Black and White: Does Race Matter for Adult Health Outcomes Among Hispanic Women of Childbearing Ages?

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Abstract

The aim of this paper is to understand the implications of race on physical health among Hispanic women of childbearing ages in the United States. We use the National Health Interview Survey (NHIS) Sample Adult respondents from 1997 to 2009. We restrict these data to females of Hispanic origin, ages 18 to 45. Using logistic regression, we analyze five measures of health: Body Mass Index (BMI), Cardiovascular Disease, Functional Limitations, Hypertension and Self Rated Health. We find that race matters for some health outcomes among Hispanics: functional limitations, cardiovascular disease, hypertension, and self rated health. White Hispanics are advantaged in comparison to black and other race Hispanics on some health measures. Additionally, we find evidence of weathering among black and other race Hispanics.

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Introduction

The aim of this paper is to understand the implications of race on physical health among Hispanic women ages 18 to 45 years old in the United States. We will first determine if racial disparities in health and mortality exist within our sample of Hispanic women of childbearing ages, and if so, to what extent. Second, we will analyze some of the reasons underlying race differences in health outcomes among early and midlife adult Hispanic women.

The research we conduct for this study is timely because Hispanics are a rising portion of the US population and by 2050, Hispanics are projected to make up one quarter or more of the total US population (CDC 2010). This work seeks to fill a void in the current literature. There have also been several studies showing that this heterogeneity within the Hispanic population in the US has important implications for health (Borrell and Crawford 2009; Hummer et al. 1999; Singh 2001) but the current literature commonly compares US racial groups with people who claim Hispanic ethnicity, the latter of whom are comprised of multiple racial groups. There is little published socio-demographic research that examines the racial heterogeneity of the Hispanic population and its affect on the physical health of that population. And, there is no work, to our knowledge, that examines this regarding women of childbearing ages.

The main working hypothesis for this paper is that racial inequality will also result in inequalities in health outcomes by race among adult Hispanic women. We hypothesize that we will find white Hispanics are advantaged in comparison to black Hispanics in measures of functional limitations, cardiovascular disease, fair or poor self-rated health, and hypertension. Last, we expect to find evidence of the weathering hypothesis among black Hispanics. we expect to find larger black-white differences in health among Hispanic women who are of older childbearing ages than in women of younger childbearing ages.

Literature Review

This section reviews literature relevant to race and health outcomes among Hispanics. We begin with a very brief overview of the current research on black-white differences in women's health outcomes. We then review recent research on the health outcomes of Hispanic women. We conclude with an analysis of the most current research regarding Hispanics, racial identification, and health outcomes.

Black-White Differences in Women's Health

Racial differences in health in the US are well documented (Hayward et al. 2000; Hummer and Chinn 2011; Williams and Sternthal 2010). While these disparities show modest signs of closing, they remain wide and are wider for younger adults than they are for older adults (Stewart 2008, Hummer and Chinn 2011). Particularly, black-white mortality disparities are such that younger (ages 25-64) black women exhibit 84% higher mortality risk than white women in the same age group (Hummer and Chinn 2011). Geronimus et al.

(2010) found that middle-aged (ages 49-55) black women exhibit accelerated biological aging (by an average of 7.5 years older) when compared to white women in the same age group. Additionally, Geronimus et al. (2006) showed that black women had a greater probability of a high allostatic load score when compared to white women. Such a difference indicates a greater physiological burden imposed by stress among black women, even while controlling for SES. These findings were particularly pronounced for women aged 35-64 years. Further, black - white differences in health status among women widen during the childbearing ages (Geronimus and Bound 1990). Therefore, we expect to find marked racial differences in health outcomes among Hispanic women of childbearing ages, with the racial gaps widening across the childbearing ages.

Women's Health among Hispanics

The Hispanic health advantage among adults varies by age and gender (Markides and Eschbach 2005; Palloni and Arias 2004; Powers et al. 2011). In their analysis of the effects of chronic stress, Kaestner et al. (2009) show that native and foreign born Mexican origin men and women have, on average, statistically higher allostatic load scores than their white counterparts. This was true both for middle aged adults (ages 30-44 years) and older adults (45-60 years of age). Looking specifically at Hispanic women of Mexican origin, Hummer and Chinn (2011) show that for middle-aged women (ages 25-64 years), Mexican origin women have on average a 40% lower mortality risk than their white counterparts after controlling for SES. This lowered mortality risk is even more dramatic when compared

to non-Hispanic blacks in the same age group. While we do not argue against the existence of the Hispanic epidemiologic paradox, we do propose that this advantage is not experienced by all Hispanics in an equal fashion. In other words, we expect to find Hispanic health differences by race such that Hispanics who identify as black have worse overall health than Hispanic women who identify as white.

Hispanics, Racial Identification, and Health Outcomes

Phenotype as Proxy for Race

There is a modest-sized literature that examines skin color and health outcomes among Hispanics in the US, most of which shows that dark-skin Hispanics have less favorable health and health outcomes than light-skin Hispanics. Looking at only men living in urban areas on the island of Puerto Rico, Costas, Jr. et al. (1981) found that skin color was associated with systolic blood pressure (sbp), with darker men having higher sbp than lighter skin men. Using the same data, Sorlie et al. (1988) and Borrell et al. (2007) confirmed this finding but also noted that darker skin Hispanic men have lower mean levels of SES. Borrell et al. (2007) also found no association between skin color and all cause mortality except when skin color was interacted with area of residence; in urban areas, darker men experienced higher mortality risks. The data set used (The Puerto Rico Heart Health Program) for these studies is quite old (subjects entered the study in 1965 with a six year follow up) but at least provides a glimpse of the relationship between skin color and physical health among Hispanics. While the US (mainland) offers a different understanding

of the relationship between race and health among Hispanics and our analyses will not include men, this research can be used to shape and inform our hypotheses and conceptual framework.

Although we will not be able to take phenotype into account, research findings that have done so are useful for the overall understanding of race and health outcomes among Hispanics. Phenotype often serves as a primary or preliminary marker of racial distinction. However, skin color is very different than actual racial identification. US racial classification is very much based on a Black-White dichotomy, even while there are five official racial categories. Unlike many of the sending countries where Hispanics experienced a continuum gradient that moves progressively from White to Black (while recognizing and distinguishing the grey in between), the US context largely forces this population to choose Black or White. Regardless, race is a socially based construct that is defined in part by the society in which it is contextualized.

Explicit Racial Identification

Explicit racial identification among Hispanics is not as common as it is in other US race/ethnic groups; in fact, 42% of Hispanics identified their racial category as "other" in the 2000 US Census (Saenz 2005). This means that just under 60% of Hispanics chose to identify themselves with a specific racial category(ies). The question remains regarding what implications this has for short and long term health outcomes. While the literature is

certainly sparse on this topic, there are five such studies that we have uncovered, four of which are authored or co-authored by Luisa Borrell.

In a 2006 paper, Borrell computed odds ratios of self-reported hypertension by race among the US Hispanic population ages 18 years or greater. She uses National Health Interview Survey data for years 2000-2003 to show that Hispanics had lower prevalence of hypertension than non-Hispanics; more specifically, non-Hispanic blacks had higher prevalence of hypertension than Hispanic blacks. More interesting, Borrell found that high SES Hispanic blacks had higher prevalence of hypertension than low SES Hispanic whites. Borrell and Crawford (2006) conducted analogous research using self-rated health status as the health outcome. They used data from the 2003 Behavioral Risk Factor System Survey to analyze self rated health differences by race among the Hispanic population. Again, differences in health by race among Hispanics are evident in these data. Hispanic blacks reported a higher prevalence of low self rated health when compared to Hispanic whites. These authors' primary finding is that race does matter when examining health outcomes among the heterogeneous Hispanic population in the US. However, further analysis is needed on this issue because country of origin is correlated with racial identification among Hispanics (Borrell 2005; Burchard et al. 2005). Additionally, these data were collected during a small window of time and measure just a narrow set of health outcomes. The data we employ will be the most currently available and will measure multiple health outcomes.

Borrell and Dallo (2008) later assessed self-rated health reports among Hispanics by race, this time using the National Health Interview Survey from 2000-2003. They find Hispanic blacks have a higher prevalence of rating their health as fair or poor compared to Hispanic whites. Additionally, the data show there is no statistical difference between the odds of black Hispanics and white Hispanics, and between black Hispanics and non-Hispanic blacks in how they rate their health. This suggests there is no Hispanic health advantage when looking at the black population in the US. Yet, Hispanic whites are more likely to rate their health as fair or poor compared to non-Hispanic whites. This finding suggests that not only is there a possibility of no Hispanic advantage among whites but there may be a *dis*advantage in self-reports of health. These results were also computed using a control variable for acculturation. Continuing the use of the NHIS by employing years 1990 to 2000 linked to mortality files through 2002, Borrell and Crawford (2009) find Hispanic whites have lower mortality rates than non-Hispanic whites. This is consistent with the epidemiologic paradox. Further, they find Hispanic blacks have similar mortality rates to non-Hispanic whites. This is in contrast to what Borrell and Crawford found in 2006 for self-rated health; i.e. that Hispanic blacks have similar health outcomes to non-Hispanic blacks. Looking at mortality rates, though, black Hispanics seem to be similarly advantaged as white Hispanics.

In a recently published article, Elo et al. (2011) use the 5% Public Use Micro Data Sample from 2000 to examine disability among blacks in the US, including black Hispanics.

Though this research does not compare black Hispanics to white Hispanics their findings have implications regarding the heterogeneity of the US Hispanic population and what this means regarding the epidemiologic paradox. They find that Hispanic blacks have higher levels of disability than non-Hispanic blacks. Recognizing the racial diversity of the Hispanic population, these results call into question the overall Hispanic health advantage and if this is experienced by both black and white Hispanics.

These contradictory findings indicate that there remains much to be explored, analyzed and teased out regarding the relationship between race and health within the Hispanic population. It is evident that race seems to matter for health outcomes for Hispanics, although that may not necessarily be the case for adult mortality. But it is unclear at this point in time what role race plays for Hispanics in their health outcomes. And none of this work to date has focused specifically on race and health outcomes among Hispanic women.

Data and Methods

We use the National Health Interview Survey (NHIS) Sample Adult respondents from 1997 to 2009. The NHIS is an annual cross-sectional household survey of a sample of the non-institutionalized US population. Surveys are administered in person and are completed by the respondent unless otherwise indicated. The NHIS contains an over sampling for blacks and Hispanics. The NHIS sample adult supplement contains additional health

questions or details not captured in the core NHIS. The NHIS sample adult supplement files surveys one respondent from each household over the age of 17.

We restrict these data to females of Hispanic origin, ages 18 to 45. The analytic data set contains 13 years of cross sectional data and 24,449 adults. We use the most recently available data to maximize the number of cases for analysis. The data are restricted to females only for three reasons: 1) of the few studies that exist which examine the relationship between race and health among Hispanics, none focus solely on females while a large portion focus on males only. 2) We aim to capture the relationship between race and health; by restricting the data to only females, this eliminates the chance for the results to be confounded by sex or gender. And, 3) one objective of this study is to replicate the findings of our similar paper which analyzes the relationship between race and infant health among Hispanics. Infant health is known to be a direct reflection of maternal health (Eberstein 1989; Geronimus 1987) and therefore we focus this analysis on women's health. Similarly, We restrict the data to women of childbearing ages, 18 to 45 years, for this same reason.

The data are restricted to persons of Hispanic origin for three important reasons. First, this dissertation seeks to answer the question of whether or not race matters for health outcomes among Hispanics. We believe a comparison of Hispanics to non-Hispanics answers a different question; one which is not within the scope of this dissertation. Fundamentally, the idea of this dissertation is to better understand heterogeneity within

the Hispanic population not in how Hispanics compare with other non-Hispanic groups. Second, health outcomes among Hispanics, particularly self-rated health (Finch et al. 2002), do not follow patterns similar to that of the non-Hispanic US population. By only examining Hispanics, we are better able to make inferences about this outcome as well as better understand this and our other health measures among the Hispanic population. Third, key socioeconomic status indicators, particularly education and marital status, perform differently among Hispanics than they do for the non-Hispanic population in the US (Goldman et al. 2006). By only including Hispanics in the analysis, our results will not be masked by SES effect size differences in comparison to the non-Hispanic population; instead we will best capture racial differences and covariate effects *within* the Hispanic population.

The key independent variable we use to predict differences in our health measures is race. Race data are self-reported in the NHIS. We group respondents into three categories: white, black, other. The other category consists of all responses except white or black. Therefore it not only includes individuals who indicate their race as "Other" but also those who select Asian, the multiple race option, and more.

We control for multiple socioeconomic status and geographical variables in the attempt to best understand why there may be race differences in Hispanic health. We operationalize SES as marital status, educational level, and family poverty level threshold. We dichotomize marital status as married or not married. Educational level is dichotomized using number of years of education completed, with 0-11 years equating to less than a high

school education and 12 or more years of education the equivalent of a high school graduate or more. We separate family poverty level threshold into 4 categories: 2.00 or higher times the family poverty line (not in poverty), 1.00-1.99 times the family poverty line (near poverty), below the family poverty line (in poverty), and respondent is missing family income information.

Our key geographical factor is nativity, dichotomized as US born (US Mainland born for Puerto Ricans) or foreign-born (Island born for Puerto Ricans). We also control for: 1) region of the residence in the US, categorized as Northeast, West, South, and Midwest, and 2) country of origin: Mexico, Puerto Rico, Cuba, Dominican Republic, and all other countries. The Dominican Republic is available for survey years 1999-2009. For survey years 1997 and 1998, the Dominican Republic is unspecified and therefore it is coded as other.

Age affects health. As populations and people age, health decreases. We are using a sample of women of child bearing ages. This includes women in young adulthood as well as middle age. We therefore control for age in all of our models. Furthermore, we center the age variable around the mean age of our sample (31.5 years) in our models. This allows for ease of interpretation of the intercept and interaction terms in our logistic regressions (Aiken and West 1991).

We use five dependent variables to measure health: Body Mass Index (BMI), Cardiovascular Disease, Functional Limitations, Hypertension and Self Rated Health. BMI is dichotomized as a score of 30 or higher and less than 30, which is the Centers for Disease

Control cut point for obesity (CDC 2010). Cardiovascular disease diagnosis is a composite of four survey questions. These questions ascertain whether or not each respondent has ever been told by a doctor that s/he had a heart condition or disease, a heart attack, coronary heart disease, or angina pectoris. The functional limitations variable refers to any type of functional limitation. Hypertension is the respondent's answer whether or not s/he has been told by a doctor that s/he have hypertension. Last, self rated health is a dichotomized self assessment of the respondent's health; poor or fair, and good, very good, or excellent.

Our goal for the design this study is to mirror our paper on infant health by race among Hispanics as closely as possible. First, to test our hypothesis that white Hispanics are advantaged in health outcomes when compared to black Hispanics, we will use logistic regression to analyze differences in the five health outcomes by race (Tables 4-2 through 4-6).

We used predicted probabilities to assess evidence of weathering, which is indicated by age differences in health outcomes by race. We display these results in (Tables 4-7 and 4-8). We only include predicted probabilities for health outcomes for which race is a statistically significant predictor of health outcomes for our sample. We display results at ages 18, 25, 35, and 45. For our covariates, We used the reference category to compute the predicted probabilities.

We are aware of the presence of small cell size in our analyses. However, these data have been sufficient to provide a thorough and careful analysis of racial differences in

health among Hispanics. We have maximized the numbers of years of data to be used in our analyses. We preserved as much of the data as possible without compromising the integrity of the analyses.

Results

Descriptive Analysis

Table 4-1 displays the weighted descriptive statistics for our sample of Hispanic women aged 18-45. Black Hispanics make up only 3% of our entire sample. White Hispanics represent 83.5% of the sample and other race Hispanics make up the remaining 14.5%. Though only 14.6% of the sample lives in the northeast region of the US, 42.6% of black Hispanics live in this area, while white and other race Hispanics are more concentrated in the western and southern regions. White and other race Hispanics are more likely to be foreign born and from Mexico or countries other than Cuba, Puerto Rico and the Dominican Republic. Black Hispanics are more than 50 percent US born, with origins concentrated in Puerto Rico and from countries not specified in the data set. They are also more likely to be from Cuba and the Dominican Republic.

Table 4-1 also illustrates some of the distinct demographic, socioeconomic and health characteristics of black and white Hispanics. Black Hispanics make up a socioeconomic profile that is vastly different than white and other race Hispanics. White and other race Hispanics are more likely to be married than black Hispanics: while 57.1% and 55.5% of white and other race Hispanics are married, only 34.6% of black Hispanics are

married. Over ¾ of black Hispanics have a high school education or greater, compared with less than 2/3 of white and other race Hispanics. Yet, this educational attainment advantage does not translate into lower poverty rates for black Hispanics. Approximately 45% of black, white and other race Hispanics live near, at, or below the family poverty level, with ¼ of black Hispanics living below the poverty line and 1/5 of white and other race Hispanics living at that same level.

Given the age of the sample, most women exhibit positive health statuses. Minor racial disparities in the health characteristics are evident in the raw data. White Hispanics are the least likely to report functional limitations (16.4%) and are most likely to report being in excellent or good health (91.5%). Black Hispanics are the most likely to have been diagnosed with heart disease (4.5%) but the least likely to have been diagnosed with hypertension (7.6%).

Logistic Regression Models of Health Outcomes

Tables 4-2 through 4-6 provide the models for racial differences in key health outcomes for Hispanic adult women of childbearing ages. Table 4-2 shows the odd ratios for functional limitations. Model 1 is the most basic model. We only control for age and region of residence in the US. In this model, black Hispanics and other race Hispanics display a higher likelihood of having functional limitations. Black and other race Hispanics are both about 49% more likely than white Hispanics (reference category) to have functional limitations. In model 2, we add a term to capture the interaction between race

and age into the model. This allows me to assess changes in the effects of race on functional limitations as age increases. The main effects of race remain significant and high. For black Hispanics, there is a slight decrease in the main effects of race on functional limitations but this is offset by a significant and positive effect of the interaction of race and age. Because the race and age interaction term is significant and positive, the effects of race change with age. In short, there is evidence of weathering. This will be more evident in Table 4-7, when we examine the predicted probabilities of functional limitations by age. The interaction between other race Hispanics and age is not significant, but other race remains a significant predictor of functional limitations in model 2.

In model 3, we control for socioeconomic factors. Poverty level, as expected is a significant predictor of functional limitations. As the level of poverty increases so does the likelihood of functional limitations. Those living below the family poverty level are 38.6% more likely than people not in poverty to have functional limitations. Education doesn't perform as expected and shows that the least educated are less likely to have functional limitations than the more educated. This effect goes away in model 4, though, when we add nativity and country of origin into the model. Education is not a predictor of functional limitations when controlling for nativity among Hispanic women. Persons with origins in Cuba and the Dominican Republic are less likely to have functional limitations than those with origins in Mexico, while people from Puerto Rico are 35% more likely to have functional limitations than people with origins in Mexico.

As we continue to add demographic, socioeconomic, and geographical controls into the models, the main effects for race decrease. This decrease is more pronounced for black Hispanics than it is for other race Hispanics. In our complete model (Model 4), black and other race Hispanics are 27.5% and 45.9% (respectively) more likely than white Hispanics to have functional limitations. However, the race and age interaction term for black Hispanics shows modest increase across models and remains strongly significant. This interaction term for other Hispanics continues to show no effect.

In Table 4-3, we show the odds ratios for models predicting race differences in cardiovascular disease in Hispanic women ages 18 to 45. The results are very similar to the results of race predicting functional limitations (Table 4-2). First, we create a model with race predicting cardiovascular disease while controlling only for age and region of residence in the US. Black Hispanics are 55.5% more likely to have cardiovascular disease than white Hispanics. There are no statistically significant differences between white and other race Hispanics in the likelihood of having cardiovascular disease.

Like our models predicting functional limitations, the interaction between race and age is positive and significant for blacks, supporting the weathering hypothesis (Model 2). For every year increase in age (at baseline), black Hispanic women are an additional 6.8% more likely than white Hispanic women to have cardiovascular disease. The main effects of race in the model do not remain significant. Also, the interaction between other race and

age is not statistically significant. In short, our data display evidence of weathering among black Hispanics but not among other race Hispanics.

Models 3 and 4 perform similarly after controlling for socioeconomic status, nativity, and country of origin. In both of these models, marital status is a strong predictor of cardiovascular disease. After controlling for nativity, the effects of education on odds of cardiovascular disease are insignificant. Though the main effects of race remain not significant in both Models 3 and 4, the interaction between black racial identification and age remains significant and increases in magnitude. Black Hispanic women exhibit increasingly higher odds of cardiovascular disease throughout the young adult ages, even after controlling for demographic variables. Further, Hispanics of Puerto Rican origins are almost twice (91.6%) as likely as those of Mexican origins to have cardiovascular disease. And, Hispanics of Cuban origin are more than 50% more likely than the Mexican origin women in this sample to have cardiovascular disease.

The next table in our analysis is Table 4-4 which displays the odds ratios for Hypertension. In Model 1, we display the basic model of race as a predictor of Hypertension while controlling for age and region of residence in the US. There are no significant differences by race or region of residence in the US in the odds of having hypertension. The only significant factor in the odds of hypertension in this model is age. This is true for Model 2 as well, in which an interaction term for race and age is added into

the model. There is a slight uptick in magnitude of the odds ratio for age and it remains highly significant, but all other effects remain insignificant.

In Model 3, socioeconomic status covariates are introduced into the model. Hispanic women with less than a high school education are 15% more likely to be hypertensive than those with at least a high school education. Furthermore, the closer the family income level is to poverty, the more likely the respondent is to be hypertensive. For example, women in our sample who have a family income at 1 to almost 2 times the poverty level are 21% more likely to have hypertension and women with family incomes less than the poverty level are 50% more likely to have hypertension than women whose family income is two times or more the poverty level. In this model, both race and the interaction between race and age are not significant. Similarly, Borrell (2006) was unable to achieve statistically significant odds of hypertension between black and white Hispanics. However, Borrell did find a higher prevalence rate of hypertension among black Hispanics when compared to white Hispanics. Hypertension appears to be a story of poverty within our relatively young sample as oppose to racial stratification as was demonstrated with cardiovascular disease and functional limitations.

Nativity and country of origin are added in Model 4. With previous health outcomes (functional limitations and cardiovascular disease), adding nativity into the model reduced the effects of education to insignificant. Here, for hypertension, education increases in magnitude and significance level. This is surprising as most often within the Hispanic

demography literature health disparities by education tend to dissipate once nativity is controlled (CITATION). Those with less than a high school education go from being 15% more likely to have hypertension in Model 3 to 28% more likely in Model 4. Similarly, the effects of poverty increase in both magnitude and significance level. Hispanic women living below the poverty line are 62% more likely to have hypertension when controlling for nativity and country of origin, and increase from 54% more likely when not controlling nativity and country of origin. Puerto Ricans and Dominicans are more likely to have hypertension than Mexicans, whereas, Cubans and those with origins in other countries are not statistically different than the Mexican origin people in our sample in their odds of having hypertension. Consistent with our other outcomes, the foreign born are significantly less likely to have hypertension (23% less likely than the native born).

Table 4-5 displays the odds rations for poor or fair self rated health. Model 1 is the basic model which shows the race differences in self rated health with age and region of residence in the US as covariates. There are moderately significant differences in poor or fair self rated health between white and other race Hispanics. Other race Hispanics are 12.5% more likely than white Hispanics to rate their health as fair or poor. we do not find statistically significant differences in self rated health between black and white Hispanics. This is in agreement with the findings of Borrell and Dallo (2008).

Hispanics in the northeastern and western regions of the US are more likely to rate their health as fair or poor than Hispanics in the southern region of the US. In Model 2, an

interaction term is added into the model. The main effect of other race on self rated health goes away but the interaction term for age and other race is statistically significant. For every year increase in age, the other race Hispanics are an additional 2% more likely than white Hispanics to rate their health as fair or poor (as opposed to good, very good or excellent). This is the only health outcome in this analysis for which there is evidence of weathering among other race Hispanics.

In Model 3, the interaction between other race and age remains moderately significant with a magnitude of 2%. It is in this model that dramatic differences in self rated health by socioeconomic status become evident. Hispanics with less than a high school education are 56% more likely to rate their health as fair or poor than Hispanics with at least a high school education. Unmarried Hispanics are 52% more likely than married Hispanics to rate their health as fair or poor. Hispanics living at or near the poverty level are 44% more likely than Hispanics with income at twice (or greater) the poverty level to have fair or poor self rated health. Hispanics living below the poverty line are at the greatest disadvantage of all. They have more than double the odds (2.26) of Hispanics living at twice the poverty level to rate their health as fair or poor. Again, fair or poor self rated health appears to be a story of poverty and economic disadvantage. But, disparities by race are also evident and should not be ignored.

Nativity and country of origin are introduced in Model 4. The main effects of race remain insignificant. The interaction between other race and age remains significant only at

the alpha equal to .10 level. Yet, the effects of socioeconomic status on the odds of fair or poor self rated health are magnified. Hispanics with less than a high school education are 73% more likely to rate their health as fair or poor than those with a minimum of a high school education (even after controlling for nativity) and those living in poverty have a 140% greater likelihood (2.4 greater odds) of having fair or poor self rated health than those living at or above 2 times the poverty level. Additionally, Hispanics with origins in Puerto Rico are 37% more likely than those with origins in Mexico to rate their health as fair or poor.

Table 4-6 presents the logistic regressions for the last of our health outcomes. This table shows the odd ratios for body mass index (BMI) of 30 or greater (obese) for Hispanic females ages 18-45. In Model 1, age, regional, racial differences in odds of obesity are evident. Hispanics living in the Northeast or Midwest regions of the US are less likely to be obese than those living in the South. Other race Hispanics are 13.8% more likely than white Hispanics to be obese. In Model 2, an interaction term for race and age is introduced into the model. The main effects for black Hispanics remain not statistically different from those of white Hispanics (and this is true for Models 1-4). Similarly, the interaction term for black and age remains insignificant across all models in this table. However, the main effects for other race Hispanics remain at 13.9% and significant. There is no interaction between age and other race. This finding is consistent across all models in this table.

In Model 3, we add socioeconomic covariates into the model. Hispanics in the northeast region of the US continue to display lower odds of being obese than Hispanics in

the south. Other race Hispanics continue to show greater odds (14.3%) of being obese than white Hispanics. Unmarried Hispanics and those with less than a high school education have greater odds of obesity than married and more highly educated Hispanics. Poverty plays a key role in the stratification of obese Hispanics and non-obese Hispanics as Hispanics living below the poverty line are 29% more likely to be obese than those living at 2 times or more above the poverty line.

In Model 4, nativity and country of origin are added to the model. It is clear that Hispanics from every country exhibit lesser odds of being obese than Hispanics with origins in Mexico. At the extreme, Cubans are 38% less likely than Mexicans to be obese. The effects of low education on the odds of being obese remain significant and increase in magnitude after controlling for nativity with the odds ratio increasing from 1.206 to 1.337. This is true for the effects of poverty as well. It seems that the Mexican origin population is more vulnerable to obesity than other groups in our sample.

Predicted Probabilities of Health Outcomes

The next two tables show the predicted probabilities for functional limitations (Table 4-7) and cardiovascular disease (Table 4-8). Predicted probabilities were computed for the other health outcomes but are not displayed because the black race did not have significant main effects or interaction effects for those outcomes. Each table displays the predicted probability at ages 18, 25, 35 and 45 for each of the three race categories used in this analysis as well as by nativity.

In Table 4-7, at every age and race combination, US born Hispanics exhibit higher probabilities of functional limitations than their foreign born counterparts. At age 18, other race Hispanics exhibit the highest probabilities of functional limitations when compared with black and white Hispanics with the same nativity status. At ages 18 and 25, black Hispanics exhibit lower probabilities for functional limitations than both their white and other race counterparts. At some time after age 25 (age 27 for the US born, not shown), black Hispanics begin to exhibit probabilities of functional limitations that are drastically higher than other race and white Hispanics. At age 45, black Hispanics have a 47% probability of having functional limitations contrasted with just 27% of white Hispanics. At early ages blacks exhibit a moderate health advantage when compared to both white and other race Hispanics. However, this advantage disappears and quickly there is a gap in probability of functional limitation that increases with age for black Hispanics compared to both white and other race Hispanics. In short, there is evidence of weathering among black Hispanics and white Hispanics are advantaged over both black and other race Hispanics.

In our final table of this paper, Table 8, at every age and race combination like the data for functional limitations, US born Hispanics exhibit higher probabilities of cardiovascular disease than their foreign born counterparts. The main effects of other race and the interaction effects of other race and age are both statistically insignificant in estimating the odds of cardiovascular disease. At ages 18 and 25, black Hispanics exhibit lower probabilities for functional limitations than their other race counterparts. Identical to

the results shown in Table 4-7, at some time after age 25 (age 30, not shown), black Hispanics begin to exhibit probabilities of cardiovascular disease that are drastically higher than other race and white Hispanics. At age 45, black Hispanics have a 13% probability of having cardiovascular disease which is more than double the probability that white Hispanic women will have suffer from cardiovascular disease. At early ages blacks exhibit a minor health advantage when compared to white Hispanics. These data support the weathering hypothesis. The health advantage disappears and soon our data show a black white gap in the probability of cardiovascular disease that increases with age.

Conclusion and Discussion

This research supports our hypotheses. Race matters for health outcomes among Hispanics. White Hispanics are advantaged in comparison to black Hispanics. And, racial gaps in health are exacerbated by age.

Our analysis showed that black Hispanics are particularly vulnerable to functional limitations and cardiovascular disease. Though previous studies were able to show higher prevalence rates of disease among black Hispanics when compared to white Hispanics (Borrell 2006; Borrell and Crawford 2006; Borrell and Dallo 2008) this is one of the only studies that was able to show statistically significant higher likelihood of disease among black Hispanics relative to white Hispanics using more robust methodologies. Additionally, other race Hispanics were also disadvantaged in health outcomes relative to white Hispanics. This was true for functional limitations and fair or poor self rated health. It is not

only important that we understand the black-white disparities in health among Hispanics but for all Hispanics who do not identify racially as white. Racial identity has implications on physical health in the US, though this is of greater magnitude among black Hispanics, other race Hispanics are not exempt. Moreover, white Hispanics were never disadvantaged in any of our analyses. For each health outcome (functional limitations, cardiovascular disease, hypertension, fair or poor self rated health, and BMI at or above 30), the odds for white Hispanics to have a particular outcome were either not statistically different from black and other race Hispanics or were favorable for white Hispanics relative to others.

In this study, we showed that race differences in health were larger at older ages than they were at younger ages. Similar to Geronimus (1987) findings regarding racial disparities in women's health at childbearing ages using the non-Hispanic population, we show that at early childbearing ages black Hispanics exhibit a health advantage over white Hispanics but this advantage disappears. For women ages 30 and above, black Hispanics exhibit a health disadvantage which increases with age. We were able to show evidence of weathering among other race Hispanics in their rating of their health. Though race mattered for BMI and functional limitations for other race Hispanics there was no evidence of weathering in our data.

We found that socioeconomic status plays a large role in health disparities within the Hispanic population in the US. SES was significant for all five health outcomes we analyzed and for Hypertension and Self Rated Health, it appeared to be the main

distinguisher in the likelihood of being in good or bad health. This finding is surprising. The epidemiologic paradox posits that Hispanics have good health despite their socioeconomic position in the US, leading many to believe that SES does not play a role in the determination of health for the subgroup of the US population. In this study we have shown, that not only does SES matter for health outcomes for this group but it is a key stratifier among Hispanics. Poverty, in some cases, more than doubled the likelihood of being in poor health.

Functional limitations, cardiovascular disease, and hypertension are diseases that typically affect older aged adults. However, despite the relatively young age of our sample, we were able to detect statistically significant differences in the odds of diagnosis of these diseases by race and socioeconomic status (despite black Hispanics making up only 3% of our sample). This speaks to the need for more rich and robust analyses of health by race *within* the Hispanic population for all age groups. These disparities may go unnoticed in analyses which simply compare non-Hispanic blacks and non-Hispanics whites with the racially diverse, pan-ethnic US Hispanic population.

This analysis is timely in that it fills many voids in the current social demographic literature. It was one of few studies to analyze health differences among Hispanics by race. It is the only study to analyze health differences by race among Hispanic women of childbearing ages. It is the only study to focus the analysis of health disparities solely on Hispanics in an effort to carefully understand the heterogeneity of the Hispanic population.

Last, it is only study to analyze black-white differences in health among Hispanics by nativity status (Tables 4-7 and 4-8).

Table 4-1: Weighted Descriptive Statistics fo Female Adult Hispanics, Ages 18-45 Years
NHIS 1997-2009

Variable	Hispanic White	Hispanic Black	Hispanic Other	Overall
Age (Mean Years)	31.1	29.8	30.8	31.1
Region of US				
South	35.1%	27.8%	26.8%	33.9%
Northeast	12.7%	42.6%	21.2%	14.6%
West	43.4%	17.4%	40.9%	42.3%
Midwest	8.7%	12.1%	11.2%	9.1%
Marital Status				
Married	57.1%	34.6%	55.5%	56.2%
Unmarried	42.9%	65.4%	44.5%	43.8%
Education				
High Sch or More	62.1%	75.9%	65.5%	63.0%
Less Than High Sch	37.9%	24.1%	34.5%	37.0%
Family Income: Poverty Threshold				
2.00 or More	35.0%	36.0%	33.5%	34.9%
1.00 - 1.99	23.6%	20.7%	24.0%	23.5%
0.99 or Less	20.3%	25.4%	20.4%	20.4%
Missing Poverty Info	21.2%	17.9%	22.1%	21.2%
Nativity				
US Born	41.8%	55.7%	44.4%	42.5%
Foreign Born	58.2%	44.3%	55.6%	57.5%
Country of Origin				
Mexico	64.6%	24.1%	57.2%	62.5%
Puerto Rico	9.0%	30.3%	12.4%	10.0%
Cuban	3.4%	5.3%	0.7%	3.1%
Dominican Republic^	2.2%	11.9%	4.0%	2.7%
Other	20.8%	28.5%	25.8%	21.7%
Body Mass Index				
30 or More	25.2%	25.0%	27.2%	25.5%
Less than 30	71.2%	73.3%	71.1%	71.3%
Missing BMI Info	3.6%	1.7%	1.7%	3.3%
Functional Limitations				
No	83.6%	77.6%	77.3%	82.6%
Yes	16.4%	22.4%	22.7%	17.4%
Heart Disease				
No	96.9%	95.5%	97.2%	96.9%
Yes	3.1%	4.5%	2.8%	3.1%
Hypertension				
No	91.4%	92.4%	90.9%	91.4%
Yes	8.6%	7.6%	9.1%	8.6%
Self Rated Health				
Excellent/Good	91.5%	90.9%	90.6%	91.3%
Fair/Poor	8.5%	9.1%	9.4%	8.7%
UnWeighted N	20190	728	3531	24449

Source: National Center for Health Statistics (2011)

^ Dominican Republic data available for survey years 1999-2009.
Survey years 1997-1998, the Dominican Republic is considered "other".

Table 4-2: Odds Ratios for Functional Limitations for Female Adult Hispanics, Ages 18-45 Years
NHIS 1997-2009

Variable	Model 1		Model 2		Model 3		Model 4	
Race								
White (ref.)	-		-		-		-	
Black	1.485	***	1.462	***	1.353	**	1.275	*
Other	1.487	***	1.484	***	1.484	***	1.459	***
Age	1.043	***	1.041	***	1.047	***	1.052	***
Region of US								
South (ref.)	-		-		-		-	
Northeast	1.227	***	1.225	***	1.169	**	1.118	+
West	1.117	**	1.116	**	1.124	**	1.127	**
Midwest	1.578	***	1.584	***	1.587	***	1.553	***
Race x Age								
White x Age (ref.)			-		-		-	
Black x Age			1.041	***	1.042	***	1.048	***
Other x Age			1.001		1.001		1.001	
Marital Status								
Married (ref.)					-		-	
Unmarried					1.382	***	1.242	***
Education								
High Sch or More (ref.)					-		-	
Less Than High Sch					0.900	**	1.069	
Family Income: Poverty Threshold								
2.00 or More (ref.)					-		-	
1.00 - 1.99					1.156	**	1.286	***
0.99 or Less					1.386	***	1.527	***
Missing Poverty Info					0.776	***	0.846	**
Nativity								
US Born (ref.)							-	
Foreign Born							0.546	***
Country of Origin								
Mexico (ref.)							-	
Puerto Rico							1.414	***
Cuban							0.752	*
Dominican Republic^							0.713	**
Other Countries							1.070	
Fit Statistics	22078.904		22066.942		21843.278		21501.280	
N	24,449		24,449		24,449		24,449	

+ $p < 0.1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Source: National Center for Health Statistics (2011)

^ Dominican Republic data available for survey years 1999-2009.
Survey years 1997-1998, the Dominican Republic is considered "other".

Table 4-3: Odds Ratios for Cardiovascular Disease for Female Adult Hispanics, Ages 18-45 Years
NHIS 1997-2009

Variable	Model 1		Model 2		Model 3		Model 4	
Race								
White (ref.)	-		-		-		-	
Black	1.555	*	1.343		1.205		1.073	
Other	0.918		0.921		0.916		0.903	
Age	1.036	***	1.034	***	1.042	***	1.044	***
Region of US								
South (ref.)	-		-		-		-	
Northeast	1.050		1.045		0.967		0.773	+
West	1.074		1.073		1.085		1.180	+
Midwest	0.963		0.969		0.962		0.962	
Race x Age								
White x Age (ref.)			-		-		-	
Black x Age			1.068	**	1.068	**	1.072	**
Other x Age			0.996		0.996		0.996	
Marital Status								
Married (ref.)					-		-	
Unmarried					1.697	***	1.549	***
Education								
High Sch or More (ref.)					-		-	
Less Than High Sch					0.834	*	0.956	
Family Income: Poverty Threshold								
2.00 or More (ref.)					-		-	
1.00 - 1.99					1.088		1.185	+
0.99 or Less					1.249	*	1.340	**
Missing Poverty Info					0.795	*	0.853	
Nativity								
US Born (ref.)							-	
Foreign Born							0.673	***
Country of Origin								
Mexico (ref.)							-	
Puerto Rico							1.916	***
Cuban							1.523	*
Dominican Republic^							1.392	
Other							1.007	
Fit Statistics	6708.408		6700.492		6628.715		6570.965	
N	24,449		24,449		24,449		24,449	

+ p < 0.1, * p <.05, ** p <.01, *** p <.001

Source: National Center for Health Statistics (2011)

^ Dominican Republic data available for survey years 1999-2009.
Survey years 1997-1998, the Dominican Republic is considered "other".

Table 4-4: Odds Ratios for Hypertension for Female Adult Hispanics, Ages 18-45 Years
NHIS 1997-2009

Variable	Model 1		Model 2		Model 3		Model 4	
Race								
White (ref.)	-		-		-		-	
Black	0.957		0.966		0.975		0.905	
Other	1.094		1.113		1.115		1.101	
Age	1.069	***	1.070	***	1.072	***	1.075	***
Region of US								
South (ref.)	-		-		-		-	
Northeast	0.933		0.934		0.925		0.854	+
West	0.984		0.984		0.963		0.963	
Midwest	0.949		0.950		0.967		0.939	
Race x Age								
White x Age (ref.)			-		-		-	
Black x Age			0.995		0.995		0.997	
Other x Age			0.993		0.992		0.992	
Marital Status								
Married (ref.)					-		-	
Unmarried					0.988		0.918	+
Education								
High Sch or More (ref.)					-		-	
Less Than High Sch					1.150	**	1.280	***
Family Income: Poverty Threshold								
2.00 or More (ref.)					-		-	
1.00 - 1.99					1.206	**	1.280	***
0.99 or Less					1.538	***	1.616	***
Missing Poverty Info					1.173	*	1.243	**
Nativity								
US Born (ref.)							-	
Foreign Born							0.672	***
Country of Origin								
Mexico (ref.)							-	
Puerto Rico							1.222	*
Cuban							0.859	
Dominican Republic^							1.486	**
Other							0.875	*
Fit Statistics	13862.922		13862.295		13793.892		13704.147	
N	24,449		24,449		24,449		24,449	

+ p < 0.1, * p <.05, ** p <.01, *** p <.001

Source: National Center for Health Statistics (2011)

^ Dominican Republic data available for survey years 1999-2009.
Survey years 1997-1998, the Dominican Republic is considered "other".

Table 4-5: Odds Ratios for Poor or Fair Self Rated Health for Female Adult Hispanics, Ages 18-45 Years, NHIS 1997-2009

Variable	Model 1		Model 2		Model 3		Model 4	
Race								
White (ref.)	-		-		-		-	
Black	1.107		1.076		1.039		0.974	
Other	1.125	+	1.078		1.091		1.081	
Age	1.055	***	1.052	***	1.061	***	1.063	***
Region of US								
South (ref.)	-		-		-		-	
Northeast	1.231	**	1.229	**	1.131	+	1.056	
West	1.112	*	1.110	*	1.042		1.079	
Midwest	0.942		0.939		0.959		0.957	
Race x Age								
White x Age (ref.)			-		-		-	
Black x Age			1.017		1.018		1.023	
Other x Age			1.019	*	1.016	+	1.016	+
Marital Status								
Married (ref.)					-		-	
Unmarried					1.516	***	1.409	***
Education								
High Sch or More (ref.)					-		-	
Less Than High Sch					1.558	***	1.734	***
Family Income: Poverty Threshold								
2.00 or More (ref.)					-		-	
1.00 - 1.99					1.444	***	1.550	***
0.99 or Less					2.260	***	2.402	***
Missing Poverty Info					1.412	***	1.496	***
Nativity								
US Born (ref.)							-	
Foreign Born							0.701	***
Country of Origin								
Mexico (ref.)							-	
Puerto Rico							1.370	***
Cuban							1.210	
Dominican Republic^							0.948	
Other							1.020	
Fit Statistics	14043.337		14038.115		13590.506		13520.495	
N	24,449		24,449		24,449		24,449	

+ $p < 0.1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Source: National Center for Health Statistics (2011)

^ Dominican Republic data available for survey years 1999-2009.
Survey years 1997-1998, the Dominican Republic is considered "other".

Table 4-6: Odd Ratios for Body Mass Index 30 or Higher for Female Adult Hispanics, Ages 18-45 Years, NHIS 1997-2009

Variable	Model 1		Model 2		Model 3		Model 4	
Race								
White (ref.)	-		-		-		-	
Black	1.076		1.081		1.077		1.097	
Other	1.138	**	1.139	**	1.143	**	1.142	**
Age	1.032	***	1.032	***	1.035	***	1.041	***
Region of US								
South (ref.)	-		-		-		-	
Northeast	0.861	**	0.861	**	0.847	***	1.004	
West	0.992		0.992		0.969		0.900	**
Midwest	0.895	*	0.896	+	0.901	+	0.841	**
Race x Age								
White x Age (ref.)			-		-		-	
Black x Age			1.007		1.007		1.010	
Other x Age			0.998		0.997		0.996	
Marital Status								
Married (ref.)					-		-	
Unmarried					1.133	***	1.062	+
Education								
High Sch or More (ref.)					-		-	
Less Than High Sch					1.206	***	1.337	***
Family Income: Poverty Threshold								
2.00 or More (ref.)					-		-	
1.00 - 1.99					1.200	***	1.285	***
0.99 or Less					1.294	***	1.357	***
Missing Poverty Info					1.121	**	1.192	***
Nativity								
US Born (ref.)							-	
Foreign Born							0.605	***
Country of Origin								
Mexico (ref.)							-	
Puerto Rico							0.846	**
Cuban							0.620	***
Dominican Republic^							0.641	***
Other							0.661	***
Fit Statistics	27442.288		27441.714		27.311.352		26907.381	
N	24,449		24,449		24,449		24,449	

+ $p < 0.1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Source: National Center for Health Statistics (2011)

^ Dominican Republic data available for survey years 1999-2009.
Survey years 1997-1998, the Dominican Republic is considered "other".

Table 4-7: Predicted Probabilities for Functional Limitations for Female Hispanics, Ages 18-45 Years, NHIS 1997-2009 Sample Adult Files

	Hispanic White	Hispanic Black	Hispanic Other
Age 18			
US Born	0.086	0.062	0.121
Foreign Born	0.047	0.034	0.068
Age 25			
US Born	0.119	0.115	0.166
Foreign Born	0.066	0.064	0.095
Age 35			
US Born	0.184	0.254	0.249
Foreign Born	0.106	0.152	0.149
Age 45			
US Born	0.274	0.471	0.357
Foreign Born	0.166	0.319	0.227

CoVariates: SES

Table 4-8: Predicted Probabilities for Cardiovascular Disease for Female Hispanics, Ages 18-45 Years, NHIS 1997-2009 Sample Adult Files

	Hispanic White	Hispanic Black*	Hispanic Other**
Age 18			
US Born	0.016	0.008	0.015
Foreign Born	0.010	0.005	0.010
Age 25			
US Born	0.022	0.016	0.020
Foreign Born	0.014	0.011	0.013
Age 35			
US Born	0.033	0.048	0.030
Foreign Born	0.022	0.032	0.019
Age 45			
US Born	0.051	0.133	0.043
Foreign Born	0.033	0.090	0.028

CoVariates: SES

*Main Effects of Race are not Statistically Significant

** Neither the Main Effects of Race nor the Interaction of Race and Age are Statistically Significant

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