lower levels of hypertension for the combined sample and across all racial/ethnic groups in separate racial/ethnic group analysis. For the combined sample, women have 73.4% lower odds of hypertension than men (OR=0.266). Hispanic women have the largest advantage over men than any other racial/ethnic group. Hispanic women have 79.3% lower odds of hypertension than Hispanic men. The gender difference is less pronounced among Blacks but is still quite sizeable, with black women having 66.9% lower odds of obesity than black men (OR=0.331). Being born outside of the U.S. is particularly advantageous for the odds of hypertension for blacks.

Differential Health Returns for Hypertension: the role of living conditions. Living conditions in adolescence influence differential health returns for hypertension by moderating the relationship between education and health so that 1) Hispanics are the only racial/ethnic group to obtain health returns to a high school diploma or some college and 2) Whites are the only racial/ethnic group to obtain significant health returns to a four-year degree or higher after controlling for living conditions in adolescence (Table 19). In contrast, living conditions in adolescence do not moderate the relationship between educational attainment and hypertension for blacks; blacks do not obtain health returns to education when adjusting for living conditions in adolescence.

Summary

When controlling for living conditions in adolescence, the education-health gradient are largely unchanged across racial/ethnic groups compared to those estimated in Chapter 4. Hispanics obtain the highest health returns to a four-year degree for both self-rated health and obesity. Blacks obtain the highest health returns to a high school diploma or some college for self-rated health, and do not obtain significant health returns to education for any other health indicator. Whites are the only racial/ethnic group to obtain health returns to a four-year degree for hypertension.

In many cases, net of individual educational attainment, indicators of living conditions in adolescence—especially parental socioeconomic status indicators—were *not* significantly associated with health indicators. Analysis suggests that indicators of parental socioeconomic status and family structure and cohesion in adolescence influence poor health indicators when educational attainment is omitted from the model (results not shown). This indicates that living conditions in adolescence influence health returns to education through the respondent's one educational attainment so that those from families with more social and economic resources are more likely to obtain higher levels of education. In particular, there is a "stickiness" of parental educational attainment whereby young adults tend to obtain the same level of education as their parents, and this propensity of young adults to obtain the same level of education as their parents is strongest for whites.

Although there were considerable racial/ethnic and socioeconomic differences in parental socioeconomic status, family structure and cohesion measures were more predictive of health outcomes than indicators of parental socioeconomic status. The family structure and cohesion variables had more explanatory power across racial/ethnic groups and health indicators. Increased family cohesion as measured by the family relationship scale was significantly associated with an *increase* of hypertension and a decrease in fair/poor self-rated health for whites. Growing up in a single parent family was significantly associated with higher odds of *all* health indicators for Hispanics. None of these indicators except household size was significantly associated with health for blacks; larger households were associated with lower odds of obesity for this racial/ethnic group.

In terms of their impact on differential health returns to education, controlling for living conditions in adolescence *widen* racial/ethnic disparities in health returns to education by moderating the relationship between the "less than high school" group and health differentially across racial/ethnic groups. For example, for health returns to a high school diploma or some college, when adjusting for demographic characteristics, the odds ratio associated with reporting fair or poor health among those without a high school diploma is 1.96 for whites and 2.53 for blacks. These odds ratios decrease after controlling for living conditions for both blacks and whites; however the odds ratio is reduced more so for whites (OR=1.78) than for blacks (OR=2.58), modestly increasing the gap in health returns to a high school diploma or some college between whites and

blacks. This indicates that, as aforementioned, living conditions in adolescence are more consequential for the self-rated health of whites than blacks or Hispanics.

Adjusting for living conditions in adolescence also widens differential health returns to education for obesity and hypertension. No racial/ethnic group obtained health returns to a high school diploma or some college for obesity when adjusting for demographics. However, after controlling for living conditions in adolescence, whites obtain health returns to a high school diploma or some college. A similar result is observed for Hispanics. For hypertension, no racial/ethnic group obtains health returns to a high school diploma or some college when adjusting for demographic characteristics. However, after controlling for living conditions in adolescence, Hispanics are the only racial/ethnic group to obtain health returns to a high school diploma or some college for hypertension.

Further analysis suggests that the relationship between living conditions, educational attainment and health varies by race/ethnicity, level of education and health indicator. For example, for whites, there is a stronger relationship between living conditions in adolescence and the lower levels of educational attainment than the higher levels. The relationship between living conditions and health indicators are also stronger for whites than blacks and Hispanics. These differences may contribute to the observed divergences in how living conditions in adolescence influence health returns to education across race/ethnicity and level of education. For example, for whites controlling for learning conditions in adolescence increase health returns to a high school diploma or some college, but decreases returns to a four-year degree. For blacks and Hispanics,

controlling for living conditions in adolescence does not have a large impact on health returns to educational attainment. After controlling for living conditions in adolescence, the relationship between a four-year degree and self-rated health increase for Hispanics and slightly decrease the association between a four-year degree and obesity for Hispanics. No sizeable differences in health returns to education were seen for blacks.

	All *n=8,601*	**White** *n=5,209*	**Black** *n=1,952*	**Hispanic** *n=961*
Parental Socioeconomic Status				
Parent—Less than High School				
All	10.38 (0.305)	6.64[c] (0.230)	10.43[c] (0.362)	31.71[a,b] (0.534)
Less than High School	31.56% (0.429)	29.96[c] (0.402)	20.99[c] (0.393)	49.50[a,b] (0.507)
High School/Some College	11.44 (0.316)	7.32[c] (0.239)	11.71[c] (0.369)	32.42[a,b] (0.538)
Four-Year Degree & Up	2.34 (0.156)	0.75[b,c] (0.082)	2.29[a,c] (0.207)	17.37[a,b] (0.455)
Parent—High School/Some College				
All	53.37 (0.499)	52.92 (0.461)	59.63[c] (0.581)	48.05[b] (0.573)
Less than High School	57.49 (0.457)	58.79 (0.432)	64.62[c] (0.461)	44.67[b] (0.504)
High School/Some College	61.71 (0.48)	63.52[c] (0.441)	64.16[c] (0.549)	49.25[a, b] (0.575)
Four-Year Degree & Up	36.51 (0.49)	34.32[b,c] (0.453)	44.58[a] (0.686)	46.02[a] (0.599)
Parent—College Degree & Above				
All	36.24 (0.481)	40.44[b,c] (0.454)	29.93[a,c] (0.542)	20.24[a,b] (0.461)
Less than High School	10.95 (0.289)	11.25 (0.277)	14.39 (0.338)	5.83 (0.238)
High School/Some College	26.84 (0.439)	29.15[c] (0.416)	24.13 (0.491)	18.33[a] (0.445)
Four-Year Degree & Up	61.15 (0.504)	64.92[b,c] (0.455)	53.12[a,c] (0.688)	36.61[a,b] (0.579)
Parent—Welfare Receipt				
All	14.54 (0.352)	10.45[b,c] (0.282)	27.58[a,c] (0.529)	21.35[a,b] (0.470)
Less than High School	32.78 (0.432)	31.07 (0.402)	41.51 (0.482)	28.16 (0.449)
High School/Some College	16.62 (0.369)	12.02[b,c] (0.297)	30.82[a,c] (0.529)	22.18[a,b] (0.484)
Four-Year Degree & Up	5.50 (0.236)	3.49[b,c] (0.175)	12.85[a] (0.460)	14.54[a] (0.429)

Continued

Table 12. Sample Descriptives of Living Conditions in Adolescence by Race/Ethnicity and Educational Attainment—Percentages (Standard Deviation)

Table 12 continued

	All *n=8,601*	**White** *n=5,209*	**Black** *n=1,952*	**Hispanic** *n=961*
Family Structure & Relationships				
Household Size				
All	4.511 (1.538)	4.328[b,c] (1.20)	4.75[a,c] (2.236)	5.25[a,b] (2.235)
Less than High School	4.773 (1.83)	4.516[c] (1.45)	4.914 (1.916)	5.387[a] (2.62)
High School/Some College	4.550 (1.60)	4.313[b,c] (1.24)	4.898[a,c] (2.27)	5.309[a,b] (2.23)
Four-Year Degree & Up	4.358 (1.27)	4.307[c] (1.08)	4.22[c] (1.95)	5.017[a,b] (1.85)
Single Parent Family				
All	24.94 (0.432)	19.84[b] (0.369)	48.27[a,c] (0.591)	24.49[a,b] (0.494)
Less than High School	38.56 (0.448)	33.12[b] (0.411)	58.39[a,c] (0.478)	31.62[b] (0.464)
High School/Some College	27.75 (0.445)	22.33[b] (0.381)	50.17[a,c] (0.572)	26.59[b] (0.511)
Four-Year Degree & Up	16.62 (0.386)	13.49[b] (0.326)	38.64[a,c] (0.669)	15.51[b] (0.438)
Family Relationship Factor				
All	0.035 (0.848)	0.019 (0.769)	0.076 (1.056)	0.073 (1.009)
Less than High School	-0.048 (1.03)	-0.136[b] (0.935)	0.142[a] (1.14)	-0.003 (1.15)
High School/Some College	-0.017 (1.01)	-0.064[b,c] (0.918)	0.089[a] (1.189)	0.081[a] (1.185)
Four-Year Degree & Up	0.162 (0.915)	0.183[b] (0.829)	0.056[a] (1.29)	0.116 (0.108)
Activities with Parents				
All	18.41% (0.388)	19.43%[b, c] (0.366)	15.86%[a] (0.432)	15.84%[a] (0.419)
Less than High School	13.83 (0.316)	14.63 (0.308)	11.34 (0.304)	13.95 (0.344)
High School/Some College	18.49 (0.385)	19.14 (0.360)	17.53 (0.434)	16.39 (0.428)
Four-Year Degree & Up	19.62 (0.412)	21.05[b,c] (0.390)	13.08[a] (0.467)	15.00[a] (0.429)

[a] significantly different than whites, [b] significantly different than blacks, [c] significantly different than Hispanics (all significant levels at least greater than .05).

Items	Factor Loading
"How much do you feel that your parents care about you?"	0.597
"How much do you feel that your family understands you?"	0.782
"How much do you feel that you and your family have fun together?"	0.814
"How much do you feel that your family pays attention to you?"	0.844
% of variance	*58.54*
Maximum value	*-2.95*
Minimum value	*1.42*

Table 13. Factor Loadings for Family Cohesion Items Using Principal Component Factor Analysis with Varimax Rotation

	All *n=8,601*	**White** *n=5,209*	**Black** *n=1,952*	**Hispanic** *n=961*
Intercept	0.056*** (0.339)	0.152** (0.716)	0.004*** (0.737)	0.128* (0.608)
Less than High School	**2.219**** (0.291)	**1.779*** (0.232)	**2.625**** (0.357)	**0.705** (0.399)
Four-Year Degree & Up	**0.426**** (0.270)	**0.377***** (0.269)	**0.321***** (0.326)	**0.249***** (0.264)
Female	1.165 (0.126)	1.142 (0.139)	1.284 (0.254)	0.985 (0.176)
U.S. Born	1.185 (0.126)	0.614 (0.609)	18.244***[6] (0.633)	1.640*** (0.176)
Age	0.019 (0.071)	1.048 (0.043)	1.003 (0.078)	0.939 (0.054)
Parental Socioeconomic Status				
Parent-Less than H.S.	0.951 (0.229)	0.915 (0.321)	0.827 (0.506)	1.396 (0.189)
Parent-H.S./Some College	0.933 (0.135)	0.859 (0.177)	0.815 (0.317)	1.854* (0.214)
Parent-Welfare Recipient	1.287 (0.199)	1.228 (0.226)	1.306 (.259)	1.004 (0.189)
Family Structure & Relationships				
Household Size *(grand mean centered)*	1.095 (0.039)	1.013 (0.063)	1.113 (0.068)	1.046 (0.044)
Single Parent Family	1.059 (0.149)	1.107 (0.261)	0.876 (0.223)	1.293* (0.097)
Family Relationship Scale *(grand centered)*	0.793** (0.071)	0.772* (0.106)	0.832† (0.097)	0.756† (0.113)
Cultural Activities w/Parent	0.834 (0.139)	0.729 (0.219)	0.869 (0.299)	2.263* (0.260)

Table 14. Logistic Regression: Living Conditions on Health Returns to Education for Reporting Fair or Poor Health—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

[6] There is a small sample size of foreign born blacks (n=19).

	Model 1 (Only Edu)	**Model 2** (Edu + Demog)	**Model 3** (Dem + Living Cond)
Less than High School			
All	2.421** (0.272)	2.453*** (0.267)	2.219** (0.291)
White	1.957*** (.181)	1.974*** (0.181)	1.779* (0.232)
Black	2.529** (.318)	2.574** (0.317)	2.625** (0.357)
Hispanic	0.702 (.648)	0.806 (0.453)	0.705 (0.399)
Four-Year Degree & Up			
All	0.404*** (0.249)	0.401*** (0.239)	0.426** (0.270)
White	0.360*** (.266)	0.361*** (0.254)	0.377*** (0.269)
Black	0.327*** (.264)	0.314*** (0.249)	0.321*** (0.326)
Hispanic	0.243* (.569)	0.339*** (0.261)	0.249*** (0.264)
Racial/Ethnic Differences			
Less than High School			
White vs. Black	0.572 (B)	0.60 (B)	0.846 (B)
White vs. Hispanic	1.255 (W)	1.168 (W)	1.074 (W)
Black vs. Hispanic	1.827 (B)	1.768 (B)	1.920 (B)
Four-Year Degree & Up			
White vs. Black	0.033 (B)	0.047 (B)	0.056 (B)
White vs. Hispanic	0.117 (H)	0.022 (H)	0.128 (H)
Black vs. Hispanic	0.084 (H)	0.025 (B)	0.072 (H)

Table 15. Racial/Ethnic Differences in Health Returns to Education for Self-Rated Health--Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

(B) indicates blacks have higher returns, (H) indicates Hispanics have higher returns and (W) indicates Whites have higher returns

	All *n=8,601*	**White** *n=5,209*	**Black** *n=1,952*	**Hispanic** *n=961*
Intercept	0.507** (0.232)	0.722 (0.429)	0.685 (0.444)	0.639 (0.463)
Less than High School	**0.896** (0.173)	**0.772*** (0.115)	**0.727** (0.257)	**0.748** (0.239)
Four-Year Degree & Up	**0.648***** (0.074)	**0.618***** (0.104)	**0.707** (0.236)	**0.472***** (0.195)
Female	1.202* (0.068)	0.984 (0.093)	1.879*** (0.142)	1.151 (0.336)
U.S. Born	1.053 (0.168)	0.868 (0.396)	1.315 (0.447)	0.986 (0.163)
Age	1.039 (0.025)	1.078** (0.026)	0.855*** (0.048)	0.937 (0.098)
Parental Socioeconomic Status				
Parent-Less than H.S.	1.125 (0.119)	0.944 (0.163)	1.314 (0.247)	0.781 (0.357)
Parent-H.S./Some College	1.192† (0.091)	1.143 (0.119)	1.339 (0.183)	0.931 (0.342)
Parent-Welfare Recipient	0.989 (0.100)	1.081 (0.145)	1.113 (0.164)	1.055 (0.225)
Family Structure & Relationships				
Household Size *(grand mean centered)*	1.007 (0.022)	1.003 (0.032)	0.919** (0.032)	1.050 (0.055)
Single Parent Family	1.071 (0.116)	1.253 (0.149)	0.725† (0.176)	2.009*** (0.123)
Family Relationship Scale *(grand mean centered)*	1.005 (0.048)	1.002 (0.124)	1.002 (0.124)	1.087 (0.109)
No Cultural Activities w/Parent	0.973 (0.110)	0.927 (0.234)	0.927 (0.234)	1.314 (0.325)

Table 16. Logistic Regression: Living Conditions on Health Returns to Education for Obesity—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; †p<.10

	Model 1 (Only Edu)	**Model 2** (Demog)	**Model 3** (Dem + Living Cond)
Less than High School			
All	0.903 (0.169)	0.915 (0.170)	0.896 (0.173)
White	0.793† (0.126)	0.792† (0.127)	0.772* (0.115)
Black	0.679 (0.262)	0.738 (0.247)	0.727 (0.257)
Hispanic	0.769 (0.215)	0.781 (0.207)	0.748 (0.239)
Four-Year Degree & Up			
All	0.623*** (0.069)	0.621*** (0.067)	0.648*** (0.074)
White	0.581*** (0.121)	0.592*** (0.097)	0.618*** (0.104)
Black	0.837 (0.184)	0.713† (0.204)	0.707 (0.236)
Hispanic	0.456*** (0.201)	0.444*** (0.224)	0.472*** (0.195)
Racial/Ethnic Differences			
Less than High School			
White vs. Black	0.113 (B)	0.054 (B)	0.450 (B)
White vs. Hispanic	0.024 (H)	0.011 (H)	0.024 (H)
Black vs. Hispanic	0.09 (H)	0.043 (B)	0.021 (H)
Four-Year Degree & Up			
White vs. Black	0.256 (B)	0.121 (B)	0.089 (B)
White vs. Hispanic	0.125 (H)	0.148 (H)	0.146 (H)
Black vs. Hispanic	0.381 (H)	0.269 (H)	0.235 (H)

Table 17. Racial/Ethnic Differences in Health Returns to Education for Obesity

***p<.001; **p<.01; *p<.05; †p<.10

(B) indicates blacks have higher returns, (H) indicates Hispanics have higher returns and (W) indicates Whites have higher returns

	All *n=8,601*	**White** *n=5,209*	**Black** *n=1,952*	**Hispanic** *n=961*
Intercept	0.183*** (0.441)	0.189* (0.839)	0.013** (0.125)	0.071*** (0.669)
Less than High School	**1.042** (0.185)	**1.278** (0.228)	**0.782** (0.330)	**0.524*** (0.317)
Four-Year Degree & Up	**0.789** (0.165)	**0.713*** (0.144)	**0.789** (0.583)	**1.387** (0.285)
Female	0.266*** (0.130)	0.257*** (0.158)	0.331*** (0.159)	0.207*** (0.251)
U.S. Born	1.202 (0.312)	1.875 (0.748)	11.25** (0.901)	1.945† (0.371)
Age	1.019 (0.034)	1.035 (0.042)	1.085† (0.047)	1.065 (0.130)
Parental Socioeconomic Status				
Parent-Less than H.S.	1.188 (0.209)	0.885 (0.269)	1.068 (0.0497)	2.213† (0.412)
Parent-H.S./Some College	1.240 (0.169)	1.085 (0.167)	1.167 (0.353)	1.074 (0.398)
Parent-Welfare Recipient	1.004 (0.184)	0.979 (0.235)	1.216 (0.303)	1.099 (0.270)
Family Structure and Relationships				
Household *Size (grand mean centered)*	1.023 (0.042)	0.932 (0.051)	1.097 (0.103)	1.098† (0.054)
Single Parent Family	1.260* (0.092)	1.303† (0.152)	1.311† (0.144)	1.375 (0.301)
Family Relationship Scale *(grand mean centered)*	1.009 (0.059)	1.171* (0.081)	0.965 (0.135)	0.954 (0.094)
Cultural Activities w/Parent	1.042 (0.157)	1.106 (0.173)	1.203 (0.255)	1.899 (0.420)

Table 18. Logistic Regression: Living Conditions on Health Returns to Education for Hypertension—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; †p<.10

	Model 1 (Only Educ)	**Model 2** (Demog)	**Model 3** (Dem + Living Cond)
Less than High School			
All	1.079 (0.169)	1.104 (0.200)	1.042 (0.185)
White	1.326 (0.269)	1.238 (0.263)	1.278 (0.228)
Black	0.936 (0.341)	0.841 (0.372)	0.782 (0.330)
Hispanic	0.837 (0.297)	0.728 (0.312)	0.524* (0.317)
Four-Year Degree & Up			
All	0.594*** (0.141)	0.724* (0.149)	0.789 (0.165)
White	0.659** (0.150)	0.709* (0.146)	0.713* (0.144)
Black	0.569 (0.544)	0.688 (0.491)	0.789 (0.583)
Hispanic	1.120 (0.389)	1.552 (0.241)	1.387 (0.285)
Racial/Ethnic Differences			
Less than High School			
White vs. Black	0.390 (B)	0.397 (B)	0.496 (B)
White vs. Hispanic	0.489 (H)	0.510 (H)	0.754 (H)
Black vs. Hispanic	0.099 (H)	0.113 (H)	0.258 (H)
Four-Year Degree & Up			
White vs. Black	0.090 (W)	0.021 (W)	0.076 (B)
White vs. Hispanic	0.461 (H)	0.843 (H)	0.674 (H)
Black vs. Hispanic	0.551 (H)	0.864 (H)	0.598 (H)

Table 19. Racial/Ethnic Differences in Health Returns to Education for Hypertension

$^{***}p<.001$; $^{**}p<.01$; $^{*}p<.05$; $^{\dagger}p<.10$

(B) indicates blacks have higher returns, (H) indicates Hispanics have higher returns and (W) indicates Whites have higher returns

Chapter 6: Learning Conditions and Health Returns to Education

Research indicates that psychosocial resources and cognitive skills contribute to health returns to education by mediating the relationship between educational attainment and health (Mirowsky & Ross 1998; Mirowsky & Ross 2003). Formal schooling endows students with "cognitive assets" (Lantz et al. 2001) and improves problem-solving capabilities by developing communication skills, logic and the ability to observe, synthesize, interpret and summarize data (Mirowsky and Ross 1998). Ross and Mirowsky claim that the process of working through increasingly complex problems develops "learned effectiveness" (2003). Learned effectiveness enables individuals to meet problems with attention, effort and perseverance and is crucial for managing a variety of life events such as timing of sexual debut (Hansson, Myers & Ginsburg 1987; Plotnick 1992), coping with involuntary job loss (Price, Choi and Vinokur 2002) and initiating preventive health care (Seeman and Seeman 1983).

Mirowsky and Ross find that learned effectiveness influences health returns to educational attainment by *mediating* the relationship between education and health. Using the Survey of Aging, Status and Sense of Control (ASOC), these authors find that learned effectiveness accounts for approximately 45% of education's effect on health

behaviors and 37% of education's effect on physical functioning in adulthood (Mirowsky & Ross 1998).

Learned effectiveness can contribute *to racial/ethnic disparities* in health returns to education in two ways: 1) racial/ethnic minorities may have lower levels of learned effectiveness and/or 2) race/ethnicity may moderate the mediating role of learned effectiveness so that the education-learned effectiveness-health pathway is stronger for some racial/ethnic groups than other groups. In the first situation, adjusting for learned effectiveness should narrow racial/ethnic disparities in health returns to education. In the latter situation, we would not expect these racial/ethnic disparities to narrow since some racial/ethnic groups may need to obtain higher levels of learned effectiveness than other racial/ethnic groups to obtain similar health returns to education.

In a sample of young adults from the National Longitudinal Study of Young Adults (NLSY), Ross and Mirowsky find that blacks have lower levels of learned effectiveness than whites, lending support to the notion that black-white disparities in learned effectiveness may contribute to racial/ethnic inequalities in health returns to education (Lewis, ross and Mirowsky 1999). Other research supports the second situation and indicates that the education-learned effectiveness-health pathway is weaker for some racial/ethnic groups. For example, Mirowsky and Ross find that the relationship between educational attainment and health is weaker for racial/ethnic minorities (2007). Shaw and Krause (2001) find that, for blacks, personal sense of control is not associated with educational attainment. Finally, Read and Gorman (2006) find that health behaviors—which Mirowsky and Ross find are largely influenced by

learned effectiveness—mediate the relationship between education and health more so for whites than blacks and Hispanics.

While Ross and Mirowsky have not attempted to explain racial/ethnic differences in the education-learned effectiveness-health pathway, they do hypothesize how socioeconomic disparities in learned effectiveness are created and reproduced. These scholars suggest that schools that serve socioeconomically disadvantaged students implement less rigorous curricula than schools that serve socioeconomically advantaged students. As a result, these scholars hypothesize that the socioeconomically advantaged children will develop higher levels of learned effectiveness due to their engagement with more difficult school curricula.

While Ross and Mirowsky advance this hypothesis as a way to explain *socioeconomic* disparities in learned effectiveness, I contend that this hypothesis also has consequences for *racial/ethnic* disparities in health returns to education due to racial/ethnic disparities in socioeconomic resources and school quality. While empirical evidence has not linked racial/ethnic differences in l*earned effectiveness* to inequalities in school quality, research has found that narrowing racial/ethnic differences in school quality can reduce racial/ethnic health disparities in adulthood. For example, Frisvold and Golberstein (2010) find that black-white disparities in Body Mass Index (BMI), self-rated health and disability in adulthood are mitigated when black-white differences in primary and secondary school quality are made equal.

Mirowsky and Ross' hypothesis regarding the creation and reproduction of socioeconomic disparities in learned effectiveness provides the motivation for this

chapter, which tests whether learning conditions in adolescence (i.e. school quality and individual experiences within the school environment) contribute to explaining racial/ethnic disparities in health returns to education. I also test how learning conditions are associated with health outcomes in young adulthood after adjusting for living conditions in adolescence and young adulthood.

This chapter is categorized into four sections. The first section provides the operationalization of learning conditions in adolescence measured during Waves I and II of Add Health data collection and living conditions in young adulthood, which are measured during Wave IV contemporaneously with health outcomes. Next, I discuss the distribution of these indicators in Tables 21 and 22 and indicate whether learning conditions in adolescence and living conditions in young adulthood significantly vary by race/ethnicity and/or level of educational attainment.

The third section of this chapter presents results from multi-level logistic regression models, for each health indicator separately. In each separate section, the first model tests whether school and individual-level learning conditions in adolescence moderate the relationship between educational attainment and health (Tables 23, 27, 31). The second model adds indicators of living conditions in young adulthood to the previous model to test whether socioeconomic status and family relationships in young adulthood influence the relationship between educational attainment and health net of learning conditions in adolescence (Tables 24, 28, 32). The final model adds the indicators of living conditions in adolescence discussed in Chapter 5 to the previous model to examine

whether socioeconomic background and family relationships in adolescence influence the relationships between educational attainment and health (Tables 25, 29, 33).

To provide a clearer assessment of whether living and learning conditions during the transition from adolescence to young adulthood are associated with racial/ethnic health returns to education, the last section of this chapter presents a compilation of the odds ratios of educational categories across four models (Tables 26, 30, 34).

Measuring Learning Conditions in Adolescence

Learning conditions include both individual and school-level indicators. Individual-level educational experiences for this analysis are captured by three scales created via principal component factor analysis from a series of eight questions about respondents' perceptions of and experiences with schoolwork, teachers, students and the general school environment (α=.774). Three of the eight items ask *how often* students have difficulty with schoolwork and teachers. For these items, responses include (1) never, (2) just a few times, (3) about once a week, (4) almost every day, and (5) every day. The remaining five items ask students how they perceive relationships with peers, students and the general school environment. For these items, responses ranges from (1) strongly agree to (5) strongly disagree. Higher scores indicate less desirable experiences with school content and/or teachers and peers. The survey questions, factors and factor loadings are detailed in Table 20.

To arrive at the three different scales that capture individual-level learning conditions, I use exploratory factor analysis to assess how these factors are correlated with one another. The items used to operationalize individual-level learning conditions must correlate highly with a group of other variables while correlating very poorly with variables outside that group to distinctive "factors", an underlying variable that these items are attempting to measure (Field 2000). Next, I use the Kaiser-Guttman criteria and analyze the scree plot to determine the factor structure. As a result of these analyses, three factors emerged which cumulatively explain 73.83% of the variation. All items load on one factor with a factor loading of at least .62 or greater and load on factors in a manner that makes conceptual sense. For example, items 4, 5, 6 and 7 gauge school integration and load on one factor that explains 28.8% of the variance in this scale. Items 1 and 7 are concerned with teacher-student relationships and load on another separate factor that explains 26.2% of the variance in this scale. Finally, items 2 and 3 measure engagement with schoolwork and compromise the third final factor which explains 18.9% of the variability in this scale. These three factors are named: "school integration" (factor1), "teacher-student interaction" (factor 2) and "schoolwork" (factor 3). Since these scales are created via factor analysis, the mean of all scales is approximately zero. Table 6.1 presents the maximum and minimum value of each scale.

Since research indicates that the home environment is a vital component of educational success (see Fan & Chen, 2001 for a review), parental educational involvement is included as a component of learning conditions in adolescence. Respondents were asked the following: *"Which of the following things listed on this card*

have you done with your parents in the past four weeks?" (1) talked about your grades (2) worked on a project for school (3) talked about other things you are doing in school. I create a dichotomous indicator in which respondents who reported doing *none* of these activities with either a residential or non-residential parent are used as the reference group compared to respondents who report doing at least one of these activities with their parents. Finally an ordinal measure of educational expectations completes the operationalization of individual-level learning conditions in adolescence in which respondents indicate how likely it is that they will go to college. Responses to this item range from (1) not very likely to (5) very likely. Higher values indicate high expectations to attend college. The mean for this item is 4.14 indicating that respondents are fairly optimistic in gauging their likelihood of attending a postsecondary institution.

Institutional-level learning conditions indicators are measured at the school-level during the first wave of data collection via school administrator surveys during the 1994 to 1995 school year. Basic characteristics include urbanicity (rural, suburban or rural), affiliation (public or private), size (small/medium versus large) and whether 2/3 of the student body were white. I use Add Health's coding scheme and classify schools with more than 775 students as "large" institutions. These large schools are the reference category for analysis compared to schools with fewer than 775 students. Teacher quality, parental involvement in school, academic preparation, and class size are used to capture school quality. Teacher quality is operationalized as the percent of new teachers without previous teaching experience and the percent of faculty with a Master's degree or above. The percent of inexperienced teachers at the school level varies from 0% to 99% across

schools in this data. The percent of faculty with a Master's degree or above varies from 0% to 95%. Parental involvement in school is measured by the percentage of parents who participate in the school's Parent-Teacher Association. The lowest reported parent participation in the PTA is 9.1% while the highest is 90.9%. The percentage of 12th grade students enrolled in college preparatory English course is used to operationalize academic preparation; this indicator ranges from 0 to 100%. All school quality variables are grand mean centered and are measured by the school administrator through the school administrator surveys during the first wave of data collection.

Measuring Living Conditions in Young Adulthood

Living conditions in young adulthood are measured during Wave IV of data collection and are organized into three categories: (1) socioeconomic status (2) family structure and (3) work-family conflict. Each of these is measured for respondents who were between the ages of 24 to 32 in Wave IV.

Several indicators were used to operationalize socioeconomic status when respondents are between the ages of 24 and 34 including wealth, financial hardship, employment status, current enrollment in a post-secondary institution and history of imprisonment. Wealth is a categorical variable derived from the following item: "*Suppose you and others in your household were to sell all of your major possessions*

(including your home), turn in all of your investments and other assets into cash, and pay off all of your debts. Would you have something left over, break even or be in debt?" Those who report that they would "be in debt"—or have negative wealth—were used as the reference category compared to respondents with positive or zero wealth. Financial hardship is a dichotomous indicator. Respondents who report at least one of the following are categorized as experiencing financial hardship: 1) not having enough money to pay for food, phone service, rent or mortgage, the full amount of a gas, electricity or oil bill, or 2) being evicted from their house or apartment or 3) having their gas, electricity or oil distribution discontinued due to non-payment within the last 12 months. Those who have not experienced financial hardship are the reference category. Employment is also a dichotomous variable that compares those who are unemployed (reference category) to those who are currently employed. Current enrollment in a post-secondary institution is also a binary indicator whereas those who are not currently enrolled in a college or university are used as a reference category compared to those who are currently enrolled. Lastly, history of imprisonment is operationalized as the total number of months the respondent has spent in a jail or prison since the age of 18.

Family structure is measured with two dichotomous indicators indicating whether the respondent is the head of a single-parent family and whether he/she is currently married. Another continuous variable measures the number of children a respondent has in his/her care.

Work-family conflict is operationalized using three separate items that indicate how often 1) family responsibilities interfere with a respondent's ability to work 2)

respondents had to cut back on their hours or turn down over time because of family responsibilities, and 3) respondents had to spend less time with their families than they wanted to because of work responsibilities. Responses include "frequently", "sometimes", "rarely" or "never". Higher values indicate *less* work-family conflict.

Sample Descriptives

This section describes how learning conditions in adolescence and living conditions in young adulthood vary across racial/ethnic groups and levels of educational attainment. Learning conditions in adolescence are measured during the first and second waves of data collection while living conditions are measured contemporaneously with the health and educational attainment measures in Wave IV of the data collection. Two sample t-tests and chi-square tests were conducted to test whether disparities across race/ethnicity or level of educational attainment are statistically significant for continuous and categorical variables, respectively. Unfortunately, separate racial/ethnic analyses are restricted to blacks and whites due to the small number of Hispanics at the school-level. Only 17 schools had more than 20 Hispanic respondents. However, scholars suggest that at least 20 level-2 units are needed to obtain reliable estimates (Kreft 1996). As a result, Hispanics are only included in analysis that refer to "all" or "combined" racial/ethnic groups. For the combined sample, there are 8,601 students in 130 schools. For the white-only analysis there are 4,960 students in 97 schools; 249 respondents and 33 schools were dropped due to a low representation of whites at the school level. For the

black-only models, 425 respondent and 98 schools are omitted due to small number of blacks in data collection efforts yielding 1,952 respondents in 32 schools.

Table 21 presents the sample descriptives for learning conditions in adolescence and Table 22 presents sample descriptives for living conditions in young adulthood. I refer to these tables in the following paragraphs in discussing any racial/ethnic or educational differences. In these tables, the rows contain level of educational attainment while the racial/ethnic groups (all, white and black) are located in the columns. Looking across these tables within rows allows for an analysis of how indicators vary across *racial/ethnic groups* within each *level of educational attainment.* Examining the columns allows for an analysis of how indicators vary across *level of educational attainment* within *racial/ethnic groups*. Each cell represents the mean of an indicator for a particular race/ethnicity-educational attainment combination. For example, the first cell on the left side (i.e. -0.21) of Table 21 represents the mean value of the school social integration scale for all racial/ethnic groups combined and for all educational groups combined. This can be referred to the grand mean in this analysis. T-tests are also run to rest whether means of indicators significantly differ across race/ethnicity. An "a" subscript next to the mean value indicates that the difference between blacks and whites is statistically significant. I will first describe how learning conditions vary by race/ethnicity and educational attainment (Table 21) followed by a discussion of disparities in living conditions in young adulthood (Table 22).

Learning Conditions: Individual-Level Indicators. There are racial/ethnic differences in all three scales measuring educational experiences at the individual level. Because these scales were created using factor analysis on sample with blacks, whites and Hispanics combined, the mean represents how many standard deviations a particular group's score is away from the *grand* mean—or mean of the factor for the entire sample. Values above zero indicate that a group's experiences are more *unfavorable* than the average experience of blacks, whites and Hispanics when all levels of educational attainment are combined. For example, column 3 in Table 21 indicates that when all levels of educational attainment are combined, blacks report more unfavorable conditions (i.e.-0.037) than whites (-0.024); however this difference is not statistically significant (i.e. there is no subscript "a" next to the mean value).

Column 1 suggests that generally, for all factors, those with higher levels of educational attainment report less difficulty with socially integrating in the school environment, interacting with teachers and engaging with schoolwork. However, these patterns differ significantly by race/ethnicity and suggest that blacks are at an advantage for several of these individual-level indicators of learning conditions (Columns 2-4). For example blacks with less than a four-year degree are significantly less likely to report that they had trouble socially integrating into school during adolescence than similarly educated whites (-0.081 compared to 0.239). Black students are also significantly less likely to report having difficulties completing schoolwork than whites among those with a high school diploma and some college or higher. However, blacks report more difficulty interacting with teachers while Hispanics report the least difficulty.

Nearly all (95.2%) of respondents report that their parents had talked to them about schoolwork or worked on a school assignment with a residential or non-residential parent within four weeks of the interview; however, there are some racial/ethnic differences for this indicator. Blacks without a high school diploma and those with a four-year degree or higher were also significantly more likely to report that their parents had been involved in educational activities than similarly educated whites.

Higher scores on the college enrollment expectation scale indicate higher expectations to enroll in college. This indicator was measure in Wave I. Blacks have significantly higher levels of expectations to enroll in a postsecondary institution than whites at every level of education except among those with a four-year degree or higher.

Learning Conditions: Institutional-Level Indicators. Nearly all respondents in this sample attended public schools regardless of race/ethnicity; only 6.3% attended a private institution. All racial/ethnic differences in institutional-level indicators of learning conditions are insignificant with the exception of urbanicity of the school. Among those who did not obtain a high school diploma, blacks were significantly more concentrated in urban schools (34.9%) than whites (18.8%). Blacks (71.9%) and whites (67.74%) were both equally represented in small or medium-sized schools. This similarity holds up across all levels of education. The schools black and white respondents attend were also similar in teacher quality. The percentage of teachers without previous experience is approximately 10% for both groups and the percentage of teachers with Master's degrees is approximately 50% for both groups. The proportion of

parents involved in the PTA (35.1% for whites and 37.7% for blacks), and the percentage of twelfth grade students enrolled in college preparatory English courses (43.7% for whites and 29.8% for blacks) is also similar across race/ethnicity. These patterns hold up across all levels of educational attainment. However, the racial/ethnic composition of respondents' schools varies significantly by the race/ethnicity of the respondent indicating the presence of racial/ethnic school segregation. For example, nearly 40% of whites go to schools in which two-thirds of the student body is white while only 1% of Blacks attend schools with a similar racial composition. Due to the small number of blacks enrolled in schools in which at least two-thirds of the student body is white in this sample, the indicator for student racial/ethnic composition is omitted from the black-only models. Schools blacks attend in this sample also have significantly larger class sizes than schools that whites attend. For example, when all education groups are combined, the average class size was 24.7 students and 26.33 for whites and blacks, respectively.

Living Conditions in Young Adulthood: Socioeconomic Status. By Wave IV of data collection, both blacks and whites display similar levels of employment with nearly two-thirds of each group reporting being employed at the time of interview (whites—65.6%; blacks—63.0%). The proportion of whites (15.8%) and blacks (17.7%) who report that they are enrolled in a post-secondary institution at the time of interview is also similar. Despite these similarities, there are considerable racial/ethnic differences in wealth and experiences with financial hardship. For example, approximately 25 percent of whites have experienced some form of financial hardship such as not having enough

money to pay rent or utilities within the past twelve months of the date of interview, yet over one-third of blacks (34.3%) have experienced such financial difficulties. Blacks are significantly more likely to experience more financial hardship than whites among those who have attained a high school diploma or higher. Blacks and whites who have not completed a high school diploma have similar levels of financial hardship. Blacks report positive wealth less than whites do and report negative wealth (debt) more often than whites at *all* levels of education. For example, among those with a four-year degree, only 10% of whites report negative wealth while 18.9% of similarly educated blacks report being in debt. Lastly, young adults in this sample spent between zero and 126 months in jail or prison since the age of 18; however only 25% of the sample was ever incarcerated during this period. When all education groups are combined, blacks spend approximately one more month in jail or prison than whites ($p<.001$). However, black-white differences in the length of imprisonment since the age of 18 do not significantly differ when looking at separate levels of educational attainment.

Living Conditions in Young Adulthood: Family Organization and Work-Family Conflict. Family structure also varies considerably across racial/ethnic groups. In chapter 5, we observed that whites were more likely to grow up in smaller households and in two-parent homes than blacks and Whites during adolescence. These racial/ethnic differences in family structure continue into young adulthood. Black respondents have significantly lower rates of marriage than their white counterparts. Over two-fifths of whites (43.4%) are married at the time of interview compared to only 22.9% of blacks.

Yet whites have significantly fewer children (.78 children) than blacks (1.2) or Hispanics (1.00). Furthermore, only 16.8% of whites report being the head of a single-parent family compared to over two-fifths of blacks (42.3%). These disparities exist at all levels of educational attainment when respondents are between the ages of 24 to 34.

However, while there are sizeable differences in family structure, and presumably family obligations, across racial/ethnic groups, there is little variability in the three items measuring family-work conflict across race/ethnicity. The only exception to this is that whites report that they reduce family time due to employment obligations more frequently than blacks or Hispanics.

Results: Logistic Regression

This section presents the results from logistic regression models that test whether the racial/ethnic and educational disparities in learning and living conditions observed in the descriptive statistics are significantly associated with the odds of reporting fair or poor self-rated health, obesity and hypertension. For each health outcomes separately, I present a series of models. First, I estimate a two-level logistic regression model to test whether individual and school-level learning conditions are associated with health in young adulthood. These results are displayed in Tables 23 (self-rated health), 27 (obesity) and 31 (hypertension). The next set of models controls for living conditions in young adulthood to test whether socioeconomic status and family organization—

measured contemporaneously with educational attainment and health—mediate the relationship between education and health. These results are displayed in Tables 24 (self-rated health), 28 (obesity) and 32 (hypertension). Finally, Tables 25 (self-rated health), 29 (obesity) and 33 (hypertension) present the results of two-level logistic regression models that include learning conditions and living conditions in *both* young adulthood and adolescence (which were discussed in Chapter 5). The models are presented for: 1) all racial/ethnic groups combined (blacks, whites and Hispanics), 2) whites and 3) blacks. Hispanics are excluded from separate racial/ethnic group analyses due to a small sample of schools (n=22) that result in unreliable estimates.

The discussion of the findings will proceed separately by health indicator. For each health indicator, I will 1) discuss the results of the logistic regression model that controls for learning conditions in adolescence, 2) examine how the results from the previous model change after controlling for living conditions in young adulthood, 3) discuss the results of the final model that controls for living conditions in adolescence and young adulthood in addition to learning conditions in adolescence and 4) use the compilation of odds ratios across models presented in Tables 26, 30 and 34 to examine whether living and learning conditions contribute to health returns to education.

Self-Rated Health

Learning Conditions in Adolescence. An educational gradient in self-rated health is clear for all racial/ethnic groups after controlling for learning conditions in adolescence (Table 23). For the entire sample, the odds of reporting fair or poor health are over two

times higher among those without a high school diploma compared to those with a high school diploma or some college (OR=2.112). A four-year college degree or higher translates into nearly 60 percent reduced odds in reporting fair/poor health compared to those with a high school diploma or some college (OR=0.428).

Controlling for learning conditions in adolescence, blacks have *higher* returns to a high school diploma and/or some college *and* a four-year degree or higher than whites. The odds of reporting fair/poor self-rated health is over two-times higher for blacks without a high school diploma compared to their counterparts with a high school diploma or some college (OR=2.21). Blacks with at least a four-year degree have 63.6% lower odds of reporting fair or poor health compared to those with a high school diploma or some college (OR=0.364). Whites without a high school diploma have 52% higher odds of reporting fair/poor self-rated health compared to their counterparts with a high school diploma or some college. Whites with at least a four-year degree have 58.7% lower odds than whites with a high school diploma or some college (OR=0.413).

School-level and individual-level indicators of learning conditions in adolescence are significantly associated with the self-rated health of whites more so than of blacks. For whites, the odds of reporting fair or poor health increases by .2% for every one percent increase in the proportion of high school seniors enrolled in college preparatory English courses above the grand mean (OR=0.998). All three scales for individual-level educational experiences ("poor social integration", "poor teacher-student interaction" and "problems with schoolwork") are positively associated with self-rated health for whites. This indicates that increased difficulty in integrating socially at school (OR=1.231),

getting along with faculty (OR=1.186) and completing school work (1.125) in adolescence is associated with an increase in the odds of reporting fair or poor health in young adulthood for whites. For every one standard deviation increase in the school-integration scale above the mean, the odds of reporting fair or poor self-rated health among whites increases 23.1%. The odds of reporting fair or poor health among whites increases by 18.6% and 12.5% for every one standard deviation increase above the average value of the teacher-student interaction and school work scales, respectively. This indicates that educational experiences in adolescence have consequences for the self-rated health of whites in young adulthood net of other school-level characteristics and the respondent's own level of educational attainment. For blacks, parental involvement in educational activities is the only significant indicator of learning conditions on self-rated health.

Learning Conditions in Adolescence and Living Conditions in Young Adulthood. There is *not* a clear education gradient for self-rated health after controlling for living conditions in young adulthood and learning conditions in adolescence for the combined sample or for whites separately (Table 24). Health returns to a high school diploma or some college are not significant after adjusting for these indicators. However, for blacks, those without a high school diploma have over a two-fold increase in the odds of reporting fair or poor health compared to blacks with a high school diploma or some college (OR=2.029). Health returns to a four-year degree or higher remains significant for all groups. The odds of reporting fair or poor health among whites with at least a

four-year degree is 60.4% lower compared to their counterparts with a high school diploma or some college. This returns is nearly the same for blacks with the odds of reporting fair or poor health among blacks with at least a four-year degree being 60.1% lower compared to blacks with a high school diploma or some college.

After controlling for living conditions in young adulthood, the percent of parents involved in the PTA is the only learning condition significantly associated with self-rated health for whites. Nonetheless, this relationship is in the opposite direction as hypothesized. Students in schools with a higher than average percentage of parents involved in the PTA has higher odds of reporting fair/poor health. The teacher-student interaction scale, the schoolwork scale and the percentage of high school seniors enrolled in college preparatory English classes are no longer significantly associated with self-rated health

Among blacks, the parental educational involvement is the only indicator of learning conditions significantly associated with self-rated health. This indicator was insignificant in the previous model. Black adolescents who reported that their parents talked with them about schoolwork or assisted them in completing schoolwork have 58.3% lower odds of reporting fair or poor health than those who did not report parental involvement in their educational endeavors.

Several indicators of living conditions in young adulthood are significantly associated with self-rated health for the combined sample and for whites; however, only one indicator of living conditions in young adulthood is significant for blacks. For whites, having positive wealth in young adulthood is associated with a 36.3% lower odds

of reporting fair or poor self-rated health compared to whites who report being in debt (OR=0.637). Furthermore, those who are employed have nearly half the odds of reporting fair or poor health compare to unemployed whites (OR=0.506). Whites reporting financial hardship also have 84% higher odds of reporting hair or poor health than whites who have not experienced financial hardship (OR=1.840).

For blacks, financial hardship is the only significant indicator of socioeconomic status in young adulthood. Blacks who have experienced financial hardship in young adulthood have a 60.4% increase in the odds of reporting fair or poor health compared to blacks who have not experienced financial hardship (OR=0.396).

In the case of family organization and work-family conflict, married whites have 42.4% lower odds of reporting fair or poor health than unmarried whites, and each child under the respondent's care is associated with 19.5% lower odds of reporting fair or poor health. No indicators of family organization or work-family conflict are significantly associated with the self-rated health of blacks.

Learning Conditions in Adolescence, Living Conditions in Young Adulthood and Living Conditions in Adolescence. After adjusting for living conditions in both adolescence and young adulthood and learning conditions in adolescence (Table 25), for the combined sample, less than high school is only marginally significantly associated with poor self-rated health and not significantly associated for whites. For blacks however, those without a high school diploma continue to have over two times the odds of reporting fair or poor health (OR=2.166). Furthermore, all groups still obtain health

returns to a four-year degree or higher for self-rated health. For the combined sample, young adults with at least a four-year degree have 65.9% lower odds of reporting their health as fair/poor compared to those with a high school diploma or some college (OR=0.441). Health returns to a four-year degree are similar for both blacks (OR=0.399) and whites (OR=0.386).

All indicators of living conditions in adolescence are *insignificant* for both the combined sample and the separate race/ethnic group analysis with the exception of household size for the combined sample. The odds of reporting fair or poor health increases approximately 10% for every one person increase above the average household size. All institutional-level learning conditions were also insignificant for the combined sample, blacks and whites. Only one indicator of individual-level learning conditions is significantly associated with self-rated health. Poor social integration in school is associated with an increase in the odds of reporting fair or poor health for the combined sample and for whites (combined OR=1.183; whites=1.187). For blacks, those who report parental involvement in educational activities have a 59.6% decrease in the odds of reporting fair or poor health compared to those reporting no parental educational involvement.

The relationship between living conditions in young adulthood and self-rated health remain largely unchanged after controlling for living conditions in adolescence. Financial hardship and employment remain significant for whites and the combined sample. The magnitude of these odds also remains largely unchanged. However, the number of children a respondent has is no longer significantly associated with the self-

rated health of whites after controlling for living conditions in adolescence. For blacks, financial hardship remains statistically significant. After controlling for learning conditions in adolescence and living conditions in both young adulthood and adolescence, reporting that family responsibilities interfere with work responsibilities is associated with a decrease in self-rated health. This relationship is in the *opposite* direction as hypothesized.

Racial/Ethnic Differences in Health Returns to Education across Models. The models presented in this chapter not only test whether aspects of living and learning conditions in adolescence and young adulthood are associated with health the three different outcomes, but will also assist in testing the main research question of interest: do living and learning conditions in adolescence contribute to racial/ethnic disparities in health *returns* to education? To answer this question, I compile the results presented in the previous tables into new tables (Tables 26, 29 and 34) which should facilitate making comparisons in the health returns to education between blacks and whites. I construct these tables for each health indicator separately and will begin discussing the table for self-rated health first.

Table 26 displays the odds of reporting fair or poor health for a) those with less than high school compared to those with a high school diploma and/or some college, and b) those with a high school diploma and/or some college and those with a four-year degree and above four models. The first model is a demographic model including only the education groups and demographic controls, and the second model controls for

learning conditions in adolescence and demographics. The third model adds living conditions in young adulthood to the second model. The final model controls for both living conditions in adolescence and young adulthood and learning conditions in adolescence.

The columns represent the four different models and the rows represent the odds ratios of fair or poor self-rated health for racial/ethnic groups within educational groups. For example, the cell located in the second column and seventh row contains the value of the odds (0.413) of reporting fair or poor health among whites with a four-year degree or above for Model 2 which controls for demographics and learning conditions in adolescence. The cell below contains the value of the odds (0.364) of reporting fair or poor health among blacks with a four-year degree or higher for the same model. In the attached table labeled "Racial/Ethnic Differences", the cells contain the mathematical difference of the odds of reporting fair or poor health between blacks and whites with the same level of education. Using the example above, the odds ratios for reporting fair or poor health for whites and blacks is 0.413 and 0.364, respectively. Thus, the mathematical difference of these odds is 0.049, which is found in the last row of Table 26 The "B" following the mathematical difference of these odds indicates that blacks obtain higher returns to a four-year degree or higher than whites for self-rated health. In order to test whether learning and living conditions contribute to racial/ethnic health disparities in adolescence, we can observe how the difference in odds ratios located in the "white vs. black" rows at the bottom of Tables 26, 29 and 34 vary across models. If these racial/ethnic differences in odds decreases appreciably across models (going from Model

1 to Model 4), we can say that learning and living conditions contribute to black-white disparities in health returns to education.

For the combined sample, after controlling only for demographic characteristics (gender, age, nativity), there are considerable health returns to a high school diploma and/or some college. Those with a high school diploma or some college are nearly a two-and-a-half times increase in the odds of reporting fair or poor self-rated health compared to those without a high school diploma (OR=2.453; p<.001). There are also considerable health returns to a four-year degree or higher; those with at least a four-year degree have a 59.9% decrease in the odds of reporting fair or poor health compared to those with a high school diploma or some college (OR=0.401; p<.001). After controlling for learning conditions, health returns to a high school diploma and or some college and to a four-year degree or higher slightly diminish and drop in significance (high school/some college: OR=2.112; p<.05; four-year degree: OR=0.428; p<.01). After controlling for living conditions in young adulthood, health returns to a high school diploma or some college are no longer significant indicating that living conditions in young adulthood mediate the relationship between educational attainment and health. Health returns to a four-year degree also decrease (OR=0.441); however, the health return remain statistically significant.

The pattern in health returns to education found for the combined sample is similar to that of whites. Whites without a high school diploma have nearly a two-fold increase in the odds or reporting fair or poor health compared to whites with a high school diploma or some college (OR=1.974; p<.001). After controlling for learning

conditions in adolescence, health returns to a high school diploma or some college diminish (OR=1.518; p<.05). After controlling for living conditions in young adulthood, health returns to a high school diploma or some college are insignificant. On the other hand, health returns to a four-year degree or higher remain significant after controlling for learning conditions in adolescence and living conditions in adolescence and young adulthood. For the model including demographic controls, whites with a four-year degree have 63.9% lower odds of reporting fair or poor health than whites with a high school diploma or some college (OR=0.361). Adjusting for learning conditions in adolescence narrows this gap and diminishes the health returns to a four-year degree or higher. However, controlling for living conditions in adolescence and young adulthood increase health returns to a four-year degree or higher suggesting that living conditions in adolescence and young adulthood moderate the effect of education on health.

Blacks show a slightly different pattern than whites. After adjusting for demographic characteristics, blacks obtain higher health returns to a high school diploma or some college than whites. The odds of reporting fair or poor health are over two-and-a-half times higher for blacks without a high school diploma compared to blacks with a high school diploma or some college. (black OR=2.574; white OR=1.974). Blacks also obtain higher health returns to a four-year degree or higher than whites. The odds of reporting fair or poor health are 68.6% lower for blacks with a four-year degree compared to blacks with a high school diploma or some college (OR=0.314). Health returns to both a high school diploma and some college and a four-year degree or higher decrease after controlling for learning conditions in adulthood (model 2) and controlling

for both living conditions in young adulthood and learning conditions in adolescence (model 3). However, in model 4, after adding living conditions in adolescence to the previous model (model 3), health returns to a high school diploma or some college *increase* rather than decrease. Health returns to a four-year degree or higher remains unchanged after controlling for learning conditions in adolescence and both living conditions in both adolescence and young adulthood.

The bottom portion of Table 26 indicates that adjusting for learning and living conditions during the transition from adolescence to young adulthood *increases* black-white disparities in health returns to a high school diploma or some college. Health returns to a four year degree or higher were similar for both blacks and whites throughout all four models; however, racial/ethnic differences in health returns to a four-year degree or higher for self-rated health nearly converge when adjusting for living conditions in young adulthood and adolescence. In Model 3, the odds of reporting fair or poor health is 60.4% and 60.1% lower for whites and blacks, respectively, with a four-year degree or higher compared to their counterparts with a high school diploma or higher (whites: OR=0.396; blacks: OR=0.399). In model 4 after controlling for living and learning conditions during the transition from adolescence to young adulthood, these disparities increase slightly (whites: OR=0.386; blacks: OR=0.399)

Obesity

Learning Conditions in Adolescence. Consistent with results in the previous chapters, the relationship between obesity and educational attainment is significant for

whites, but insignificant blacks after controlling for learning conditions in adolescence **(Table #).** The relationship between education and obesity is not gradational for whites since those with a high school diploma or some college have the highest rates of obesity than any other educational group. After controlling for both school-level and individual level learning conditions in adolescence, whites without a high school diploma have 21.3% *lower* odds of obesity than whites with a high school diploma or some college (OR=0.797). Whites with at least a four-year degree have 38.7% lower odds of obesity than whites with a high school diploma or some college (OR=0.613). Blacks do not obtain health returns to any level of education for obesity in this model.

In contrast to models predicting the odds of reporting fair or poor health, several school-level indicators are significant for both blacks and whites. However, they operate in different directions depending on the racial group. The percent of teachers without previous teaching experience, the proportion of 12th grade students in college preparatory English courses and the percent of parents who report involvement in the PTA are significantly associated with obesity for both blacks and whites. These indicators are *negatively* associated with the odds of obesity for whites and *positively* associated with the odds of obesity for blacks. For example, while each percent increase in the proportion of inexperienced faculty at the school-level *decreases* the odds of obesity for whites by .7%, it is associated with a 2.9% *increase* in the odds of obesity for blacks. Furthermore, each percent increase above the grand mean in the proportion of 12th grade students in college preparatory English courses is associated with a .5% *decrease* in the odds of obesity for whites and a .6% *increase* in the odds of obesity for blacks. For

parental PTA involvement, a one percent increase in the proportion of parents involved in the PTA is associated with a 52.6% *decrease* in the odds of obesity for whites, but over a two-fold *increase* in the odds of obesity for blacks. Whites in suburban schools also have 25.3% lower odds of obesity than whites in urban schools. Urbanicity of the school setting is not a significant predictor of obesity for blacks in this model.

Only one individual-level indicator of learning conditions in adolescence is significant at traditional cut-off levels for whites, while all indicators are insignificant for blacks. For whites, the difficulty with schoolwork factor is negatively associated with obesity indicating that those who report difficulty with school work in adolescence have significantly *lower* odds of obesity in young adulthood (OR=0.900). This relationship is not in the direction hypothesized; those experiencing more difficulty in schoolwork in adolescence are hypothesized to have higher odds of obesity in young adulthood.

Another difference in results between whites and blacks in this model is the relationship between gender and obesity. Black women have significantly higher odds of obesity (90.7%) than black men; however, there are no significant gender differences for whites. Additionally, while increased age is significantly associated with increased odds of obesity among whites, the reverse is true among blacks. For every year increase in age above the mean age, the odds of obesity decrease by 15.5% for blacks. However, among whites, the odds of obesity increase by 8.9% for every one year increase in age above the mean age.

Learning Conditions in Adolescence and Living Conditions in Young Adulthood.

Table 27 illustrates the relationship between learning conditions in adolescence in adolescence and obesity net of living conditions in young adulthood. After controlling for living conditions in young adulthood, whites without a high school diploma or some college no longer have lower odds of obesity than whites with a high school diploma or some college. However, whites with at least a four-year degree have 43.2% lower odds of obesity than those with a high school diploma or some college. Additionally, whereas blacks obtained no significant health returns to education for obesity in the previous model controlling for learning conditions in adolescence, after including indicators of socioeconomic and family characteristics in young adulthood, blacks with at least a four year degree have 41.6% lower odds of obesity than blacks with a high school diploma or some college. Black females continue to have significant higher odds of obesity than black males (OR=1.875) and older blacks have lower odds of obesity than younger blacks. In contrast, gender differences in obesity are still insignificant for whites and age continues to be positively associated with obesity.

After controlling for both living conditions in young adulthood and learning conditions in adolescence, only one school-level indicator is significantly associated with obesity for blacks. For whites, the three school-level indicators that were significant in the previous model remain significant. For blacks, the proportion of inexperienced teachers is positively associated with obesity. This indicator was not significant in the previous model controlling only for learning conditions. For whites, those in suburban schools have 24.7% lower odds of obesity than white students in urban schools. The proportion of 12^{th} grade students in college preparatory English courses and the

proportion of parents involved in the PTA are negatively associated with the odds of obesity for whites. For individual-level learning conditions, expectations of college attendance is positively associated for blacks and negatively associated with obesity for whites indicating that higher expectations for college attendance are associated with an *increase* in the odds of obesity for blacks and a *decrease* in the odds of obesity for whites. Surprisingly, blacks who report parental involvement in educational activities have a 225% *increase* in the odds of obesity compared to blacks who do not report such activities with their parents. It was hypothesized that parental involvement in educational activities would be associated with a decrease in the odds of obesity.

Only one indicator of living conditions in young adulthood is significant for whites. Those who report positive wealth have 30.4% lower odds of hypertension than whites with negative wealth (OR= 0.696). For blacks, several indicators of living conditions in young adulthood are significant. Blacks who were married at the time of the interview have 53.5% *higher* odds of obesity compared to unmarried blacks. The odds of reporting obesity decrease by 2.5% for every month a black respondent spends in jail or prison (OR=0.975). Lastly, higher odds of obesity are found among those who report the need to reduce work hours for family responsibilities (OR=1.195).

Learning Conditions in Adolescence, Living Conditions in Young Adulthood and Living Conditions in Adolescence. Table 28 shows that, after adjusting for learning conditions in adolescence and living conditions in both adolescence and young adulthood, both blacks and whites obtain nearly identical returns to a four-year degree.

The odds of obesity are 41.7% and 41.8% lower for whites and blacks, respectively who obtain a four-year degree or higher compared to their counterparts with a high school diploma or some college (whites: OR=0.583; blacks: OR=0.582). There are no significant health returns to a high school diploma or some college for blacks or whites group for this model. Indicators of living conditions in adolescence are not significantly associated with obesity for whites or for the combined sample. However, parental educational attainment, parental welfare receipt and the single parent household indicators are significantly associated with obesity for blacks. Blacks with a parent whose highest level of educational attainment is a high school diploma or some college have a 44.2% increase in the odds of obesity compared to blacks with parents with at least a four-year degree. For blacks, growing up in a single parent household is associated with a 28.3% decrease in the odds of obesity. In addition, the odds of obesity decrease by 7.9% for every one-person increase in household size above the average household size.

Several learning conditions are significantly associated with obesity for blacks and whites after controlling for living conditions in adolescence and young adulthood and learning conditions in adolescence; however, different learning conditions are associated with this health indicator for blacks and whites. For example, for whites, at the school-level, attending school in a suburban setting is associated with a 23.4% decrease in the odds of obesity compared to whites in urban schools. In addition, every one percent increase in the proportion of 12^{th} grade students in college preparatory English courses and the percentage of parents involved in the PTA is associated with a 0.5% and 52.5%

decrease in the odds of obesity, respectively. However, none of these school-level indicators is significantly associated with obesity for blacks. Among black young adults, the percent of new teachers is the only significant indicator at the school level. The odds of obesity increase by nearly 3% for every 1% increase above the average proportion of new teachers.

For individual-level predictors of learning conditions in adolescence, the teacher-student interaction scale are associated with a decrease in the odds of obesity for whites (OR=0.888), but not for blacks. College expectations and parental involvement in educational activities are associated with obesity for blacks. However, these relationships are in a direction opposite than hypothesized. As in the previous model, for blacks, high expectations of college enrollment is associated with an increase in the odds of obesity and those who report parental involvement in educational activities during adolescence have over two times the odds of obesity as blacks who do not report parental involvement in educational activities.

Lastly, more indicators of living conditions in young adulthood are significant for blacks than whites. For whites, only wealth is associated with obesity. Whites who report positive wealth have 30% lower odds of obesity compared to whites reporting negative wealth (OR=0.701). For blacks, incarceration in adulthood is the only indicator of socioeconomic status in adulthood that significantly predicts obesity. Each month blacks spend incarcerated is associated with a 2.5% decrease in the odds of obesity. Both marital status and an indicator of work-family conflict are also significantly associated with the self-rated health of blacks. Married blacks have a 53.1% increase in the odds of

obesity compared to unmarried blacks. Reporting the need to reduce hours at work due to family issues is also associated with an increase in obesity for blacks (OR=1.191).

After controlling for learning and living conditions in adolescence and living conditions in young adulthood, black females have a 74.3% increase in the odds of obesity. Age remains positively associated with obesity for whites and negatively associated with this health indicator for blacks. Each one-year increase in age above the average age (approximately 28 years) is associated with a 9.4% increase in the odds of obesity for whites and a 17.4% decrease in the odds for blacks.

Racial/Ethnic Differences in Health Returns to Education across Models. The bottom of Table 29 shows how the relationship between educational attainment and obesity varies across models. If these racial/ethnic differences in odds decrease appreciably across models (going from Model 1 to Model 4), we can say that learning and living conditions contribute to black-white disparities in health returns to education.

For the combined model, for obesity, young adults do not obtain health returns to a high school diploma or some college compared to those with less than high school. However, young adults obtain significant health returns to a four-year degree or higher for the combined sample. After adjusting for demographic characteristics (age, gender and nativity), young adults with a four year degree have 37.9% lower odds of obesity than those with a high school diploma or some college. Health returns to a high school diploma or some college increase only slightly after adjusting for learning conditions in adolescence and living conditions in young adulthood. For example, after controlling for

learning conditions in adolescence and living conditions in young adulthood, young adults with a four-year degree or some college have 44.4% lower odds of obesity than those with a high school diploma or some college (OR=0.556). Health returns to a four year degree or higher are only slightly lower after controlling for living conditions in adolescence (OR=0.578).

Because the prevalence of obesity is higher among those with a high school diploma or some college than those without a high school diploma, there are not health returns to a high school diploma or some college. Rather, for this health outcome, those with a high school diploma or some college experience a health deficit. For whites, this health deficit is only significant after controlling for learning conditions in adolescence (model 2). Whites without a high school diploma have 20.3% lower odds of obesity than whites with a high school diploma or some college. However, whites obtain health returns to a four-year degree or higher for obesity. When adjusting for demographic controls, the odds of obesity among whites with at least a four year degree are 40.8% lower than among whites with a high school diploma or some college (OR=0.621). Health returns to a four year degree or higher decrease when controlling for learning conditions in adolescence (OR=0.609) and both living conditions in young adulthood and learning conditions in adolescence (OR=0.556). However, when adjusting for living conditions in adolescence in addition to living conditions in young adulthood and learning conditions in adolescence, health returns to a four-year degree or higher slightly decreases so that whites with a four year degree or higher have a 41.7% decrease in the

odds of obesity compared to whites with a high school diploma or some college (OR= 0.583).

Blacks do not obtain health returns or a health deficit to a high school diploma or some college, regardless of which controls are present in the model. In addition, blacks obtain health returns to a four-year degree only after controlling for learning conditions in adolescence and living conditions in young adulthood. After controlling for learning conditions in adolescence and living conditions in young adulthood, blacks with a four year degree or higher have a 41.6% decrease in the odds of obesity compared to blacks with a high school diploma or some college (OR=0.584). The odds of obesity for blacks with a four year degree or higher compared to those with a high school diploma or some college remains relatively unchanged after controlling for learning conditions in adolescence and living conditions in both adolescence and young adulthood (OR=0.582).

Black-white differences in health returns to obesity are small across models. The bottom rows of Table 29 labeled "Racial/Ethnic Differences" shows that only whites obtain health returns to a high school diploma or some college, in Model 2 (column 2). In this model, whites without a high school diploma have 20.3% lower odds of obesity than whites with a high school diploma or some college (OR=0.797), while blacks do not obtain significant health returns to this degree. However, this disparity in health returns to education is mitigated after controlling for living conditions in young adulthood. Whites obtain higher health returns to a four year degree or higher for Models 1 and 2. Blacks do not obtain health returns to a four-year degree for these models; however, whites obtain significant health returns to this level of education. Only after controlling

for learning conditions in adolescence and living conditions in young adulthood, blacks obtain significant health returns to a four year degree and the gap in health returns to a four year degree or higher between blacks (OR=0.584) and whites (OR=0.568) decreases. After controlling for learning conditions in adolescence and living conditions in young adulthood and adolescence, this small gap in health returns to education between blacks (OR=0.582) and whites (OR=0.583) is closed.

Hypertension

Learning Conditions in Adolescence. Table 30 demonstrates that there is not a clear educational gradient for blacks, whites or the combined sample for hypertension when controlling for learning conditions in adolescence. Blacks do not obtain any health returns to education while whites obtain health returns only to a four year degree or higher. Whites with at least a four year degree have 33.1% lower odds of hypertension compared to whites with a high school diploma or some college.

When all racial/ethnic groups are combined, all school-level and individual-level indicators of learning conditions in adolescence are *insignificant*. However when analyzing racial/ethnic groups separately, two indicators of learning conditions are significant for both blacks and whites. For blacks, only school-level indicators are associated with obesity. Those who attend schools in rural settings have 54.3% lower odds of hypertension than blacks attending schools in urban settings. Furthermore, schools with an above average proportion of inexperienced teachers are associated with an increase in the odds of hypertension among blacks (OR=1.016). For whites, the

percentage of 12th graders enrolled in college preparatory English courses is associated with a decrease in the odds of hypertension (OR=0.996). In addition, every one standard deviation increase in the difficulty with schoolwork scale is associated with a 10.6% decrease in the odds of obesity (OR=0.894). This is relationship is in the opposite direction than hypothesized.

Age is positively associated with hypertension for both blacks and whites. The odds of hypertension are 10.6% and 5.4% higher for each additional year in age above the mean for blacks and whites, respectively. Both black and white women have decreased odds of hypertension. White women have a larger health advantage relative to their male counterparts than blacks; white women have 64.9% lower odds of hypertension than white men while the odds of hypertension are 52.1% lower among black women compared to black men.

Learning Conditions in Adolescence and Living Conditions in Young Adulthood. Table 31 shows that when controlling for both living conditions in young adulthood and learning conditions in adolescence, whites remain the only group to obtain health returns to education. Whites with at least a four year degree have 41.7% lower odds of hypertension than whites with a high school diploma or some college.

For blacks, only one learning condition is significantly associated with the odds of hypertension after controlling for contemporaneous living conditions. Black adolescents attending schools in rural areas have 51.1% lower odds of hypertension than blacks in urban settings. The percentage of inexperienced teachers is no longer significant after

controlling for living conditions in young adulthood. For whites, every one percent increase in the proportion of 12th grade students in college preparatory English courses, the odds of hypertension decrease 0.4% for whites. Among whites, the odds of hypertension decrease by 1.8% for every one student increase above the average class size. This indicator was not significant in the previous model. In addition, unlike the previous model that controls only for learning conditions, no individual-level indicators of learning conditions obtain significance when controlling for living conditions in young adulthood.

For whites, indicators of socioeconomic status in young adulthood are not significantly associated with hypertension; however, two indicators of family organization are significant. Those who were married have 32.1% lower odds of hypertension than those who are not married and those who are the head of a single parent household have 30.4% lower odds of hypertension. This last relationship between single parenthood status and hypertension are in the opposite direction hypothesized. Only one socioeconomic status indicator is significant for blacks; employed blacks have 30.8% lower odds of hypertension than unemployed blacks. As for the family indicators, blacks who report that family responsibilities interfere with work responsibilities have lower odds of hypertension (OR=0.794) and those who report that they need to cut back work hours for family time less often have higher odds of hypertension (OR=1.588).

Age remains positively associated with hypertension for both blacks and whites, and white women continue to have a larger health advantage over white men (OR=0.354) compared to black women (OR=0.485).

Learning Conditions in Adolescence, Living Conditions in Young Adulthood and Living Conditions in Adolescence. Table 32 demonstrates that for the combined sample, young adults obtain health returns to a four-year degree or higher. In separate racial/ethnic group analysis, only whites obtain a health return to the highest level of education. Whites with at least a four-year degree have a 41.5% decrease in the odds of hypertension compared to whites with a high school diploma or some college. Neither blacks nor whites obtain health returns to a high school diploma or some college

All indicators of learning conditions in adolescence are insignificant for whites and only parental education is associated with hypertension for blacks. Blacks who have parents whose highest level of education is a high school diploma or some college have a 43.1% increase in the odds of obesity compared to blacks who have parents who have completed a four-year degree or higher.

None of the *individual*-level indicators of learning conditions in adolescence is significant for either blacks or whites. Two indicators of *school*-level learning indicators are associated with hypertension for whites, yet none of these indicators is significant for blacks. For whites, each percent increase above the average proportion of twelfth graders enrolled in college preparatory English courses is associated with a 0.4% decrease in the odds of hypertension. In addition, each one-student increase above the average class size is associated with a 1.8% decrease in the odds of hypertension.

The relationship between living conditions in young adulthood and self-rated health are similar here to the relationship in the previous model controlling for learning

conditions in adolescence and living conditions in young adulthood. The magnitude of these relationships remains largely unchanged from the previous model. For living conditions in young adulthood, married whites have a 31.7% decrease in the odds of hypertension. Single parenthood was hypothesized to be positively associated with hypertension, yet, whites who are single parents have a 30.5% decrease in the odds of hypertension. Single parenthood and marriage are not associated with hypertension for blacks. For blacks, employment is associated with a 28.9% decrease in the odds of hypertension (OR=0.711). In addition, reporting that family interferes with the ability to work decreases the odds of hypertension (OR=0.812) while reporting the need to cut back work hours due to family increases the odds of hypertension (OR=1.607).

Both black and white females have a decrease in the odds of hypertension. This advantage was larger for whites women (OR=0.356) than black women (OR=.462). White and black women have 74.4% and 53.8% lower odds of hypertension compared to their male counterparts, respectively. Age is also positively associated with hypertension for both blacks and whites. Each additional one-year increase in age above the average age is associated with a 9.9% and 12.1% increase in the odds of hypertension for whites and blacks, respectively.

Racial/Ethnic Differences in Health Returns to Education across Models. For the combined sample, young adults do not obtain health returns to a high school diploma or some college for hypertension during the transition from adolescence to young adulthood (Table 34). However, young adults obtain health returns to a four year degree

or higher. When controlling only for demographics (age, gender and nativity), young adults with a four-year degree or higher have 40.6% lower odds of hypertension than those with a high school diploma or some college (OR=0.594). However, after adjusting for learning conditions in adolescence, the health return to a four year degree or higher decreases so that young adults with a four year degree or higher have 22.2% lower odds of hypertension than those with a high school diploma or some college (OR=0.778). After controlling for learning conditions in adolescence and living conditions in young adulthood, health returns to a four-year degree or higher increase (OR=0.716). However, after controlling for learning conditions in adolescence and living conditions in both young adulthood and adolescence, health returns to a four year degree or higher decrease; young adults with a four year degree or higher have a 23.9% lower odds of hypertension than those with a high school diploma or some college (OR=0.761).

Whites do not obtain health returns to a high school diploma or some college for any model. However, whites obtain significant health returns to a four-year degree or higher across all models. When controlling for demographics, whites with at least a four year degree have a 34.1% decrease in the odds of hypertension compared to whites with a high school diploma or some college (OR=0.659). Health returns to a four year degree slightly or higher decrease after adjusting for learning conditions in adolescence (OR=0.669) and learning conditions and living conditions in young adulthood (OR=0.583). Health returns to a four-year degree or higher remains relatively unchanged from model three to model four. After controlling for learning conditions in adolescence and living conditions in adolescence and young adulthood, whites with a four year degree

or higher have 41.5% lower odds if hypertension than those with a high school diploma or some college.

In contrast, for blacks the relationship between educational attainment and health is insignificant at all levels of education and across all models. Blacks do not obtain significant health returns a high school diploma or some college or a four-year degree. Given that blacks do not obtain health returns to a four-year degree or higher and whites do, health returns to a four year degree or higher are quite marked.

Summary

The relationship between learning conditions in adolescence and health returns to education varies across racial/ethnic groups, health indicators and levels of educational attainment.

For both blacks and whites, in comparison to models adjusting only for demographic characteristics, adjusting for learning conditions in adolescence: 1) reduces health returns to a high school diploma for self rated health and 2) moderates the relationship between education and health so that whites obtain a health deficit to a high school diploma or some college for obesity and 3) does little to influence health returns to a four-year degree or higher.

For whites, in the model controlling for only demographics, those without a high school diploma have nearly two-fold decrease in the odds of reporting fair or poor self-rated health than whites with a high school diploma or some college. When controlling for learning conditions in adolescence, this advantage decreases so that whites without a

high school diploma have 150% higher odds of reporting fair or poor self-rated health. Similarly, for blacks, when controlling only for demographic characteristics, blacks without a high school diploma have over two-and-a-half higher odds of reporting fair or poor self-rated health than blacks with a high school diploma or some college (OR=2.57). After controlling for learning conditions, health returns to a high school diploma or some college modestly decrease (OR=2.21).

Learning conditions in adolescence also moderate the relationship between education and health so that blacks and whites obtain a significant health deficit to a high school diploma or some college for obesity after controlling for learning conditions in adolescence. When controlling only for demographic controls, the relationship between a high school diploma or some college and obesity is insignificant for both blacks and whites. However, after adjusting for learning conditions in adolescence, blacks and whites with a high school diploma or some college sustain a significant health deficit for obesity (i.e. the odds of obesity are higher for those with a high school diploma or some college than for those without a high school diploma).

Although there was not a measure of learned effectiveness in these models, it was hypothesized that those in higher quality schools would have higher levels of learned efficacy, and that if racial/ethnic disparities in health returns *converge* after controlling for learning conditions then there is some tangential evidence that there are racial/ethnic differences in learned effectiveness. However, if racial/ethnic differences in health returns to education *increase* then this may be evidence that some racial/ethnic groups need higher levels of effective agency than other groups to obtain similar health returns to

education. I find evidence of both of these patterns. After controlling for learning conditions in adolescence, black-white disparities in health returns to a high school diploma or some college *increase* for both obesity and self-rated health yet, for obesity, black-disparities in health returns to a four-year degree or higher *decrease*.

In terms of whether adjusting for learning and living conditions in both adolescence and young adulthood influence differential health returns to education, we find that for self-rated health, black-white disparities in health returns to a high school diploma or some college increase. This disparity increases since, after controlling for living and learning conditions during the transition from adolescence to young adulthood, health returns to a high school diploma or some college are no longer significant for whites. Yet for blacks, those without a high school diploma still have over a two-fold increase in the odds of reporting fair or poor health than those with a high school diploma or some college. However, black-white disparities in health returns to a four-year degree or higher decrease for self-rated health (blacks: OR=0.399; whites: OR=0.396). Furthermore, for obesity, black-white disparities in health returns to both a high school diploma (blacks: OR=0.85; whites: OR=0.80) and a four-year degree or higher (blacks: OR=0.582; whites: OR=0.583) decrease after controlling for learning conditions in adolescence and living conditions in both adolescence and young adulthood.

These findings indicate that using a life course perspective for assessing racial/ethnic differences in health returns to education is more useful for explaining inequalities in self-rated health and obesity, but not hypertension. Furthermore, while some scholars hypothesized that adjusting for learning and living conditions earlier in the

life course may decrease racial/ethnic disparities in health returns to education, these findings suggest that living and learning conditions in adolescence may *widen* racial/ethnic disparities by moderating the relationship between educational attainment and health in young adulthood differentially across racial/ethnic groups.

Items	Factor 1	Factor 2	Factor 3
(1) "How often have you had trouble getting along with your teachers?"	0.091	***0.983***	0.149
(2) "How often have you had trouble paying attention in school?"	0.113	0.275	***0.814***
(3) "How often have you had trouble getting your homework done?"	0.085	0.146	***0.874***
(4) "You feel close to people at your school"	***0.792***	0.059	0.066
(5) "You feel like you a part of your school"	***0.823***	0.089	0.127
(6) "You are happy to be at your school"	***0.759***	0.198	0.141
(7) "The teachers at your school treat students fairly"	0.091	***0.983***	0.149
(8) "You feel safe in your school"	***0.617***	0.138	0.005
% of variance	*28.75*	*26.21*	*18.89*
Minimum Value	*-2.372*	*-1.711*	*-2.671*
Maximum Value	*3.826*	*3.777*	*4.395*

Table 20. Factor Loadings for Educational Experience Items Using Principal Component Factor Analysis with Varimax Rotation

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Learning Conditions—Individual			
Poor Social Integration			
All	-0.021 (0.999)	-0.024 (0.928)	-0.037 (1.189)
Less than High School	0.123 (0.972)	0.239[b] (0.924)	-0.081[a] (1.048)
High School/Some College	0.039 (1.02)	0.051[b] (0.949)	-0.002[a] (1.148)
Four-Year Degree & Up	-0.179 (0.939)	-0.203 (0.853)	-0.054 (1.299)
Poor Student-Teacher Interaction			
All	0.062 (1.025)	0.039[b] (0.926)	0.229[a] (1.337)
Less than High School	0.593 (1.216)	0.635 (1.172)	0.771 (1.284)
High School/Some College	0.085 (1.022)	0.072[b] (0.923)	0.185[a] (1.247)
Four-Year Degree & Up	-0.129 (0.880)	-0.137[b] (0.798)	0.038[a] (1.369)

Continued

Table 21. Sample Descriptives of Learning Conditions in Adolescence by Race/Ethnicity and Educational Attainment

[a] significantly different than whites, [b] significantly different than blacks,(all significant levels at least greater than .05).

Table 21 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Problems with School Work			
All	0.169 (1.001)	0.059[b] (0.913)	-0.168[a] (1.234)
Less than High School	0.281 (1.179)	0.399 (1.139)	0.077 (1.240)
High School/Some College	0.0295 (1.002)	0.081[b] (0.912)	-0.178[a] (1.193)
Four-Year Degree & Up	-0.081 (0.902)	-0.047[b] (0.822)	-0.268[a] (1.237)
Parental Educational Involvement (%)			
All	95.18 (0.214)	95.15 (0.199)	96.30 (0.222)
Less than High School	92.02 (0.249)	89.63[b] (0.266)	95.99[a] (0.189)
High School/Some College	95.26 (0.211)	95.57 (0.188)	95.69 (0.232)
Four-Year Degree & Up	95.95 (0.204)	95.62[b] (0.195)	98.04[a] (0.190)
College Enrollment Expectations			
All	4.107 (1.176)	4.156 (1.073)	4.094 (1.392)
Less than High School	3.216 (1.316)	3.064[b] (1.206)	3.564[a] (1.462)
High School/Some College	3.928 (1.195)	3.943[b] (1.103)	4.003[a] (1.337)
Four-Year Degree & Up	4.718 (0.647)	4.752[b] (0.559)	4.644[a] (0.969)
Learning Conditions—Institutional			
Public (%)			
All	93.72 (0.243)	93.05 (0.235)	95.86 (0.234)
Less than High School	99.03 (0.090)	99.30 (0.0726)	98.35 (0.123)
High School/Some College	94.99 (0.216)	94.42 (0.209)	97.48 (0.179)
Four-Year Degree & Up	89.63 (0.316)	89.38 (0.294)	89.61 (0.419)

Continued

Table 21 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Urban (%)			
All	26.12 (0.439)	19.31 (0.365)	29.91 (0.539)
Less than High School	31.16 (0.426)	18.77[b] (0.341)	34.93[a] (0.462)
High School/Some College	26.40 (0.438)	19.14 (0.359)	26.75 (0.51)
Four-Year Degree & Up	24.07 (0.443)	19.71 (0.379)	33.55 (0.649)
Suburban (%)			
All	57.29 (0.495)	61.25 (0.451)	56.33 (0.584)
Less than High School	51.91 (0.459)	57.33 (0.432)	55.44 (0.482)
High School/Some College	55.78 (0.493)	59.69 (0.448)	57.92 (0.565)
Four-Year Degree & Up	61.85 (0.503)	64.72 (0.456)	54.30 (0.684)
Rural (%)			
All	16.58 (0.372)	19.44 (0.366)	13.77 (0.405)
Less than High School	16.93 (0.345)	23.89 (0.372)	9.62 (0.286)
High School/Some College	17.81 (0.379)	21.16 (0.373)	15.33 (0.412)
Four-Year Degree & Up	14.08 (0.360)	15.56 (0.346)	12.15 (0.449)
Small-Medium (%)			
All	65.22 (0.476)	67.74 (0.433)	71.99 (0.528)
Less than High School	70.70 (0.419)	74.38 (0.381)	74.61 (0.422)
High School/Some College	65.42 (0.472)	68.37 (0.425)	73.94 (0.502)
Four-Year Degree & Up	63.22 (0.499)	65.22 (0.455)	63.84 (0.660)

Continued

Table 21 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Inexperienced Teachers (%)			
All	9.68 (0.136)	9.63 (0.133)	9.86 (0.148)
Less than High School	8.61 (0.095)	8.18 (0.973)	9.09 (0.086)
High School/Some College	9.33 (0.126)	9.11 (0.119)	9.79 (0.146)
Four-Year Degree & Up	10.73 (0.167)	10.91 (0.161)	10.85 (0.189)
Teachers w/ Master's (%)			
All	49.53 (24.88)	50.24 (0.232)	49.39 (0.267)
Less than High School	46.28 (0.225)	46.52 (0.215)	47.87 (0.232)
High School/Some College	49.03 (0.244)	49.80 (0.229)	48.87 (0.248)
Four-Year Degree & Up	51.56 (0.263)	51.87 (0.238)	50.65 (0.338)
Parents in PTA (%)			
All	35.22 (0.169)	35.13 (0.158)	37.66 (0.184)
Less than High School	30.66 (0.124)	29.57 (0.117)	33.95 (0.118)
High School/Some College	33.14 (0.151)	32.76 (0.139)	36.09 (0.175)
Four-Year Degree & Up	40.31 (0.197)	40.34 (0.185)	44.93 (0.225)
College Prep English Enrollment (%)			
All	42.31 (32.2)	43.71 (0.294)	39.83 (0.393)
Less than High School	31.73 (0.269)	34.11 (0.257)	29.55 (0.276)
High School/Some College	39.85 (0.308)	40.91 (0.278)	36.79 (0.362)
Four-Year Degree & Up	50.68 (0.351)	50.96 (0.316)	55.98 (0.487)

Continued

Table 21 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Student Racial Composition (2/3 White or above)			
All	28.73 (0.453)	39.27[b] (0.452)	0.724[a] (0.099)
Less than High School	27.89 (0.413)	45.12[b] (0.434)	0.00[a] (0.00)
High School/Some College	29.34 (0.452)	41.59[b] (0.450)	0.683[a] (0.094)
Four-Year Degree & Up	27.79 (0.464)	34.07[b] (0.452)	1.281[a] (0.154)
Class Size			
All	25.47 (4.93)	24.74[b] (4.42)	26.33[a] (5.46)
Less than High School	25.70 (4.258)	24.50[b,c] (3.979)	26.63[a] (3.66)
High School/Some College	25.41 (4.948)	24.58[b] (4.365)	26.46[a] (5.25)
Four-Year Degree & Up	25.51 (5.09)	25.10 (4.579)	26.30 (6.185)

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Socioeconomic Status			
Employed			
All	65.43 (0.476)	65.57 (0.439)	63.04 (0.539)
Less than High School	55.73 (0.457)	56.34 (0.433)	46.79 (0.484)
High School/Some College	65.89 (0.471)	66.12 (0.433)	63.94 (0.550)
Four-Year Degree & Up	67.42 (0.485)	66.65 (0.449)	72.03 (0.616)

Continued

Table 22. Sample Descriptives of Living Conditions in Young Adulthood by Race/Ethnicity and Educational Attainment

[a] significantly different than whites, [b] significantly different than blacks,(all significant levels at least greater than .05).

Table 22 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Financial Hardship			
All	24.94 (0.433)	23.02[b] (0.389)	34.10[a] (0.559)
Less than High School	44.82 (0.458)	47.39[c] (0.436)	48.01[c] (0.484)
High School/Some College	29.61 (0.453)	28.58[b] (0.413)	35.17[a] (0.546)
Four-Year Degree & Up	9.99 (0.309)	8.33[b] (0.264)	23.05[a,c] (0.579)
Wealth-Positive			
All	61.62 (0.486)	64.87[b] (0.442)	48.58[a,c] (0.589)
Less than High School	50.87 (0.462)	51.10[b] (0.439)	37.13[a] (0.466)
High School/Some College	61.33 (0.484)	64.42[b] (0.438)	50.43[a] (0.572)
Four-Year Degree & Up	65.16 (0.491)	68.42[b] (0.442)	49.42[a] (0.685)
Wealth-Zero			
All	17.44 (0.379)	20.67[b] (0.375)	25.87[a] (0.517)
Less than High School	25.76 (0.404)	27.76 (0.394)	30.02 (0.443)
High School/Some College	19.37 (0.393)	19.27 (0.361)	23.07 (0.482)
Four-Year Degree & Up	22.59 (0.431)	21.54[b] (0.391)	31.62[a] (0.637)
Wealth-Negative (reference)			
All	20.94 (0.407)	14.46[b] (0.325)	25.55[a] (0.515)
Less than High School	23.37 (0.391)	21.14[b] (0.359)	32.85[a] (0.453)
High School/Some College	19.30 (0.393)	16.32[b,c] (0.338)	26.49[a] (0.505)
Four-Year Degree & Up	12.25 (0.338)	10.03[b] (0.285)	18.96[a] (0.537)

Continued

Table 22 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Financial Hardship			
All	24.94 (0.433)	23.02[b] (0.389)	34.10[a] (0.559)
Less than High School	44.82 (0.458)	47.39[c] (0.436)	48.01[c] (0.484)
High School/Some College	29.61 (0.453)	28.58[b] (0.413)	35.17[a] (0.546)
Four-Year Degree & Up	9.99 (0.309)	8.33[b] (0.264)	23.05[a,c] (0.579)
Wealth-Positive			
All	61.62 (0.486)	64.87[b] (0.442)	48.58[a,c] (0.589)
Less than High School	50.87 (0.462)	51.10[b] (0.439)	37.13[a] (0.466)
High School/Some College	61.33 (0.484)	64.42[b] (0.438)	50.43[a] (0.572)
Four-Year Degree & Up	65.16 (0.491)	68.42[b] (0.442)	49.42[a] (0.685)
Wealth-Zero			
All	17.44 (0.379)	20.67[b] (0.375)	25.87[a] (0.517)
Less than High School	25.76 (0.404)	27.76 (0.394)	30.02 (0.443)
High School/Some College	19.37 (0.393)	19.27 (0.361)	23.07 (0.482)
Four-Year Degree & Up	22.59 (0.431)	21.54[b] (0.391)	31.62[a] (0.637)
Wealth-Negative (reference)			
All	20.94 (0.407)	14.46[b] (0.325)	25.55[a] (0.515)
Less than High School	23.37 (0.391)	21.14[b] (0.359)	32.85[a] (0.453)
High School/Some College	19.30 (0.393)	16.32[b,c] (0.338)	26.49[a] (0.505)
Four-Year Degree & Up	12.25 (0.338)	10.03[b] (0.285)	18.96[a] (0.537)
Enrolled in College			
All	16.16 (0.368)	15.83 (0.338)	17.49 (0.447)
Less than High School	4.96 (0.199)	3.52[b] (0.161)	8.27[a] (0.267)
High School/Some College	16.93 (0.372)	16.65 (0.340)	18.42 (0.444)
Four-Year Degree & Up	18.01 (0.398)	17.13 (0.359)	20.75 (0.557)

Continued

Table 22 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Incarceration since 18 (months)			
All	2.22 (5.78)	1.962[b] (5.022)	2.949[a] (8.161)
Less than High School	5.44 (7.690)	4.961 (6.575)	6.629 (10.16)
High School/Some College	2.55 (6.143)	2.381 (5.534)	3.002 (7.719)
Four-Year Degree & Up	0.611 (2.802)	0.601 (2.557)	0.801 (4.252)
Family Structure			
Single Parent			
All	22.19 (0.416)	17.12[b] (0.349)	43.41[a] (0.584)
Less than High School	43.24 (0.457)	39.97[b] (0.430)	55.38[a] (0.481)
High School/Some College	27.39 (0.443)	22.05[b] (0.379)	50.71[a,c] (0.571)
Four-Year Degree & Up	6.06 (0.247)	3.97[b] (0.186)	16.48[a] (0.506)
Married			
All	39.70 (0.489)	43.77 (0.459)	22.85 (0.494)
Less than High School	32.56 (0.133)	34.83 (0.419)	20.89 (0.394)
High School/Some College	40.09 (0.487)	44.47 (0.455)	21.37 (0.468)
Four-Year Degree & Up	41.99 (0.510)	44.49 (0.473)	28.02 (0.612)
Number of Children			
All	0.874 (1.13)	0.779[b] (0.956)	1.193[a] (1.593)
Less than High School	1.563 (1.321)	1.427[b] (1.148)	1.888[a] (1.148)
High School/Some College	1.029 (1.121)	0.956[b] (0.963)	1.297[a] (1.488)
Four-Year Degree & Up	0.367 (0.795)	0.336[b] (0.678)	0.532[a] (1.298)

Continued

Table 22 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Work-Family Conflict			
Family Interferes with Work			
All	3.879 (1.166)	3.891 (1.092)	3.889 (1.326)
Less than High School	3.716 (1.126)	3.753 (1.130)	3.722 (1.092)
High School/Some College	3.799 (1.179)	3.799 (1.101)	3.846 (1.298)
Four-Year Degree & Up	4.083 (1.111)	4.076 (1.038)	4.108 (1.457)
Cut Back Hours Due to Family			
All	3.479 (0.084)	3.496 (0.769)	3.462 (1.026)
Less than High School	3.377 (0.849)	3.381 (0.809)	3.399 (0.883)
High School/Some College	3.434 (0.866)	3.442 (0.7920	3.434 (1.013)
Four-Year Degree & Up	3.602 (0.760)	3.609 (0.700)	3.575 (1.071)
Cut Back Family Time Due to Work			
All	2.811 (1.111)	2.782[b] (1.029)	2.912[a] (1.322)
Less than High School	2.757 (1.079)	2.626 (1.042)	2.999 (1.099)
High School/Some College	2.778 (1.115)	2.738 (1.031)	2.877 (1.282)
Four-Year Degree & Up	2.887 (1.013)	2.888 (1.009)	2.966 (1.511)

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.096*** (0.508)	0.067*** (0.644)	0.006*** (1.104)
Less than High School	**2.112*** (0.327)	**1.518*** (0.192)	**2.205**** (0.338)
Four-Year Degree & Up	**0.428**** (0.261)	**0.413**** (0.279)	**0.364** (0.317)

Continued

Table 23. Multi-Level Logistic Regression Results--Learning Conditions in Adolescence on Reporting Fair/Poor Self-Rated Health

***p<.001; **p<.01; *p<.05; †p<.10

Table 23 continued

All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*	**All** *n=8,601*
Female	1.270† (0.129)	1.291† (0.147)	1.406*** (0.235)
Foreign-Born	1.199 (0.236)	0.597 (0.602)	16.851*** (0.723)
Age	1.029 (0.039)	1.043 (0.052)	1.056 (0.099)
Individual-Level			
Poor School Integration	1.200*** (0.052)	1.231** (0.064)	1.186 (0.112)
Poor Teacher-Student Interaction	1.152* (0.061)	1.186* (0.083)	1.164 (0.110)
School Work Scale	1.049 (0.052)	1.125* (0.060)	1.032 (0.085)
Parental Involvement	0.782 (0.037)	1.441 (0.365)	0.427† (0.472)
College Expectations	0.973 (0.063)	0.922 (0.069)	0.938 (0.081)
School-Level			
Student Racial Composition (2/3 White)	0.825 (0.166)	1.179 (0.163)	------[7]
Parents in PTA *(grand mean centered)*	0.915 (0.345)	2.102 (0.373)	2.527 (1.127)
Small/Medium	1.188 (0.18)	1.209 (0.188)	0.895 (0.289)
Rural	0.793 (0.158)	0.822 (0.234)	0.757 (0.391)
Suburban	0.801† (0.130)	0.757 (0.212)	1.159 (0.233)
Public	1.344† (0.174)	1.527 (0.319)	2.331 (0.659)
Teachers w/Masters *(grand-mean centered)*	1.001 (0.003)	1.001 (0.006)	1.002 (0.005)
Inexperienced Teachers *(grand-mean centered)*	0.991† (0.005)	1.002 (0.006)	1.014 (0.011)
Class Size *(grand-mean centered)*	1.015 (0.010)	0.998 (0.018)	0.970* (0.022)
College Prep English *(grand-mean centered)*	1.001 (0.002)	1.002* (0.003)	0.994 (0.004)

[7] The "student racial composition" variable is *not* included in black-only models due to small number of blacks enrolled in schools in which 2/3 of the student body is white (see Table 22).

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.185*** (0.434)	0.179 (0.689)	0.007*** (3.903)
Less than High School	1.878† (0.324)	1.398† (0.197)	2.029** (0.236)
Four-Year Degree & Up	0.441** (0.268)	0.396** (0.310)	0.399*** (0.279)
Female	1.105 (0.144)	1.149 (0.146)	1.258 (0.194)
Foreign Born	1.165 (0.249)	0.711 (0.625)	14.73*** (3.187)
Age	1.026 (0.041)	1.075 (0.056)	1.058 (0.073)
Learning Conditions in Adolescence—School Level			
Racial Composition (2/3 White)	0.903 (0.157)	1.144 (0.166)	----------
Parents in PTA *(grand-mean centered)*	1.224 (0.316)	2.345* (0.408)	3.706 (1.206)
Small or Medium	1.165 (0.129)	1.200 (0.194)	0.873 (0.373)
Rural	0.810 (0.153)	0.854 (0.239)	0.876 (0.486)
Suburban	0.829 (0.134)	0.753 (0.197)	1.257 (0.317)
Public	1.239 (0.176)	1.444 (0.308)	2.215 (0.668)
Teachers w/Masters *(grand-mean centered)*	0.999 (0.002)	1.002 (0.004)	1.002 (0.006)
Inexperienced Teachers *(grand-mean centered)*	0.993 (0.004)	0.998 (0.005)	1.016 (0.013)
Class Size *(grand-mean centered)*	1.009 (0.011)	0.996 (0.018)	0.969 (0.032)
College Prep *(grand-mean centered)*	1.001 (0.002)	1.002 (0.004)	0.994 (0.005)
Learning Conditions in Adolescence—Individual Level			
Poor School Integration Scale	1.183*** (0.048)	1.187** (0.064)	1.173† (0.092)
Poor Teacher-Student Interaction Scale	1.129* (0.060)	1.171† (0.086)	1.156† (0.076)
Problems with School Work Scale	1.027 (0.051)	1.084 (0.060)	1.043 (0.084)

Continued

Table 24. Multi-Level Logistic Regression Results--Learning Conditions in Adolescence and Living Conditions in Young Adulthood on Reporting Fair/Poor Self-Rated Health

***p<.001; **p<.01; *p<.05; † p<.10

Table 24 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Parental Educational Involvement	0.794 (0.371)	1.511 (0.337)	0.417* (0.379)
High College Expectations	0.989 (0.060)	0.928 (0.064)	0.957 (0.075)
Living Conditions in Young Adulthood—*Socioeconomic Status*			
Currently Enrolled	0.801† (0.134)	0.771 (0.201)	0.768 (0.258)
Positive Wealth	0.606*** (0.158)	0.637** (0.165)	0.826 (0.238)
Zero Wealth	0.844 (0.167)	0.659† (0.218)	0.979 (0.245)
Financial Hardship	1.486*** (0.142)	1.840** (0.188)	1.604* (0.189)
Currently Employed	0.737* (0.134)	0.506*** (0.188)	1.013 (0.188)
Incarceration since 18 (months)	0.989 (0.013)	0.981 (0.014)	1.002 (0.011)
Living Conditions in Young Adulthood—*Family*			
Married	0.648** (0.167)	0.576* (0.272)	0.834 (0.309)
Number of Children	1.006 (0.067)	0.805* (0.105)	0.983 (0.086)
Single Parent Family	0.804 (0.196)	0.914 (0.263)	1.094 (0.277)
Family Interferes with Work	1.050 (0.081)	0.959 (0.086)	0.839† (0.093)
Reduce Work Hours for Family	0.800† (0.121)	0.853 (0.116)	1.118 (0.127)
Reduce Family Time for Work	0.925 (0.069)	0.980 (0.093)	0.858† (0.081)

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.158*** (0.464)	0.136** (0.754)	0.007 (3.67)
Less than High School	**1.843**† (0.339)	**1.378** (0.252)	**2.166**** (0.239)
Four-Year Degree & Up	**0.441**** (0.282)	**0.386**** (0.339)	**0.399**** (0.293)
Female	1.047 (0.157)	1.099 (0.151)	1.188 (0.203)
Foreign Born	1.257 (0.255)	0.765 (0.625)	17.56 (3.578)
Age	1.020 (0.041)	1.068 (0.063)	1.057 (0.075)
Learning Conditions in Adolescence—*School Level*			
Racial Composition (2/3 white)	0.930 (0.161)	1.168 (0.157)	----------
PTA Involvement	1.319 (0.327)	2.139† (0.406)	4.152 (?????)
Small or Medium	1.176 (0.131)	1.179 (0.177)	0.910 (0.391)
Rural	0.788 (0.155)	0.828 (0.229)	0.795 (0.509)
Suburban	0.813 (0.138)	0.708† (0.199)	1.247 (0.334)
Public	1,217 (0.183)	1.326 (0.301)	2.556 (0.732)
Teachers w/Masters *(grand-mean centered)*	0.999 (0.005)	1.004 (0.003)	1.001 (0.006)
Inexperienced Teachers *(grand-mean centered)*	0.995 (0.005)	0.998 (0.005)	1.016 (0.014)
Class Size *(grand-mean centered)*	1.01 (0.010)	0.999 (0.017)	0.965 (0.034)
College Prep *(grand-mean centered)*	1.001 (0.002)	1.003 (0.003)	0.994 (0.006)
Learning Conditions in Adolescence—Individual Level			
Poor School Integration Scale	1.154** (0.054)	1.175* (0.068)	1.130 (0.097)
Poor Teacher-Student Interaction	1.119† (0.064)	1.172† (0.092)	1.136 (0.078)

Continued

Table 25. Multi-Level Logistic Regression Results--Learning Conditions in Adolescence, Living Conditions in Young Adulthood and Living Conditions in Adolescence on Reporting Fair/Poor Health--Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

Table 25 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Problems with Schoolwork	0.997 (0.056)	1.056 (0.060)	1.020 (0.087)
Parental Involvement	1.132 (0.184)	0.987 (0.051)	2.217† (0.448)
College Expectations	1.01 (0.039)	0.963 (.0204)	1.141 (0.080)
Living Conditions in Adolescence—*Parent's Socioeconomic Status*			
Parent's Education-Less than High school	0.936 (0.221)	0.832 (0.296)	0.857 (0.382)
Parent's Education-High School or Some College	0.929 (0.143)	0.872 (0.177)	0.714 (0.244)
Parental Welfare Receipt	1.149 (0.198)	1.117 (0.257)	1.271 (0.271)
Living Conditions in Adolescence—*Family Structure and Relationships*			
Household Size	1.099* (0.042)	1.034 (0.062)	1.089† (0.049)
Single Parent Household	0.941 (0.153)	1.010 (0.269)	0.755 (0.198)
Family Relationship Scale	0.897 (0.077)	0.939 (0.107)	0.949 (0.092)
Cultural Activities with Parent	0.775† (0.142)	0.684† (0.212)	0.857 (0.261)
Living Conditions in Young Adulthood—*Socioeconomic Status*			
Currently Enrolled in College	0.782 (0.221)	0.766 (0.204)	0.766 (0.262)
Positive Wealth	0.877 (0.221)	.891 (0.233)	0.853 (0.227)
Zero Wealth	0.842 (0.165)	0.872 (0.227)	0.901 (0.247)
Financial Hardship	1.526** (0.142)	1.865** (0.203)	1.560* (0.192)
Employed	0.739* (0.137)	0.503*** (0.182)	1.006 (0.191)
Incarceration since 18 (months)	0.988 (0.013)	0.981 (0.015)	1.000 (0.011)
Living Conditions in Young Adulthood —*Family Structure & Relationships*			
Married	0.654* (0.171)	0.570* (0.286)	0.896 (0.316)

Continued

Table 25 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Number of Children	0.986 (0.066)	0.814† (0.114)	0.967 (0.089)
Single Parent Family	0.815 (0.201)	0.881 (0.262)	1.167 (0.280)
Family Interferes with Work	1.040 (0.080)	0.955 (0.085)	0.828* (0.094)
Reduce Work Hours for Family	0.799† (0.120)	0.849 (0.119)	1.124 (0.131)
Reduce Family Time for Work	0.928 (0.070)	0.980 (0.094)	0.859† (0.082)

	Model 1 Demog	**Model 2** Learning in Young Adult	**Model 3** Learning & Living in Young Adult	**Model 4** Learning & Living (Y.A.) & Living (Adol)
Less than High School				
All	2.453*** (0.267)	2.112* (0.327)	1.878† (0.324)	1.843† (0.339)
White	1.974*** (0.181)	1.518* (0.192)	1.398† (0.197)	1.378 (0.252)
Black	2.574** (0.317)	2.205** (0.338)	2.029** (0.236)	2.166** (0.239)
Four-Year Degree & Up				
All	0.401*** (0.239)	0.428** (0.261)	0.441** (0.268)	0.441** (0.282)
White	0.361*** (0.254)	0.413** (0.279)	0.396** (0.310)	0.386** (0.339)
Black	0.314*** (0.249)	0.364** (0.317)	0.399** (0.279)	0.399** (0.293)
Racial/Ethnic Differences				
Less than High School				
White vs. Black	0.60(B)	0.687 (B)	0.631 (B)	.788 (B)
Four-Year Degree & Up				
White vs. Black	0.047 (B)	0.049 (B)	0.003 (W)	0.013 (W)

Continued

Table 26. Racial/Ethnic Differences in Health Returns to Education for Self-Rated Health

***p<.001; **p<.01; *p<.05; †p<.10

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.538* (0.288)	1.173 (0.479)	0.172* (0.664)
Less than High School	**0.945** (0.184)	**0.797*** (0.114)	**0.850** (0.212)
Four-Year Degree & Up	**0.609***** (0.069)	**0.613***** (0.095)	**0.681** (0.241)
Female	1.185* (0.071)	0.969 (0.095)	0.907*** (0.152)
Foreign-Born	1.185* (0.071)	0.873 (0.389)	1.352 (0.439)
Age	1.044† (0.026)	1.089** (0.032)	0.845** (0.063)
School-Level			
Student Racial Composition (2/3 White)	0.731* (0.134)	0.952 (0.134)	-----
Parents in PTA (%)	0.479** (0.245)	0.474* (0.302)	2.017* (0.696)
Small/Medium	1.157 (0.104)	1.024 (0.116)	1.185 (0.173)
Rural	1.053 (0.159)	0.805 (0.160)	1.097 (0.283)
Suburban	0.849 (0.105)	0.747* (0.126)	1.012 (0.220)
Public	1.053 (0.149)	0.834 (0.172)	1.154 (0.422)
Teachers with Masters	1.004 (0.002)	1.001 (0.003)	0.997 (0.003)
Inexperienced Teachers	0.999 (0.002)	0.993* (0.003)	1.029* (0.011)
Class Size	1.012 (0.011)	0.994 (0.009)	1.038† (0.019)
Individual-Level			
Poor School Integration	1.042 (0.035)	1.080† (0.045)	0.968 (0.060)
Poor Teacher-Student Interaction	0.949 (0.044)	0.947 (0.038)	0.979 (0.081)
Problems with Schoolwork	0.910* (0.037)	0.900* (0.049)	0.921 (0.082)
Parental Educational Involvement	1.132 (0.184)	0.987 (0.051)	2.217† (0.448)
College Expectations	1.01 (0.039)	0.963 (.0204)	1.141 (0.080)

Continued

Table 27. Multi-Level Logistic Regression Results—Learning Conditions in Adolescence on Obesity—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.744 (0.315)	1.678 (0.534)	0.185† (0.899)
Less than High School	**0.982** (0.180)	**0.819** (0.129)	**0.905** (0.196)
Four-Year Degree & Up	**0.556***** (0.080)	**0.568***** (0.105)	**0.584***** (0.143)
Female	1.116 (0.075)	0.931 (0.094)	1.875*** (0.121)
Foreign Born	1.142 (0.177)	0.844 (0.421)	1.442 (0.703)
Age	1.051† (0.027)	1.095** (0.034)	0.833*** (0.047)
Learning Conditions in Adolescence— ***School Level***			
Student Racial Composition (2/3 white)	0.721* (0.133)	0.949 (0.139)	---------
Parents in PTA (%)	0.494*** (0.244)	0.495* (0.294)	0.162 (0.859)
Small/Medium	1.152 (0.103)	1.017 (0.120)	1.204 (0.269)
Rural	1.053 (0.159)	0.808 (0.164)	1.059 (0.329)
Suburban	0.854 (0.108)	0.753* (0.129)	0.999 (0.225)
Public	1.027 (0.153)	0.824 (0.177)	1.086 (0.425)
Teachers with Masters	1.004 (0.002)	1.001 (0.003)	0.997 (0.004)
Inexperienced Teachers	0.999 (0.004)	0.993† (0.004)	1.029* (0.011)
Class Size	1.013 (0.012)	0.995 (0.008)	1.036 (0.023)
College Prep English Enrollment	0.999 (0.002)	0.995* (0.002)	1.006 (0.004)
Learning Conditions in Adolescence— ***Individual Level***			
Poor School Integration	1.045 (0.034)	1.075 (0.046)	0.985 (0.061)
Poor Teacher-Student Interaction	0.959 (0.042)	0.953 (0.038)	0.976 (0.054)
Problems with School Work	0.906 (0.036)	0.896 (0.048)	0.932 (0.056)

Continued

Table 28. Multi-Level Logistic Regression Results—Learning Conditions in Adolescence and Living Conditions in Young Adulthood on Obesity—Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; †p<.10

Table 28 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.744 (0.315)	1.678 (0.534)	0.185† (0.899)
Less than High School	**0.982** (0.180)	**0.819** (0.129)	**0.905** (0.196)
Four-Year Degree & Up	**0.556***** (0.080)	**0.568***** (0.105)	**0.584***** (0.143)
Female	1.116 (0.075)	0.931 (0.094)	1.875*** (0.121)
Foreign Born	1.142 (0.177)	0.844 (0.421)	1.442 (0.703)
Age	1.051† (0.027)	1.095** (0.034)	0.833*** (0.047)
Learning Conditions in Adolescence— ***School Level***			
Student Racial Composition (2/3 white)	0.721* (0.133)	0.949 (0.139)	---------
Parents in PTA (%)	0.494*** (0.244)	0.495* (0.294)	0.162 (0.859)
Small/Medium	1.152 (0.103)	1.017 (0.120)	1.204 (0.269)
Rural	1.053 (0.159)	0.808 (0.164)	1.059 (0.329)
Suburban	0.854 (0.108)	0.753* (0.129)	0.999 (0.225)
Public	1.027 (0.153)	0.824 (0.177)	1.086 (0.425)
Teachers with Masters	1.004 (0.002)	1.001 (0.003)	0.997 (0.004)
Inexperienced Teachers	0.999 (0.004)	0.993† (0.004)	1.029* (0.011)
Class Size	1.013 (0.012)	0.995 (0.008)	1.036 (0.023)
College Prep English Enrollment	0.999 (0.002)	0.995* (0.002)	1.006 (0.004)
Learning Conditions in Adolescence— ***Individual Level***			
Poor School Integration	1.045 (0.034)	1.075 (0.046)	0.985 (0.061)
Poor Teacher-Student Interaction	0.959 (0.042)	0.953 (0.038)	0.976 (0.054)
Problems with School Work	0.906 (0.036)	0.896 (0.048)	0.932 (0.056)

Continued

Table 28 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Parental Educational Involvement	1.134 (0.183)	0.965 (0.207)	2.247 (0.329)
College Expectations	1.014 (0.041)	0.986* (0.053)	1.132* (0.055)
Living Conditions in Young Adulthood — *Parental Socioeconomic Status*			
Currently Enrolled in College	0.893 (0.109)	0.907 (0.139)	1.084 (0.148)
Positive Wealth	0.744*** (0.086)	0.696** (0.121)	0.782 (0.156)
Zero Wealth	0.839 (0.119)	0.767 (0.165)	1.037 (0.177)
Financial Hardship	1.221* (0.089)	1.095 (0.098)	1.111 (0.129)
Employed	0.972 (0.089)	0.989 (0.126)	1.133 (0.121)
Incarceration since 18 (months)	0.969** (0.010)	0.983† (0.009)	0.975* (0.175)
Living Conditions in Young Adulthood — *Family Structure & Relationships*			
Married	1.224* (0.103)	1.272† (0.139)	1.535* (0.175)
Number of Children	0.923 (0.056)	0.918 (0.067)	1.007 (0.061)
Single Parent Family	0.985 (0.149)	0.983 (0.173)	0.761 (0.183)
Family Interferes with Work	1.054 (0.037)	0.994 (0.044)	0.959 (0.062)
Reduce Work Hours for Family	0.956 (0.071)	0.993 (0.048)	1.195* (0.086)
Reduce Family Time for Work	1.018 (0.038)	1.015 (0.048)	0.980 (0.052)

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.649 (0.335)	1.618 (0.532)	0.236 (0.137)
Less than High School	**0.980** (0.181)	**0.822** (0.120)	**0.911** (0.199)
Four-Year Degree & Up	**0.578***** (0.079)	**0.583***** (0.107)	**0.582***** (0.147)
Female	1.091 (0.076)	0.914 (0.097)	1.743*** (0.127)
Foreign Born	1.115 (0.181)	0.818 (0.426)	1.447 (0.719)
Age	1.046 (0.027)	1.094** (0.034)	0.826*** (0.048)
Learning Conditions in Adolescence— ***School Level***			
Students Racial Composition (2/3 white)	0.718* (0.134)	0.942 (0.138)	----------
Parents in PTA	0.515** (0.244)	0.475* (0.304)	0.197† (0.897)
Small/Medium	1.157 (0.104)	1.024 (0.121)	1.206 (0.273)
Rural	1.057 (0.158)	0.812 (0.159)	1.129 (0.336)
Suburban	0.836 (0.106)	0.757* (0.125)	1.073 (0.228)
Public	1.022 (0.144)	0.822 (0.174)	1.055 (0.432)
Teachers with Masters	1.004 (0.002)	1.000 (0.003)	0.998 (0.004)
Inexperienced Teachers	0.999 (0.003)	0.994† (0.003)	1.029* (0.011)
Class Size	1.013 (0.011)	0.994 (0.009)	1.038 (0.023)
College Prep English Enrollment	0.999 (0.002)	0.995* (0.002)	1.006 (0.004)
Learning Conditions in Adolescence— ***Individual Level***			
Poor School Integration Scale	1.036 (0.037)	1.066 (0.049)	0.973 (0.063)
Poor Teacher-Student Interaction	0.952 (0.044)	0.948 (0.039)	0.982 (0.055)

Continued

Table 29. Multi-Level Logistic Regression Results—Learning Conditions in Adolescence, Living Conditions in Young Adulthood and Living Conditions in Adolescence on Obesity--Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; †p<.10

Table 29 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Problems with School Work	0.899** (0.039)	0.888* (0.051)	0.932 (0.057)
Parental Educational Involvement	1.153 (0.187)	0.976 (0.209)	2.353* (0.335)
College Expectations	1.028 (0.043)	0.993 (0.053)	1.178** (0.057)
Living Conditions in Adolescence—*Parental Socioeconomic Status*			
Parent's Education-Less than High School	1.084 (0.140)	0.873 (0.191)	1.266 (0.256)
Parent's Education-High School or Some College	1.194 (0.108)	1.063 (0.125)	1.443** (0.139)
Parental Welfare Receipt	1.015 (0.023)	1.098 (0.140)	1.209 (0.159)
Living Conditions in Adolescence—*Socioeconomic Status*			
Household Size	1.005 (0.023)	0.996 (0.030)	0.921* (0.035)
Single Parent Household	1.059 (0.112)	1.251 (0.147)	0.717** (0.122)
Family Relationship Scale	0.957 (0.043)	0.961 (0.052)	0.937 (0.061)
Cultural Activities with Parent	0.973 (0.103)	0.932 (0.107)	0.943 (0.187)
Living Conditions in Young Adulthood —*Socioeconomic Status*			
Currently Enrolled in College	0.896 (0.105)	0.902 (0.139)	1.117 (0.157)
Positive Wealth	0.756*** (0.084)	0.701** (0.118)	0.777 (0.158)
Zero Wealth	0.842 (0.119)	0.772 (0.167)	1.037 (0.178)
Financial Hardship	1.229* (0.091)	1.080 (0.100)	1.168 (0.132)
Employed	0.967 (0.089)	0.985 (0.126)	1.103 (0.123)
Incarceration since 18 (months)	0.969** (0.009)	0.983† (0.009)	0.975* (0.010)

Continued

Table 29 continued

Living Conditions in Young Adulthood —*Family Structure & Relationships*			
Married	1.229* (0.102)	1.287† (0.139)	1.531* (0.178)
Number of Children	0.918 (0.055)	0.915 (0.067)	1.008 (0.063)
Single Parent Family	0.982 (0.148)	0.983 (0.173)	0.765 (0.187)
Family Interferes with Work	1.059 (0.037)	1.005 (0.043)	0.963 (0.063)
Reduce Work Hours for Family	0.954 (0.072)	0.991 (0.048)	1.191* (0.087)
Reduce Family Time for Work	1.020 (0.038)	1.013 (0.048)	0.988 (0.053)

	Model 1 Demog	**Model 2** Learning in Young Adult	**Model 3** Learning & Living in Young Adult	**Model 4** Learning & Living (Y.A.) & Living (Adol)
Less than High School				
All	0.915 (0.170)	0.945 (0.184)	0.982 (0.180)	0.980 (0.181)
White	0.792† (0.127)	0.797* (0.114)	0.819 (0.129)	0.822 (0.120)
Black	0.738 (0.247)	0.850 (0.212)	0.905 (0.196)	0.991 (0.199)
Four-Year Degree & Up				
All	0.621*** (0.067)	0.609*** (0.069)	0.556*** (0.80)	0.578*** (0.079)
White	0.592*** (0.097)	0.613*** (0.095)	0.568*** (0.105)	0.583*** (0.107)
Black	0.713† (0.204)	0.681 (0.241)	0.584*** (0.143)	0.582*** (0.147)
Racial/Ethnic Differences				
Less than High School				
White vs. Black	0.054 (B)	0.184 (W)	0.086 (W)	0.169 (W)
Four-Year Degree & Up				
White vs. Black	0.121 (W)	0.068 (W)	0.016 (W)	0.001 (B)

Table 30. Racial/Ethnic Differences in Health Returns to Education for Obesity

***p<.001; **p<.01; *p<.05; † p<.10

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.473* (0.034)	0.248* (0.640)	0.349 (0.846)
Less than High School	**1.074** (0.147)	**1.229**† (0.192)	**0.887** (0.242)
Four-Year Degree & Up	**0.778*** (0.115)	**0.669***** (0.111)	**0.819** (0.389)
Female	0.355*** (0.098)	0.331*** (0.108)	0.479*** (0.183)
Foreign-Born	0.355 (0.098)	2.092 (0.639)	0.861 (0.656)
Age	1.066* (0.027)	1.054† (0.031)	1.106* (0.052)
School-Level			
Student Racial Composition (2/3 white)	1.016 (0.095)	1.028 (0.102)	-------
Parents in PTA (%)	1.324 (0.372)	1.149 (0.328)	0.785 (0.002)
Small/Medium	1.084 (0.093)	1.008 (0.112)	1.128 (0.193)
Rural	0.918 (0.109)	0.793 (0.141)	0.457* (0.318)
Suburban	0.958 (0.088)	0.894 (0.124)	0.819 (0.140)
Public	1.073 (0.001)	1.061 (0.134)	1.468 (0.432)
Teachers with Masters	1.002 (0.001)	1.002 (0.001)	0.997 (0.003)
Inexperienced Teachers	0.999 (0.001)	0.996 (0.004)	1.016* (0.006)
Class Size	1.001 (0.008)	0.985† (0.009)	1.006 (0.020)
College Prep English Enrollment	0.998 (0.001)	0.996* (0.002)	0.999 (0.002)
Individual-Level			
Poor School Integration	1.007 (0.051)	1.032 (0.053)	0.951 (0.091)
Poor Teacher-Student Interaction	0.967 (0.045)	0.906† (0.056)	0.911 (0.057)
Problems with Schoolwork	0.942 (0.043)	0.894* (0.055)	0.994 (0.088)
Parental Educational Involvement	0.873 (0.232)	0.876 (0.278)	1.222 (0.041)
College Expectations	0.960 (0.041)	1.031 (0.071)	1.041 (0.091)

Table 31. Multi-Level Logistic Regression Results--Learning Conditions in Adolescence on Hypertension--Odds Ratio (Standard Errors)

***p<.001; **p<.01; *p<.05; † p<.10

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.609 (0.349)	0.397 (0.649)	0.523 (0.956)
Less than High School	**1.137** (0.131)	**1.391**† (0.175)	**0.904** (0.217)
Four-Year Degree & Up	**0.716**** (0.121)	**0.583***** (0.122)	**0.822** (0.166)
Female	0.348*** (0.101)	0.354*** (0.101)	0.485*** (0.141)
Foreign Born	1.144 (0.235)	2.281 (0.638)	0.769 (0.726)
Age	1.095*** (0.028)	1.099** (0.034)	1.138* (0.052)
Learning Conditions in Adolescence— ***School Level***			
Racial Composition	1.044 (0.092)	1.011 (0.101)	----------
Parents in PTA	1.311 (0.351)	1.081 (0.397)	0.977 (0.891)
Small/Medium	1.081 (0.092)	1.074 (0.105)	1.103 (0.276)
Rural	0.917 (0.104)	0.801 (0.142)	0.489* (0.352)
Suburban	0.949 (0.087)	0.836 (0.115)	0.896 (0.232)
Public	1.050 (0.112)	1.078 (0.131)	1.354 (0.457)
Teachers with Masters	1.001 (0.001)	1.002 (0.001)	0.998 (0.005)
Inexperienced Teachers	0.999 (0.003)	0.998 (0.004)	1.017 (0.010)
Class Size	0.997 (0.007)	0.982* (0.009)	1.012 (0.024)
College Prep English Enrollment	0.998† (0.001)	0.996* (0.002)	0.998 (0.004)
Learning Conditions in Adolescence— ***Individual Level***			
Poor School Integration	1.001 (0.054)	1.039 (0.054)	0.975 (0.069)
Poor Teacher-Student Interaction	0.967 (0.041)	0.923 (0.051)	0.892† (0.062)

Continued

Table 32. Multi-Level Logistic Regression Results--Learning Conditions in Adolescence and Living Conditions in Young Adulthood on Hypertension--Odds Ratio (Standard Errors)

***p<.001; **p<.01; *p<.05; †p<.10

Table 32 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Problems with Schoolwork	0.940 (0.042)	0.897† (0.057)	0.977 (0.064)
Parental Educational Involvement	0.964 (0.039)	0.835 (0.227)	1.723 (0.375)
College Expectations	0.893 (0.238)	1.007 (0.052)	1.031 (0.061)
Living Conditions in Young Adulthood —*Socioeconomic Status*			
Currently Enrolled in College	1.068 (0.134)	0.835 (0.227)	1.067 (0.175)
Positive Wealth	0.818 (0.133)	0.885 (0.155)	0.735 (0.161)
Zero Wealth	0.859 (0.167)	0.998 (0.159)	0.649 (0.186)
Financial Hardship	1.124 (0.198)	0.974 (0.147)	0.814 (0.153)
Employed	0.869† (0.079)	0.858 (0.095)	0.692** (0.138)
Incarceration since 18 (months)	0.981 (0.012)	0.982 (0.013)	1.004 (0.009)
Living Conditions in Young Adulthood —*Family Structure & Relationships*			
Married	0.765† (0.144)	0.679* (0.154)	0.924 (0.197)
Number of Children	0.935 (0.077)	0.883 (0.092)	0.996 (0.068)
Single Parent Family	0.932 (0.017)	0.696* (0.154)	1.001 (0.202)
Family Interferes with Work	0.947 (0.094)	1.045 (0.072)	0.794** (0.070)
Reduce Work Hours for Family	1.203 (0.119)	1.021 (0.086)	1.588** (0.104)
Reduce Family Time for Work	0.999 (0.035)	0.984 (0.047)	1.031 (0.060)

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Intercept	0.627 (0.329)	0.393 (0.652)	0.963 (0.175)
Less than High School	**1.116** (0.131)	**1.407**† (0.176)	**0.898** (0.225)
Four-Year Degree & Up	**0.761*** (0.129)	**0.585***** (0.122)	**0.963** (0.175)
Female	0.341*** (0.108)	0.356*** (0.104)	0.462*** (0.151)
Foreign Born	1.129 (0.240)	2.260 (0.631)	0.462*** (0.151)
Age	1.090** (0.028)	1.099** (0.031)	0.749 (0.779)
Learning Conditions in Adolescence— ***School Level***			
Racial Composition (2/3 white)	1.059 (0.095)	1.012 (0.101)	---------
Parents in PTA (%)	1.426 (0.344)	1.060 (0.387)	1.581 (0.907)
Small/Medium	1.085 (0.094)	1.081 (0.104)	1.109 (0.275)
Rural	0.926 (0.104)	0.808 (0.141)	0.529† (0.357)
Suburban	0.959 (0.087)	0.841 (0.114)	0.965 (0.235)
Public	1.036 (0.115)	1.075 (0.134)	1.088 (0.466)
Teachers with Masters	1.001 (0.001)	1.002 (0.001)	0.998 (0.005)
Inexperienced Teachers	1.000 (0.003)	0.998 (0.004)	1.019 (0.010)
Class Size	0.997 (0.007)	0.982* (0.009)	1.024 (0.024)
College Prep English Enrollment	0.998 (0.001)	0.996* (0.002)	0.999 (0.004)
Learning Conditions in Adolescence— ***Individual Level***			
Poor School Integration	1.002 (0.056)	1.045 (0.057)	0.998 (0.075)
Poor Teacher-Student Interaction	0.964 (0.042)	0.923 (0.052)	0.887† (0.070)
Problems with Schoolwork	0.939 (0.041)	0.903† (0.054)	0.999 (0.067)

Continued

Table 33. Multi-Level Logistic Regression Results--Learning Conditions in Adolescence, Living Conditions in Young Adulthood and Living Conditions in Adolescence on Hypertension--Odds Ratios (Standard Errors)

***p<.001; **p<.01; *p<.05; †p<.10

Table 33 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Parental Educational Involvement	0.892 (0.236)	0.823 (0.276)	1.503 (0.420)
College Expectations	0.977 (0.034)	1.003 (0.054)	1.057 (0.065)
Living Conditions in Adolescence—*Parental Socioeconomic Status*			
Parent's Education-Less than High school	0.942 (0.143)	0.967 (0.185)	0.730 (0.309)
Parent's Education-High School or Some College	**0.796**† **(0.118)**	**0.981 (0.130)**	**0.571**** **(0.176)**
Parental Welfare Receipt	0.998 (0.139)	0.960 (0.193)	1.290 (0.178)
Living Conditions in Adolescence—*Family Structure & Relationships*			
Household Size	1.035 (0.032)	0.971 (0.046)	1.039 (0.040)
Single Parent Household	1.147 (0.091)	1.108 (0.136)	1.168 (0.144)
Family Relationship Scale	0.987 (0.045)	1.017 (0.058)	1.079 (0.073)
Cultural Activities with Parent	1.053 (0.136)	1.102 (0.146)	1.365 (0.216)
Living Conditions in Young Adulthood—*Socioeconomic Status*			
Currently Enrolled in College	1.083 (0.133)	1.189 (0.155)	1.153 (0.180)
Positive Wealth	0.840 (0.130)	0.883 (0.159)	0.761 (0.187)
Zero Wealth	0.859 (0.166)	0.883 (0.156)	0.682† (0.215)
Financial Hardship	1.129 (0.205)	0.963 (0.149)	0.809 (0.158)
Employed	0.868† (0.079)	0.854† (0.096)	0.711* (0.143)
Incarceration since 18 (months)	0.980† (0.012)	0.981 (0.013)	0.997 (0.009)
Living Conditions in Young Adulthood —*Family Structure & Relationships*			
Married	0.764† (0.144)	0.683** (0.155)	0.912 (0.205)
Number of Children	0.932 (0.076)	0.884 (0.094)	0.812** (0.074)
Single Parent Family	0.919 (0.171)	0.695* (0.168)	0.985 (0.208)

Continued

Table 33 continued

	All *n=8,601*	**White** *n=4,960*	**Black** *n=1,527*
Single Parent Family	0.919 (0.171)	0.695* (0.168)	0.985 (0.208)
Family Interferes with Work	0.951 (0.094)	1.051 (0.072)	0.812** (0.074)
Reduce Work Hours for Family	1.202 (0.119)	1.019 (0.087)	1.607*** (0.111)
Reduce Family Time for Work	1.002 (0.035)	0.982 (0.047)	1.033 (0.065)

	Model 1 Demog	**Model 2** Learning in Young Adult	**Model 3** Learning & Living in Young Adult	**Model 4** Learning & Living (Y.A.) & Living (Adol)
Less than High School				
All	1.104 (0.200)	1.074 (0.147)	1.137 (0.131)	1.116 (0.131)
White	1.238 (0.263)	1.229† (0.192)	1.391† (0.175)	1.407† (0.176)
Black	0.841 (0.372)	0.887 (0.242)	0.904 (0.217)	0.898 (0.225)
Four-Year Degree & Up				
All	0.594*** (0.141)	0.778* (0.115)	0.716** (0.121)	0.761* (0.129)
White	0.659** (0.150)	0.669*** (0.111)	0.583*** (0.122)	0.585*** (0.122)
Black	0.569 (0.544)	0.819 (0.389)	0.822 (0.166)	0.963 (0.175)
Racial/ethnic Differences				
Less than High School				
White vs. Black	0.397 (W)	0.342 (W)	0.487 (W)	0.509 (W)
Four-Year Degree & Up				
White vs. Black	0.09 (W)	0.150 (W)	0.239 (W)	0.378 (W)

Table 34. Racial/Ethnic Differences in Health Returns to Education for Hypertension

***p<.001; **p<.01; *p<.05; †p<.10

Chapter 7: Conclusions

The objectives of this dissertation were to assess whether there are racial/ethnic differences in health returns to education and to examine whether living and learning conditions in adolescence contribute to differential health returns to education across racial/ethnic groups. Results from this research indicate that there are racial/ethnic disparities in health returns for all health indicators and that living and learning conditions in adolescence and young adulthood both *increase* and *decrease* racial/ethnic disparities in health returns to education depending on the health outcome and level of education.

Are there racial/ethnic disparities in health returns to education?

Figures 2 through 7 facilitate an assessment of how racial/ethnic differences in health returns to education vary across racial/ethnic groups, levels of education and health indicators. These figures display the odds of reporting fair or poor health for those without a high school diploma compared to those with a high school diploma or some college (i.e. health returns to a high school diploma or some college) (Figures 2, 4 and 6). Figures 3, 5 and 7 compares the odds of reporting fair or poor health for those with a

four-year degree and higher to those with a high school diploma or some college (i.e. health returns to a four-year degree or higher). For Figures 3, 5, and 7, odds ratios are subtracted from one to facilitate a more intuitive assessment of which racial/ethnic groups obtain higher health returns to education.

Model 1 adjusts for *demographic* controls, Model 2 adjusts for *living* conditions in adolescence, Model 3 adjusts for *learning* conditions in adolescence and Model 4 adjusts for learning conditions in adolescence *and* living conditions in both adolescence and young adulthood. Each bar represents health returns to education for the combined sample ("all"), whites, blacks and Hispanics. Bars with horizontal lines indicate that a health return is *not* statistically significant. For example, for Figure 2, Hispanics do not obtain health returns to a high school diploma or some college while blacks, whites and the combined sample do. There are no data points (bars) for Hispanics for Models 3 and 4 since Hispanics were dropped from these models due to the small sample of Hispanics at the school level.

To assess whether there are differential health returns to education across race/ethnicity, I refer to Model 1, which adjusts for gender, nativity and age. *Racial/ethnic differences* in health returns to education are most marked for health returns to a high school diploma or some college for self-rated health (Figure 2) and health returns to a four-year degree or higher for obesity (Figure 5).

In contrast to some of the existing evidence on differential racial/ethnic health returns to education (Ferraro and Farmer 2005; Read and Gorman 2006; Shuey and Wilson 2008), I find that white young adults *are not* the most advantaged racial/ethnic

group in terms of health returns for either self-rated health or obesity. For self-rated health, blacks obtain *higher* health returns to a high school diploma to some college. The odds of reporting fair or poor health for blacks without a high school diploma are over two-and-a-half times higher compared to blacks with a high school diploma or some college. For whites, there is less than a two-fold increase in the odds of fair or poor health among those without a high school diploma compared to those with a high school diploma or some college. Similarly, whites do not obtain higher health returns to education than Hispanics for obesity. Hispanics obtain higher health returns to a four-year degree or higher (OR=0.444) than whites (OR=0.592). However, Kimbro and colleagues' investigation of the education-health gradient among middle-aged men support these findings (2008). These scholars find that the education-self-rated health gradient is steeper for blacks than whites and Hispanics and that the education-obesity gradient is steeper for U.S. born Hispanics than U.S. born blacks or whites.

Although whites did not obtain the highest health returns to education for self-rated health or obesity, whites are the only racial/ethnic group to obtain health returns to education for *all* health indicators assessed in this dissertation. When controlling for demographic characteristics (Model 1), Hispanics obtain health returns to self-rated health and obesity, and blacks obtain health returns to self-rated health. However, whites obtain health returns to all three indicators and are the only racial/ethnic group to obtain health returns to hypertension when controlling only for demographic characteristics.

Do living and learning conditions in adolescence contribute to racial/ethnic inequalities in health returns to education?

Living and learning conditions in adolescence contribute to differential health returns to education for all health indicators by both *increasing* and *decreasing* racial/ethnic differences in health returns. Living conditions in young adulthood decrease black-white disparities in health returns to a four-year degree or higher for both self-rated health and obesity.

Figure 2 shows that for self-rated health, adjusting for learning conditions and living conditions in adolescence *increases* differential health returns to a high school diploma or some college between blacks and whites. Adjusting for learning and living conditions in adolescence decreases health returns to a high school diploma or some college for both blacks and whites; however, these indicators decrease health returns to a high school diploma or some college more so for whites than blacks. The difference in the magnitude of the moderating effect of living and learning conditions in adolescence between blacks and whites creates a racial disparity in the health returns to a high school diploma or some college for self-rated health.

Figure 4 illustrates that for obesity, learning conditions *increase* black-white disparities in health returns to a high school diploma or some college while living conditions in adolescence *decrease* black-white disparities in health returns to a high school diploma or some college. Learning conditions moderate the relationship between education and obesity so that whites sustain a significant health "deficit" to a high school

diploma or some college for obesity while blacks neither obtain a deficit nor return to this credential. This leaves whites at a disadvantage relative to blacks since, for whites, *higher* credentials are associated with *poorer* health. However, after controlling for learning conditions, blacks also sustain a significant "health deficit" to a high school diploma or some college, *narrowing* the disparity between blacks and whites. Learning conditions also *decrease* black-white disparities in health returns to a four-year degree or higher for obesity (Figure 5). When controlling only for demographics, blacks do not obtain health returns to a four-year degree or higher for obesity while whites do. After controlling for learning conditions, blacks obtain health returns to a four-year degree or higher, *decreasing* black-white disparities in health returns for obesity.

Living conditions in adolescence also *increase* racial/ethnic differences in health returns to education for hypertension. Living conditions in adolescence moderate the relationship between education and hypertension for Hispanics so that Hispanics are the only racial/ethnic group to obtain health returns to a high school diploma or some college (Figure 6).

While living and learning conditions appear to both increase *and* decrease differential health returns to education across race/ethnicity, controlling for living conditions in young adulthood (when also adjusting for living and learning conditions in adolescence) typically *narrows* differential returns. For self-rated health, Figure 3 demonstrates that blacks and whites attain almost identical health returns to a four-year degree and higher after controlling for living conditions in adulthood (blacks: OR=0.399; whites: OR=0.396). A similar result is found for health returns to a four-year degree or

higher for obesity. Figure 5 shows that after controlling for living conditions in young adulthood, blacks (OR=0.582) and whites (OR=0.583) obtain similar health returns to a four-year degree or higher.

The only instance in which living conditions in young adulthood increase racial/ethnic health disparities in health returns to education is for self-rated health. Living conditions mediate the relationship between education and self-rated health so that health returns to a high school diploma or some college is not significant for whites, while health returns to this credential remain significant for blacks (Figure 3).

Limitations

Although this dissertation provides rich data on how racial/ethnic disparities in health returns to education vary across racial/ethnic groups, health indicators and levels of education, it is not without limitations. First, although add Health data is longitudinal, this dissertation uses a cross-sectional framework. Using a longitudinal approach would better address the goal of the life course framework to assess how *duration* and *timing* of living and learning conditions influence health returns to education. Longitudinal analysis may also better address unobservable differences among respondents in the propensity to attain higher education and maintain health, which may influence health returns to education.

Furthermore, research indicates that, while educational attainment influences health, health in the early stages of the life course can influence educational attainment

(Case and Paxson 2006; Haas 2006; Warren 2009). Children with suboptimal health face truncated educational attainment compared to those who are healthier during childhood. However, this literature also indicates educational attainment has an effect on health net of childhood health indicators. Nevertheless, adjusting for health earlier in the life course may attenuate the health returns to education found in this research.

Because research indicates that indicators of socioeconomic position are incommensurate across race/ethnicity, I separate analyses by racial/ethnic group to assess how all aspects of the relationships between living and learning conditions during the transition from adolescence to young adulthood to vary by race/ethnicity. However, the relatively small sample size for blacks (n=1,527) may lead to less reliable estimates of health returns to education and the processes that reproduce them. Small sample sizes also prohibited an assessment of how learning conditions contribute to health returns to education for Hispanics.

The lack of a direct influence of living conditions in adolescence on health outcomes may also reflect my chosen operationalization of variables or inclusion of variables. For example, I did not control for household income in either adolescence or adulthood due to a large amount of missing data, but I do control for indicators of financial hardship in both adolescence and young adulthood. Indicators of socioeconomic position such as household income better capture the gradational relationship between education and socioeconomic position than the measures I use in this dissertation which are aimed at capturing poverty.

Due to restrictions in the Add Health data, I was unable to operationalize educational attainment as a continuous indicator. Furthermore, educational attainment data for Add Health is truncated in two ways. First, respondents for Add Health were students in grades seven through twelve during the first wave of data collection, therefore individuals with zero or very low levels of education are not represented. Nonetheless, research indicates that health is more responsive to credentials than years of schooling (Masters, Hummer and Power 2012). Secondly, respondents are between 24 and 34 years of age during Wave IV of data collection, therefore many respondents have not completed their desired levels of educational attainment. However, there were no significant differences in health outcomes between those who were enrolled in college and those who were not enrolled in any of the models in this study. There were also too few students who had achieved advanced professional and/or academic degrees (i.e. J.D., M.D., PhD) to warrant a separate analysis of this group.

Implications and Future Research

The findings of this dissertation have multiple implications for future research, theoretical frameworks and the development of policies aimed at using education policy as health policy to improve population health and reduce health disparities.

Numerous empirical investigations have supported the claim of fundamental cause theory and its theoretical predecessors such as the McKeown thesis that *social*

conditions, such as educational attainment and race/ethnicity, are the most *downstream* causes of health. Nonetheless, the finding that social conditions influence health differentially across racial/ethnic groups indicates that more theorizing is needed to understand how fundamental causes interact with each other to influence health. Applying theories of intersectionality, which explore how the occupation of *multiple* positions within the social hierarchy has consequences for everyday life, may aid in this endeavor. Furthermore, more research is needed to understand why some health outcomes are more responsive to fundamental causes than others. For example, while there is a clear educational gradient for self-rated health, the relationship between education and hypertension is negligible for some racial/ethnic groups. In addition, while fundamental cause theory would imply that those with a high school diploma or some college have a *lower* prevalence of obesity than those without a high school diploma, this study indicates that the reverse is true.

In regards to the lifecourse theory framework, this analysis provides support for the "social chains of risk" model in which indicators of living and learning conditions in adolescence primarily influence health through contemporaneous measures of living conditions and educational attainment in young adulthood. However, in some cases, especially for blacks, indicators of living and learning conditions in adolescence influence health net of living conditions in young adulthood. This suggests that some living and learning conditions can have implications for health later in life as discussed in the "biological chains of risk" model. The finding in which *both* biological and social pathways have implications for health returns to education is similar to Hayward and

Gorman's work on the relationship between childhood living conditions and mortality (2004). Other methodologies such as trajectory models and path analysis may aid in the exploration of how living and learning conditions in adolescence influence health outcomes through setting and solidifying health and socioeconomic trajectories and assessing the relative impact of these pathways across health indicators.

In particular, three findings from this dissertation warrant further investigation. First, more research using varying methodological approaches and nationally representative data sets is needed to corroborate the finding that in comparison to whites, black young adults obtain *higher* health returns to a four-year degree or higher for obesity after controlling for living and learning conditions in adolescence, and that blacks obtain higher health returns to both a four-year degree or higher and a high school diploma or some college for self-rated health. Research finds that the relationship between educational attainment and obesity is especially weak for blacks (Flegal et al. 2010; Kimbro et al. 2008). However, after controlling for living and learning conditions in adolescence, blacks obtain higher returns to a four-year degree for obesity. In addition, research indicates that blacks obtain lower returns to self-rated health (Ferraro and Farmer 2005; Shuey and Wilson 2008), yet results from this study indicate that blacks obtain higher health returns to education for self-rated health and that black-white differences in health returns to education increase after controlling for living and learning conditions in adolescence.

Furthermore, the finding that young adults with a high school diploma or some college have a *higher* prevalence of obesity than those without a high school diploma

calls for more investigation. Other studies also find this relationship (Flegal et al. 2010; Kimbro et al. 2008); nevertheless, it is unclear what mechanisms contribute to this finding. Because this study did not differentiate between weight categories (i.e. underweight, normal weight, class I obesity, etc), it is unclear whether the lower prevalence of obesity among those without a high school diploma is due to a higher prevalence of underweight or normal weight individuals.

More research is also needed to understand why learning and living conditions in adolescence operate differently for blacks and whites. Indicators of living and learning conditions in adolescence and young adulthood are more strongly correlated with educational attainment and health for some racial/ethnic groups than others. School quality indicators that were hypothesized to *decrease* the odds of unfavorable health outcomes *increase* the odds of unfavorable health outcome for blacks. In addition, more work is needed to assess why age is positively associated with obesity for whites and negatively associated with obesity for blacks.

This dissertation also provides implications surrounding the usage of education policy as health policy. Policymakers should be aware that the relationship between educational attainment and health is not "one size fits all". Health returns to education vary by race/ethnicity, health outcome and level of education. For obesity, those with a high school diploma or some college have the *highest* prevalence of obesity. Therefore, policy makers aiming to address the obesity epidemic may find it advantageous to focus on this population. Furthermore, interventions aimed at maintaining and increasing the quality of learning conditions among black youth may be especially important for

reducing the prevalence of obesity among this racial/ethnic group and diminishing racial/ethnic disparities in obesity. Because blacks obtain higher health returns to education for self-rated health than whites, increasing educational attainment among blacks may also reduce black-white health disparities. Furthermore, using education policies to reduce the prevalence of hypertension among young adults may not be successful given that this study finds that educational attainment is not particularly consequential for the prevalence of hypertension among young adults. More research aimed at understanding the processes that contribute to racial/ethnic differences in health returns to education is needed to provide more definitive avenues through which policymakers can intervene to improve population health and reduce racial/ethnic and socioeconomic health disparities.

In conclusion, this research provides further support that health returns to education vary by race/ethnicity—even in young adulthood. However, unlike findings from previous research, whites *do not* consistently obtain the highest returns to education across all health indicators, in some cases black and Hispanic young adults obtain higher health returns to education. This dissertation also provides evidence that the relationship between education and health varies across health indicators. While education is strongly associated with self-rated health, it is less consequential for obesity and hypertension. Finally, this empirical investigation provides preliminary evidence that learning and living conditions in adolescence may influence racial/ethnic disparities in health returns to education by shaping health and educational attainment trajectories differentially across racial/ethnic groups.

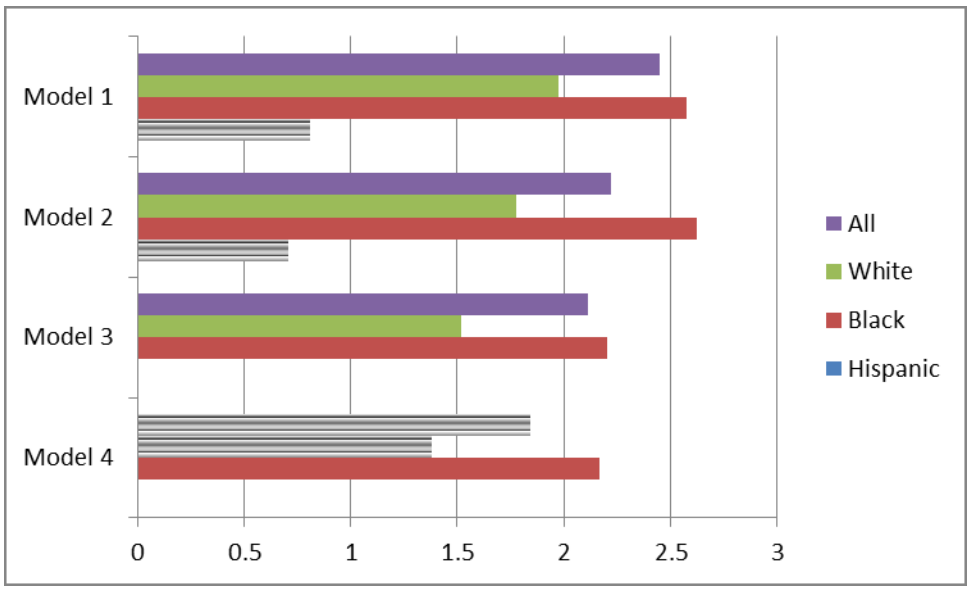

Figure 2. Racial/Ethnic Disparities in Health Returns to a High School Diploma or Some College--Odds of Reporting Fair or Poor Health (bars with horizontal lines indicate *insignificant* health returns) [8]

[8] [Model 1: Educational Attainment and Demographics; Model 2: Educational Attainment, Demographics and Living Conditions in Adolescence; Model 3: Educational Attainment, Demographics and Learning Conditions in Adolescence; Model 4: Educational Attainment, Demographics, Living and Learning Conditions in Adolescence and Living Conditions in Young Adulthood]

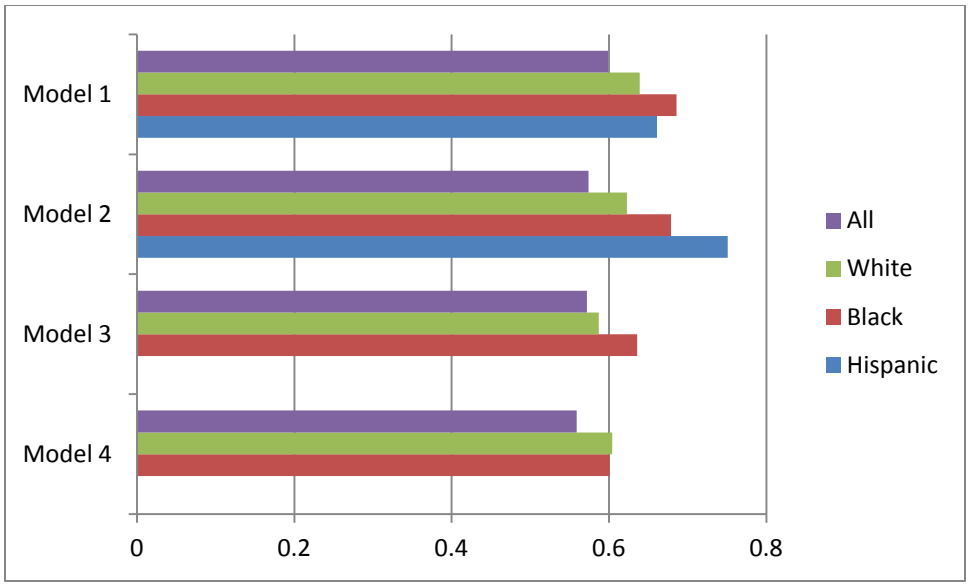

Figure 3. Racial/Ethnic Disparities in Health Returns to a Four-Year Degree or Higher--Odds of Reporting Fair or Poor Health (bars with horizontal lines indicate *insignificant* health returns)

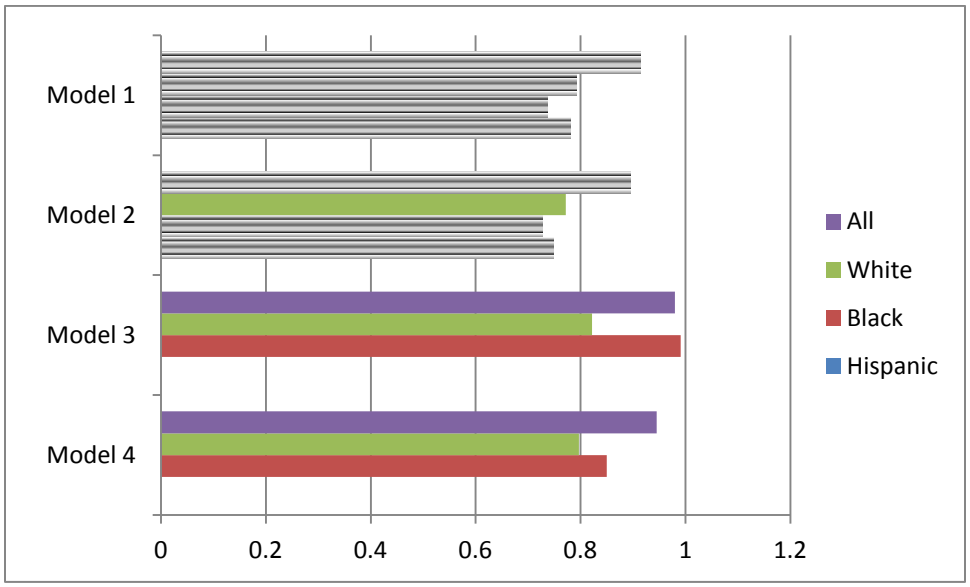

Figure 4. Racial/Ethnic Disparities in Health Returns to a High School Diploma or Some College--Odds of Obesity (bars with horizontal lines indicate *insignificant* health returns)

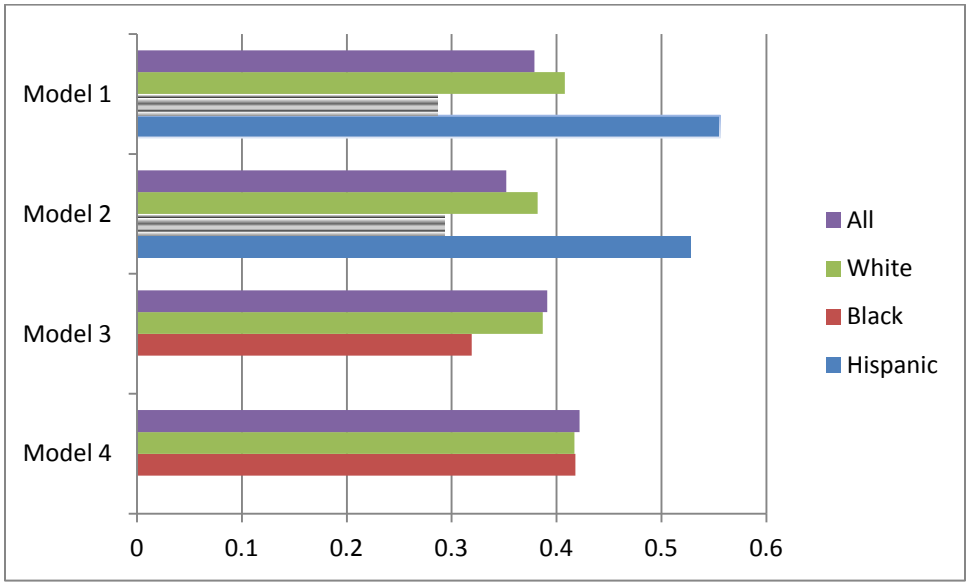

Figure 5. Racial/Ethnic Disparities in Health Returns to a Four-Year Degree or Higher -- Odds of Obesity (bars with horizontal lines indicate *insignificant* health returns)

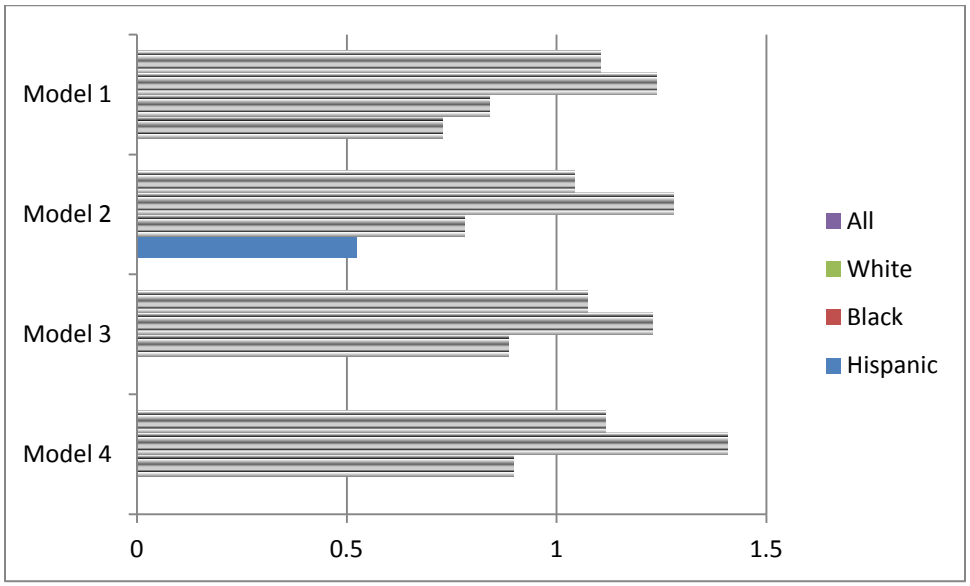

Figure 6. Racial/Ethnic Disparities in Health Returns to a High School Diploma or Some College--Odds of Hypertension (bars with horizontal lines indicate *insignificant* health returns)

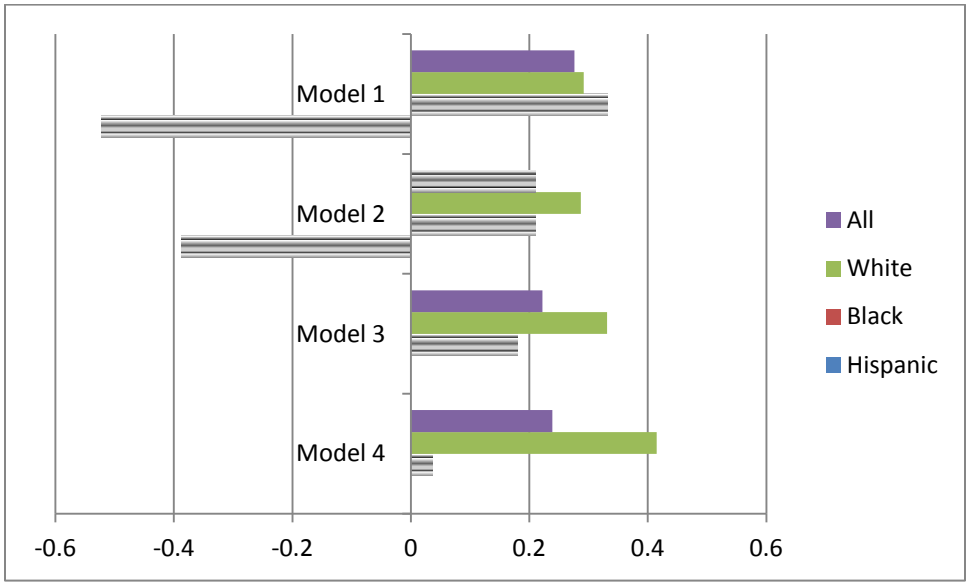

Figure 7. Racial/Ethnic Disparities in Health Returns to a Four-Year Degree or Higher--Odds of Obesity (bars with horizontal lines indicate *insignificant* health returns)

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