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# A comprehensive analysis of the mortality experience of hispanic subgroups in the United States: Variation by age, country of origin, and nativity

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## ABSTRACT

Although those identifying as "Hispanic or Latino" experience lower adult mortality than the more socio-economically advantaged non-Hispanic white population, the ethnic category Hispanic conceals variation by country of origin, nativity, age, and immigration experience. The current analysis examines adult mortality differentials among 12 Hispanic subgroups by region of origin and nativity, and non-Hispanic whites, adjusting for socioeconomic and demographic characteristics. We use the National Health Interview Survey Linked Mortality Files pooled 1990–2009 to obtain sufficient sample of each subgroup to calculate mortality estimates by sex and age group (25–64, 65+). Among adults aged 65 and over, all foreign born subgroups have an advantage over non-Hispanic whites, and many USB subgroups exhibit an advantage in the adjusted model. Foreign-born Dominicans, Central/South Americans, and other Hispanics exhibit consistent advantages across models for both men and women, aged 25–64 and 65 and over, and both unadjusted and adjusted for socioeconomic covariates. Both US-born and foreign-born Mexicans between ages 25 and 64 have mortality disadvantaged relative to non-Hispanic whites, while older Mexicans exhibit clear advantages. Our results complicate the traditional formulation of the Hispanic Paradox and cast doubt on the singularity of the mortality experience of those of Hispanic origin.

## Introduction

In most populations, socioeconomic status (SES) exhibits a strong positive association with health; this relationship holds for a variety of measures of both SES and health, which speaks to its relatively universal nature (Elo, 2009). Between populations, however, the SES-health relationship is less clear, particularly with respect to the Hispanic/Latino population in the United States. The Hispanic mortality paradox, as it is sometimes known, refers to the finding that Hispanics in the United States have health and mortality outcomes similar to those of non-Hispanic whites while having socioeconomic attainment similar to African-Americans (Fenelon, 2013; Hummer, Powers, Pullum, Gossman, & Frisbie, 2000; Markides & Eschbach, 2011). In many studies, Hispanics exhibit higher life expectancy than non-Hispanic whites (Arias, Kochanek, & Anderson, 2015), as well as more favorable profiles with respect to non-fatal conditions such as cancer incidence and severity, heart disease, and hypertension (Eschbach, Mahnken, & Goodwin, 2005; Singh & Siahpush, 2002). Although the earliest empirical findings demonstrated this for Hispanics as a whole, subsequent work showed that the pattern varies significantly by country of origin and place of birth (Palloni & Arias, 2004).

The emergence of the panethnic Hispanic origin group has its roots in the second-half of the 20th Century (Jones-Correa & Leal, 1996); but instead of being the result of the natural development of an existing cultural identity, the formation of the official ethnic origin "Hispanic/Latino" reflected the simultaneous actions of state actors aiming to describe the origins of growing immigrant populations and social movement interests aiming to generate political legitimacy for a social group (Mora, 2014). Indeed, the speed with which the terms "Hispanic" and "Latino" entered the public lexicon of the United States partially reflects the growing population of Mexicans and Mexican-Americans in the US Southwest during the 1960s and 1970s. The implicit perception that Hispanic was synonymous with Mexican also contributed to the development of the "Hispanic Epidemiological Paradox" in the 1980s, which largely referred to evidence of the mortality experience of Mexican-Americans (Markides & Coreil, 1986). As the Hispanic population has expanded,

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so has the recognition of Hispanics' internal heterogeneity. Individuals classified as Hispanic by the U.S. census and demographic surveys have origins in more than 20 countries, each with distinctive social and cultural characteristics that contribute to unique health experiences within the United States.

U.S. Hispanics differ greatly in terms of nativity and country of origin, socioeconomic background and attainment, English language orientation, geographic mobility, and health (Fenelon, 2016; Hall, 2013; Markides & Eschbach, 2005) While the largest waves of Mexican migration began in the 1960s and 1970s, large populations of immigrants from Central America arrived in the 1980s and South American migration began largely in the 1990s and 2000s. Mexicans tend to experience the highest levels of socioeconomic disadvantage (Franzini & Fernandez-Esquer, 2004), and employment for Mexican immigrants is concentrated both geographically and in terms of industry (Kandel & Parrado, 2005; Palloni & Arias, 2004). Puerto Ricans tend to be the most residentially segregated from non-Hispanic whites (Tienda & Fuentes, 2014), and US-born Cuban Americans achieve the highest levels of socioeconomic attainment among Hispanics (Williams, Mohammed, Leavell, & Collins, 2010). These patterns support the notion that comparing Hispanics as a whole to other race/ethnic groups in terms of mortality experience ignores substantial within-group variation.

## Background

### *Explanations for the hispanic paradox*

Explanations for the Hispanic mortality advantage historically fall into three main categories: data artifacts, migration effects, and cultural effects (Waters & Pineau, 2015). The data artifacts hypothesis questions whether mortality data for Hispanics in the US, particularly immigrants, are of high enough quality to obtain accurate estimates; because Hispanic origin is often undercounted on US death certificates, standard mortality calculations for Hispanic populations may be underestimated (Arias, Schauman, Eschbach, Sorlie, & Backlund, 2008). Nationally-representative surveys with prospective mortality follow-up have resolved issues of underreporting of Hispanic ethnicity on US death certificates, since these combined datasets use self-reported ethnicity in the survey rather than relying on third-party reporting from death certificates (Fenelon, 2013; Lariscy, Hummer, & Hayward, 2015). As a result, recent research has focused largely on the latter two explanations.

Since the majority of adult Hispanics in the United States are foreign born, explanations of the Hispanic mortality experience must account for migration. This explanation draws attention to the selective processes governing both who comes to the United States as well as who remains in the country over time (Palloni & Ewbank, 2004). Individuals who come to the United States are likely to be different from those who remain in their origin countries in ways that are relevant to health, a process known as the healthy migrant effect (Hamilton, 2015; Lu & Qin, 2014). Alternatively, older Hispanics may return to their countries of origin as their health declines, leaving a relatively healthy subset in the United States, referred to as return migration bias or salmon bias (Arenas, Goldman, Pebley, & Teruel, 2015). Both selection processes certainly occur with respect to Hispanic immigrants, although selection is unlikely to be of sufficient magnitude to explain a large proportion of the advantage for most groups (Akresh & Frank, 2008; Turra & Elo, 2008). Additionally, return migration effects are unlikely to explain the advantage found with respect to infant mortality (Hummer, Powers, Pullum, Gossman, & Frisbie, 2007).

More recent research focusing on the role of cultural buffering suggests that aspects of Hispanic culture may provide health benefits and may help to shelter individuals from the deleterious effects of socioeconomic disadvantage. Scholars suggest that Hispanic communities may foster and maintain beneficial social, cultural, and behavioral characteristics in close-knit community enclaves (Markides & Eschbach, 2005; Osypuk, Roux, Hadley, & Kandula, 2009).

### *Hispanic panethnicity and the mortality of hispanic subgroups*

Partially by definition, most explanations for the Hispanic Paradox view Hispanics as a singular ethnic group with a homogeneous mortality experience. The opportunity to identify as of Hispanic origin on the United States Census first appeared in 1970,[1] with the precise category "Hispanic" entering the census in 1980 as a result of the 1977 Office of Management and Budget standard identifying Hispanic ethnicity as a separate concept from Race.[2] With the growing use of Hispanic panethnicity in the US system of racial and ethnic classification, incoming US immigrants have been increasingly categorized in the panethnic. Although the term Hispanic has traditionally meant little outside of the US context, transnational relationships and global Spanish-language media have increasingly adopted the term and led to greater usage in origin countries (Roth, 2009). Research approaches that have combined all Hispanics into a singular group have typically done so due to data limitations, since direct measurement of the mortality experience of Hispanic subgroups is unavailable in many data sources (Arias et al., 2008; Elo, Turra, Kestenbaum, & Ferguson, 2004; Liao et al., 1998; Sorlie, Backlund, Johnson, & Rogot, 1993). The heterogeneity of the Hispanic population has also grown over time, as migration from Latin America to the United States increased during the 1990s and early 2000s (Logan & Turner, 2013).

Variation in the social and behavioral characteristics of Hispanic subgroups can lead to corresponding differences in mortality experience vis-à-vis non-Hispanic whites. The distinctive migration experiences of US Hispanic region-of-origin subgroups underscore this heterogeneity (Borrell & Lancet, 2012). For instance, work by Feliciano (2005) suggests that the greater migration distance for migrants countries in South America as compared to Mexico implies stronger socioeconomic and health selection. This is supported by the finding that Mexicans appear to be among the least select immigrant groups in the United States (Akresh & Frank, 2008). Early Cuban migrants were highly-selected, while more recent migration cohorts are more mixed (Zsembik & Fennell, 2005). Puerto Ricans have fewer immigration barriers than other groups, given U.S. citizenship (Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999). Different migration experiences contribute to socioeconomic variation among Hispanic subgroups, which may contribute to differences in adult mortality rates. Hispanic subgroups may also differ in terms of health-related behaviors such as cigarette smoking. While Cubans and Puerto Ricans in the United States smoke at relatively high rates, Central Americans, South Americans, Dominicans, and Mexicans exhibit low smoking prevalence (Kaplan et al., 2014). Mexican immigrants in the US, particularly women, tend to smoke at very low rates, which explain a large fraction of their mortality advantage over non-Hispanic whites (Fenelon, 2013).

Some comprehensive demographic studies of adult mortality differentials among Hispanics have expanded their analysis to include many region of origin populations. Hummer et al. (2000) used the National Health Interview Survey (NHIS) linked mortality file pooled from 1986 to 1995 to reveal modest variation in mortality experience among Hispanics by region of origin, finding that Puerto Ricans experience the highest mortality and Central/South Americans the lowest. Mexicans also exhibit consistently favorable mortality outcomes relative to non-Hispanic whites (Sorlie et al., 1993). Indeed, the fact that Mexicans comprise nearly two-thirds of American Hispanics is an

[1] Individuals could identify as Mexican, Cuban, Puerto Rican, Central or South American, or Other Spanish. The term "Hispanic" was not used in this census cycle.

[2] Subsequently, the OMB 1997 standard changed the term "Hispanic" to "Hispanic or Latino"

important reason for the observation that Hispanics have favorable mortality outcomes when considered as a whole (Fenelon, 2013).

In the 2000s, nearly half of all Hispanic individuals were born outside the United States, and Hispanic immigrants form the plurality of all foreign-born individuals in the United States. Nativity is important because the characteristics that select immigrants from their origin populations to the United States are likely to be related to health, and may impact comparisons to US-born populations (Blue & Fenelon, 2011). Foreign-born Hispanic populations tend to exhibit more favorable outcomes than those born in the United States, and assimilation has long been associated with worsening mortality outcomes among Hispanic immigrants (Abraido-Lanza, Chao, & Florez, 2005; Riosmena, Everett, Rogers, & Dennis, 2015). Although some research has found an advantage for US-born Hispanics relative to non-Hispanic whites, it is greatly diminished compared with that of foreign-born Hispanics (Singh & Siahpush, 2002). Although scholars have recently attempted to integrate considerations of region of origin and nativity, data limitations have hampered the ability to draw broad conclusions about variation in Hispanic mortality on these dimensions. Palloni and Arias (2004) considered both region of origin and nativity, examining Mexicans, Cubans, Puerto Ricans, and other Hispanics. However, their analysis was limited by relatively small sample sizes for many subgroups, particularly Cubans and Puerto Ricans. Furthermore, they were unable to consider Central Americans, South Americans, or Dominicans. As a result, their analysis found statistically significant mortality advantages only for foreign-born Mexicans and foreign-born other Hispanics. Likewise, Borrell and Lancet (2012) examined a number of Hispanic subgroups by nativity, but were unable to detect statistical significance for many of the groups due to relatively small sample sizes, and thus their results were mixed. As a result, a comprehensive analysis of the mortality experience of Hispanic subgroups by both region of origin and nativity is warranted.

At younger adult ages, many Hispanic subgroups experience a mortality disadvantage relative to non-Hispanic whites. Evidence for the "young adult disadvantage" comes from the work of Hayes-Bautista among others (Hayes-Bautista et al., 2002; Vaca, Anderson, & Hayes-Bautista, 2011), demonstrating that Hispanics have considerably elevated mortality compared to non-Hispanic whites between ages 15 and 24. However, this excess mortality is also observed among younger adults aged 25–44, at least for particular subgroups (Eschbach et al., 2007; Lariscy, Nau, Firebaugh, & Hummer, 2016). Given the significant mortality advantage among Hispanics at older ages (Markides & Eschbach, 2011), the relatively unfavorable mortality experience of young adult Hispanics adds an additional layer to the Hispanic paradox; studies that combine all adult ages into a summary measure often miss this nuance in the Hispanic Paradox and conclude that the mortality advantage extends to all adults (Abraido-Lanza et al., 1999). Although the reasons for the young adult disadvantage of Hispanics as well as its pattern across subgroups remain unclear, elevated mortality among younger adults is particularly notable for men (Hummer et al., 2000).

Age-related differences in the mortality advantage of Hispanic subgroups may reflect either differences in the determinants of mortality by age or differences in selection mechanisms across migration cohorts. Given that the large majority of the foreign born in the US arrived as immigrants prior to age 40 (Holmes, Driscoll, & Heron, 2015), age variation in mortality experience may reflect differences in migrant selection across migration cohorts (Reynolds, Chernenko, & Read, 2016). We may expect greater health selection among migrants prior to the large immigration wave of the 1990s, given less strong migration networks and streams. At the same time, underlying improvements in health in sending regions of origin countries may result in healthier immigrants over time, even if selection mechanisms are unchanged (Riosmena , Wong, & Palloni, 2013). Empirical research suggests that immigrants in the most recent migration cohorts from Mexico and other parts of Latin America report better health than migrants in earlier migration cohorts (Hamilton, Palermo, & Green, 2015).

This study uses a large nationally-representative household survey linked to mortality follow-up to provide a detailed portrait of adult mortality experience across 12 Hispanic subgroups, considering region of origin, nativity, sex, and age group. The analysis focuses on Mexicans, Puerto Ricans, Cubans, Dominicans, and Central/South Americans, comparing US-born and foreign-born individuals in each origin subgroup. We demonstrate a significant range of mortality experience across subgroups; some subgroups exhibit mortality experience similar to that of US-born non-Hispanic whites and others exhibit a significant adult mortality advantage. Below age 65, mortality advantages over non-Hispanic whites are smaller, and some groups, particularly Mexicans and Puerto Ricans, have a mortality disadvantage. At age 65 and over, nearly all Hispanic subgroups, particularly the foreign born, experience a mortality advantage over non-Hispanic whites. Our results provide additional support for the substantial heterogeneity in mortality experience among Hispanics and confirm that the "Hispanic Paradox" does not apply to all subpopulations within the panethnic category Hispanic.

## Data

We use data from the National Health Interview Survey Linked-Mortality Files (NHIS-LMF), covering the period 1990–2009 with mortality follow-up through the end of 2011. NHIS collects detailed demographic, behavioral, and health information in annual cross-sectional samples and is conducted by the National Center for Health Statistics (NCHS). NHIS-LMF matches deceased individuals to mortality vital statistics through stochastic linkage to the National Death Index. This linkage allows the analysis of disparities in survival on a large number of social dimensions. The survey years 1990–2009 were chosen because they contain complete information on Hispanic origin and nativity status.

The primary benefit of the NHIS is the large and geographically-diverse sample. Many of the Hispanic subgroups considered here make up less than 1% of the US population, which makes representative samples for these groups difficult to obtain in most survey samples. With surveys pooled 1990 to 2009, the total sample becomes large enough to examine smaller Hispanic subgroups than has been possible in prior research. Individuals under age 25 are excluded because they are less likely to have completed their education, which is a key measure of socioeconomic status in our analysis. The total pooled sample includes 890,115 individuals and 143,435 deaths by the end of 2011. Table 1 provides a detailed description of the sample by Hispanic subgroup, while Table 2 provides the number of deaths by Hispanic subgroup, sex, and age group.

### *Hispanic subgroups*

NHIS respondents report their race and whether they are of Hispanic or Latino origin. Those that identify as Hispanic or Latino also report their specific Hispanic subgroup (if any). We consider six region-of-origin subgroups: Mexicans, Puerto Ricans, Cubans, Dominicans, Central/South Americans, and other Hispanics.[3] We also consider nativity among Hispanics, separating each origin group into foreign-born (FB) and US-born (USB) subgroups, which gives 12 Hispanic subgroups. Respondents are considered foreign-born if they were born outside the fifty states and the District of Columbia. For our purposes, Island-born Puerto Ricans are considered foreign born even though they are US citizens at birth. US-born individuals who identify

[3] Other Hispanics include those not identifying as members of another group. This includes residual groups such as Spaniards, Hispanics of multiple origins, and Hispanics of unknown origin.

**Table 1**
Descriptive statistics of National Health Interview Survey sample by Hispanic subgroup 1990–2009.

| | US-born | | | | | | |
|---|---|---|---|---|---|---|---|
| | Non-Hispanic white | Mexican | Puerto Rican | Cuban | Dominican | Central/South American | other Hispanic |
| n | 726,805 | 41,534 | 6453 | 1565 | 283 | 1093 | 9793 |
| Mean Age | 49.8 | 43.8 | 38.5 | 39.3 | 33.7 | 36.2 | 45.1 |
| Mean Family Size | 2.7 | 3.4 | 3.3 | 3.0 | 3.3 | 3.2 | 2.9 |
| Male % | 47.4 | 46.0 | 44.3 | 47.8 | 42.1 | 48.0 | 45.0 |
| Education (%) | | | | | | | |
| 12 years or less | 49.2 | 65.2 | 55.5 | 36.3 | 40.3 | 32.8 | 55.3 |
| 13 years or more | 50.8 | 34.8 | 44.5 | 63.7 | 59.7 | 67.3 | 44.7 |
| Poverty Status (%) | | | | | | | |
| Below 100% of Poverty | 7.0 | 18.4 | 18.8 | 8.0 | 16.6 | 7.8 | 15.3 |
| 100–399% | 55.5 | 60.2 | 54.4 | 50.4 | 54.8 | 50.2 | 59.5 |
| 400% and above | 37.5 | 21.4 | 26.8 | 41.7 | 28.6 | 42.0 | 25.2 |
| Employment Status (%) | | | | | | | |
| Employed | 64.7 | 66.5 | 68.9 | 77.1 | 73.5 | 79.4 | 64.8 |
| Unemployed | 2.0 | 3.5 | 5.4 | 3.6 | 5.0 | 4.4 | 3.4 |
| Not in Labor Force | 33.3 | 30.0 | 25.7 | 19.4 | 21.6 | 16.2 | 31.9 |
| Marital Status (%) | | | | | | | |
| Married | 70.0 | 61.7 | 53.3 | 57.7 | 44.2 | 49.2 | 60.0 |
| Divorced | 11.7 | 16.0 | 16.9 | 15.0 | 15.2 | 13.5 | 17.2 |
| Widowed | 8.1 | 5.1 | 2.3 | 4.2 | 0.4 | 2.1 | 6.2 |
| Never Married | 10.3 | 17.2 | 27.5 | 23.2 | 40.3 | 35.2 | 16.6 |
| | Foreign-born | | | | | | |
| | | Mexican | Puerto Rican | Cuban | Dominican | Central/South American | other Hispanic |
| n | | 56,786 | 9049 | 8570 | 2522 | 14,428 | 11,234 |
| Mean Age | | 41.1 | 48.8 | 54.4 | 45.0 | 42.9 | 43.0 |
| Mean Family Size | | 4.3 | 3.1 | 3.0 | 3.5 | 3.5 | 3.6 |
| Male % | | 50.8 | 41.9 | 46.3 | 36.6 | 46.5 | 42.9 |
| Education (%) | | | | | | | |
| 12 years or less | | 87.2 | 74.0 | 63.8 | 69.7 | 64.7 | 67.3 |
| 13 years or more | | 12.8 | 26.0 | 36.2 | 30.3 | 35.4 | 32.7 |
| Poverty Status (%) | | | | | | | |
| Below 100% of Poverty | | 33.6 | 29.9 | 17.2 | 32.4 | 18.8 | 25.3 |
| 100–399% | | 59.8 | 54.9 | 62.1 | 56.0 | 63.0 | 62.6 |
| 400% and above | | 6.7 | 15.2 | 20.7 | 11.6 | 18.2 | 12.2 |
| Employment Status (%) | | | | | | | |
| Employed | | 64.7 | 49.1 | 55.7 | 61.1 | 72.3 | 65.7 |
| Unemployed | | 3.7 | 2.9 | 2.7 | 4.5 | 4.3 | 3.9 |
| Not in Labor Force | | 31.6 | 48.0 | 41.6 | 34.4 | 23.4 | 30.5 |
| Marital Status (%) | | | | | | | |
| Married | | 74.6 | 55.5 | 66.5 | 53.5 | 64.7 | 66.0 |
| Divorced | | 8.8 | 19.8 | 15.2 | 25.0 | 13.3 | 15.4 |
| Widowed | | 3.7 | 7.8 | 9.5 | 5.0 | 3.6 | 4.5 |
| Never Married | | 12.9 | 16.9 | 8.8 | 16.6 | 18.4 | 14.2 |

a Fewer than 10 deaths occurred for US-born Dominicans. Number not shown due to disclosure risk.
* Different from US-born non-Hispanic whites at $p < 0.05$

as white and as "not of Hispanic origin" are classified as non-Hispanic whites and form the majority comparison group for the analysis.

### *Sociodemographic controls*

The analysis also adjusts for demographic and socioeconomic characteristics: age, sex, level of education, marital status, family size, family income, employment status, and year of interview. Education is measured using a dichotomous variable denoting whether an individual has 12 years of education or less versus 13 years of education or more.[4] Family income is categorized according to the income-to-poverty ratio (< 100% of the poverty line, 100–399%, 400%+). Employment status is categorized as employed, unemployed, or not in the labor force. Respondents with missing data on these covariates were excluded from the analysis (although data on family income comes from NHIS imputed income files). 1.5% of respondents were excluded due to missing data. This is a similar set of variables used by previous analyses examining the Hispanic mortality advantage using NHIS-LMF data (Fenelon, 2013, 2016; Lariscy et al., 2015).

[4] The meaning of education may differ across national populations, making it difficult (*footnote continued*) to compare levels of education between US-born and foreign-born subgroups. Previous studies have found these differences have little impact on mortality comparisons for Hispanics vis-à-vis whites (Hummer et al. 1999)

**Table 2**
Number of deaths by subgroup at ages 25–64 and 65+ from NHIS-LMF 1990–2011.

| | Men | | Women | |
|---|---|---|---|---|
| Subgroup | Deaths at Ages 25–64 | Deaths at Ages 65+ | Deaths at Ages 25–64 | Deaths at Ages 65+ |
| US Born | | | | |
| Non-Hispanic White | 26,462 | 38,038 | 19,188 | 45,920 |
| Mexican | 1317 | 917 | 837 | 1007 |
| Puerto Rican | 147 | 43 | 114 | 51 |
| Cuban | 28 | 30 | 30 | 37 |
| Dominican | a | a | a | a |
| Central/South American | a | a | a | a |
| other Hispanic | 351 | 339 | 305 | 382 |
| Foreign Born | | | | |
| Mexican | 1510 | 611 | 1020 | 692 |
| Puerto Rican | 374 | 248 | 341 | 291 |
| Cuban | 261 | 499 | 157 | 556 |
| Dominican | 17 | 11 | 16 | 22 |
| Central/South American | 91 | 63 | 78 | 99 |
| other Hispanic | 271 | 165 | 235 | 231 |

a Fewer than 10 deaths occurred for US-born Dominicans and Central/South Americans. Number not shown due to disclosure risk.

## Methods

We use a hazard modeling approach to examine differences in mortality risk between non-Hispanic whites and Hispanic subgroups. Since the exact date of interview and death are available through the restricted-use file, the model uses a continuous-time proportional hazards procedure modeled using a Gompertz-distributed hazard function. The first set of models (unadjusted) examines mortality differences among Hispanic subgroups and non-Hispanic whites focusing on two age groups: 25–64 and 65+. The second set of models includes controls for socioeconomic and demographic characteristics (adjusted). We run all models separately by sex, in order to consider differences between Hispanic men and women in migration experiences, socioeconomic experiences in the United States (Lariscy et al., 2015). The coefficient for each Hispanic subgroup denotes the hazard ratio of the mortality risk in comparison to that for US-born non-Hispanic whites. We use sample weights adjusted for eligibility status in the mortality linkage (National Center for Health Statistics, 2013).

## Results

Table 1 presents descriptive statistics of the sample by Hispanic subgroup and nativity. Mexicans are the largest Hispanic subgroup, comprising 59% of all Hispanics in the sample. Central/South Americans are the next largest (9.4%), followed by Puerto Ricans (9.3%), Cubans (6.1%) and Dominicans (1.7%). Other Hispanics make up 14% of Hispanics in the sample. Sixty-three percent of Hispanics are foreign-born. Subgroups also differ substantially in their socioeconomic attainment, and not all Hispanic subgroups exhibit lower SES than non-Hispanic whites. Although all foreign-born groups have lower levels of education and income than whites, USB Cubans, Dominicans, and Central/South Americans show higher socioeconomic attainment. While 50.8% of whites have at least 13 years of education, 63.7% of USB Cubans, 59.7% of USB Dominicans, and 67.3% of USB Central/South Americans do. FB Mexicans have particularly low levels of SES, with 33.6% having family income below the federal poverty line. FB Dominicans have the next highest poverty rate, 32.4%, followed by FB Puerto Ricans, 29.9%. Within each Hispanic subgroup, the foreign-born have lower levels of education and greater rates of poverty than the US-born. The number of deaths observed for each subgroup is shown in Table 2. Some Hispanic subgroups have too few deaths to report (fewer than 10), and thus our models have difficulty calculating accurate death rates for these groups. Specifically, mortality estimates for US-born Central/South Americans and Dominicans should be interpreted with caution.

The results of hazard models estimating differences in mortality among Hispanic subgroups by region of origin and nativity are shown for men in Table 3. The first two models consider men aged 25–64. Model 1 adjusts only for age and year of interview (unadjusted model), while Model 2 includes socioeconomic covariates (adjusted model). For men in the unadjusted model, many subgroups experience higher mortality risk than non-Hispanic whites, including USB and FB Mexicans and Puerto Ricans. Adjusting for socioeconomic covariates mediates the disadvantage of these groups, suggesting that younger adult Mexican and Puerto Rican men experience mortality disadvantage as a function of socioeconomic disadvantage. Only FB Central/South American and other Hispanic men experience lower risks than non-Hispanic white men in this age group. Models 3 and 4 examine mortality among men aged 65 and over. In the unadjusted model, Mexican men are the only USB subgroup with a mortality advantage. In the adjusted model, all FB subgroups, as well as USB Mexicans, Cubans, and other Hispanics, exhibit an advantage relative to non-Hispanic whites. Among men aged 65 and over, FB Dominicans have the most favorable mortality outcomes of any subgroup in both the unadjusted and adjusted models, although differences by subgroup in relative mortality risks were not tested for statistical significance.

Among women (Table 4), the pattern of Hispanic advantage and disadvantage across subgroups is similar to that of men. Among women aged 25–64, unadjusted for socioeconomic covariates, several subgroups experience higher mortality risk than non-Hispanic whites including FB Mexicans, USB and FB Puerto Ricans and USB other Hispanics (Model 1). However, unlike for men, Mexican and FB Puerto Rican women's disadvantage is reversed and becomes a mortality advantage in the adjusted model (Model 2). All FB subgroups have an advantage in the adjusted model. Among women aged 65 and over, all FB subgroups and USB Mexicans have an advantage in the unadjusted model. In the adjusted model, advantages expand for these subgroups, but no other USB subgroups exhibit an advantage. Among women aged 65 and over, FB Dominicans again experience the lowest mortality risk of any subgroup, although differences in relative mortality risks were not tested statistically.

Table 5 summarizes the findings with respect to the mortality advantage (or disadvantage) of each Hispanic subgroup vis-à-vis non-Hispanic whites. Among adults aged 25–64, many US-born subgroups and some foreign-born subgroups experience mortality disadvantages. These disadvantages largely reflect socioeconomic disadvantage, and are not present in the adjusted models. Among adults aged 65 and over, all FB subgroups have an advantage over non-Hispanic whites, and many USB subgroups exhibit an advantage in the adjusted model. FB Dominicans, Central/South Americans, and other Hispanics exhibit consistent advantages across models for both men and women, aged 25–64 and 65 and over, and both unadjusted and adjusted for socioeconomic covariates. Although much of the focus of the Hispanic paradox is on Mexican-origin populations, foreign-born Dominicans, Central/South Americans, and other Hispanics have the most consistent mortality advantage across age and sex among Hispanic subgroups.

## Discussion

Although much of the existing research on the Hispanic mortality paradox has often treated the more than 50 million individuals of Hispanic origin in the US as a singular group, there is significant heterogeneity in this population. The primary contribution of this study is a comprehensive analysis of the mortality experience of Hispanic subgroups compared to non-Hispanic whites. In accomplishing this,

**Table 3**
Hazard ratios of mortality by Hispanic subgroup among men by age group.

| | Ages 25–64 | | Ages 65+ | |
|---|---|---|---|---|
| | Model 1[a] | Model 2[b] | Model 3[a] | Model 4[b] |
| Subgroup | | | | |
| US-born | | | | |
| NH White | 1.00 | 1.00 | 1.00 | 1.00 |
| Mexican | 1.22 (1.15–1.30)*** | 1.03 (0.96–1.10) | 0.87 (0.81–0.94)*** | 0.77 (0.71–0.83)*** |
| Puerto Rican | 1.24 (1.03–1.49)* | 1.05 (0.88–1.26) | 1.05 (0.78–1.42) | 0.99 (0.33–1.34) |
| Cuban | 0.77 (0.52–1.14) | 0.74 (0.50–1.09) | 0.72 (0.48–1.07) | 0.63 (0.42–0.95)* |
| Dominican | 0.63 (0.09–4.52) | 0.50 (0.07–3.63) | 3.67 (0.37–36.8) | 3.22 (0.31–33.3) |
| Central/South American | 0.64 (0.31–1.31) | 0.65 (0.33–1.29) | 1.24 (0.52–2.95) | 1.14 (0.44–2.92) |
| other Hispanic | 1.14 (1.02–1.30)* | 1.02 (0.83–0.99) | 0.95 (0.84–1.06) | 0.88 (0.79–0.99)* |
| Foreign-Born | | | | |
| Mexican | 1.18 (1.11–1.25)*** | 0.97 (0.91–1.03) | 0.71 (0.64–0.78)*** | 0.60 (0.55–0.66)*** |
| Puerto Rican | 1.32 (1.17–1.48)*** | 0.90 (0.80–1.01) | 0.88 (0.75–1.03) | 0.73 (0.62–0.86)*** |
| Cuban | 1.00 (0.87–1.15) | 0.93 (0.81–1.07) | 0.83 (0.74–0.93)*** | 0.78 (0.69–0.87)*** |
| Dominican | 0.73 (0.43–1.23) | 0.54 (0.32–0.92)* | 0.33 (0.16–0.66)** | 0.26 (0.13–0.54)*** |
| Central/South American | 0.48 (0.38–0.60)*** | 0.45 (0.36–0.57)*** | 0.49 (0.37–0.63)*** | 0.44 (0.33–0.57)*** |
| other Hispanic | 0.59 (0.52–0.67)*** | 0.52 (0.46–0.59)*** | 0.58 (0.49–0.69)*** | 0.56 (0.47–0.67)*** |
| Sociodemographic Covariates | | | | |
| Education | | | | |
| 12 years or fewer | | 1.00 | | 1.00 |
| 13 years or more | | 0.71 (0.69–0.73)*** | | 0.86 (0.84–0.88)*** |
| Employment Status | | | | |
| Employed | | 1.00 | | 1.00 |
| Unemployed | | 1.38 (1.30–1.47)*** | | 1.08 (0.92–1.26) |
| Not in Labor Force | | 2.13 (2.07–2.20)*** | | 1.38 (1.34–1.43)*** |
| Family Income | | | | |
| Below 100% of Poverty | | 1.00 | | 1.00 |
| 100–399% | | 0.81 (0.78–0.84)*** | | 0.86 (0.83–0.90)*** |
| 400% and above | | 0.60 (0.58–0.63)*** | | 0.71 (0.67–0.74)*** |
| Household Size | | 0.96 (0.95–0.97)*** | | 1.01 (1.00–1.03) |
| Marital Status | | | | |
| Married | | 1.00 | | 1.00 |
| Divorced/separated | | 1.48 (1.42–1.53)*** | | 1.30 (1.24–1.36)*** |
| Widowed | | 1.45 (1.34–1.57)*** | | 1.16 (1.12–1.20)*** |
| Never Married | | 1.49 (1.43–1.55)*** | | 1.16 (1.11–1.23)*** |
| Number of Observations | 411,184 | 411,184 | 84,941 | 84,941 |

[a] Models 1 and 3 control only for age and year of interview (unadjusted model).
[b] Models 2 and 4 add socioeconomic covariates: education, family income, employment status, marital status, family size (adjusted model)
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

our results complicate the traditional formulation of the Hispanic Paradox by highlighting the variation in mortality experience among Hispanic subgroups by age, region of origin, and nativity. The significance of this finding should not be discounted in research on the Hispanic and immigrant epidemiological paradoxes in the United States, since it has implications both for our understanding of the processes of immigrant health as well as for data collection strategies for identifying Hispanic subgroups (Hayward, Hummer, Chiu, González-González, & Wong, 2014; Ruiz, Steffen, & Smith, 2013). Immigrants from diverse backgrounds entering the United States have found the assimilation process to be especially complicated given the nature of the American racial classification system (Frank, Akresh, & Lu, 2010). New immigrants often face racial discrimination, residential and occupational segregation, and categorization into broad racial and ethnic categories, particularly Hispanic panethnicity (Okamoto & Mora, 2014). We demonstrate the importance of a critical perspective on the use of the panethnic category for research on health and mortality, which is likely to become increasingly important as the Hispanic population continues to grow in both size and diversity.

Using the largest available nationally-representative sample for the study of Hispanic mortality, we compare the mortality experience of 48 subgroups (six region of origin groups by nativity, age group, and adjusted/unadjusted) to that of US-born non-Hispanic whites. Overall, 27 of the 48 subgroup comparisons show an advantage for the Hispanic subgroup over non-Hispanic whites, 5 show a disadvantage, and 16 show no statistical difference. Although this demonstrates a fair amount of consistency in the Hispanic mortality advantage, it suggests a more nuanced perspective on this difference than is often claimed. We observe that foreign-born subgroups have more favorable outcomes than their US-born counterparts, almost without exception. Consistently lower mortality risk is found among Mexicans at older ages, and foreign-born Cubans, Dominicans Central/South Americans, and other Hispanics. US-born Puerto Ricans consistently have the poorest mortality outcomes among Hispanics, although this partially reflects low levels of SES in this population. Our results simultaneously provide evidence for the Hispanic mortality advantage as well as evidence that the advantage does not apply equally to all Hispanic subgroups.

**Table 4**
Hazard ratios of mortality by Hispanic subgroup among women by age group.

| | Ages 25–64 | | Ages 65+ | |
|---|---|---|---|---|
| | Model 1[a] | Model 2[b] | Model 3[a] | Model 4[b] |
| Subgroup | | | | |
| US-born | | | | |
| NH White | 1.00 | 1.00 | 1.00 | 1.00 |
| Mexican | 0.98 (0.91–1.06) | 0.80 (0.74–0.87)*** | 0.92 (0.86–0.99)* | 0.82 (0.76–0.88)*** |
| Puerto Rican | 1.22 (1.01–1.49)* | 0.97 (0.80–1.18) | 0.92 (0.69–1.23) | 0.85 (0.62–1.14) |
| Cuban | 1.26 (0.84–1.89) | 1.29 (0.87–1.93) | 0.96 (0.67–1.36) | 0.93 (0.65–1.33) |
| Dominican | 1.90 (0.48–7.59) | 1.49 (0.36–6.04) | 1.93 (0.94–2.88) | 1.68 (0.85–2.71) |
| Central/South American | 1.02 (0.42–2.45) | 1.01 (0.42–2.40) | 0.78 (0.27–2.28) | 0.76 (0.27–2.10) |
| other Hispanic | 1.23 (1.08–1.41)** | 1.07 (0.94–1.22) | 1.06 (0.95–1.19) | 1.00 (0.90–1.12) |
| Foreign-Born | | | | |
| Mexican | 1.28 (1.19–1.38)*** | 0.87 (0.81–0.94)*** | 0.79 (0.72–0.86)*** | 0.66 (0.60–0.73)*** |
| Puerto Rican | 1.32 (1.18–1.50)*** | 0.81 (0.72–0.92)*** | 0.79 (0.69–0.90)*** | 0.68 (0.60–0.77)*** |
| Cuban | 0.74 (0.62–0.89)*** | 0.64 (0.53–0.77)*** | 0.79 (0.71–0.87)*** | 0.71 (0.65–0.80)*** |
| Dominican | 0.48 (0.29–0.80)** | 0.29 (0.17–0.48)*** | 0.44 (0.26–0.72)*** | 0.36 (0.22–0.59)*** |
| Central/South American | 0.44 (0.35–0.56)*** | 0.36 (0.28–0.46)*** | 0.54 (0.43–0.68)*** | 0.47 (0.37–0.58)*** |
| other Hispanic | 0.59 (0.51–0.67)*** | 0.45 (0.39–0.52)*** | 0.51 (0.44–0.59)*** | 0.44 (0.38–0.52)*** |
| Sociodemographic Covariates | | | | |
| Education | | | | |
| 12 years or fewer | | 1.00 | | 1.00 |
| 13 years or more | | 0.75 (0.73–0.77)*** | | 0.86 (0.84–0.88)*** |
| Employment Status | | | | |
| Employed | | 1.00 | | 1.00 |
| Unemployed | | 1.26 (1.16–1.37)*** | | 1.27 (1.05–1.52)*** |
| Not in Labor Force | | 1.83 (1.77–1.88)*** | | 1.50 (1.45–1.56)*** |
| Family Income | | | | |
| Below 100% of Poverty | | 1.00 | | 1.00 |
| 100–399% | | 0.71 (0.69–0.74)*** | | 0.91 (0.88–0.93)*** |
| 400% and above | | 0.50 (0.47–0.52)*** | | 0.80 (0.77–0.82)*** |
| Household Size | | 0.95 (0.94–0.96)*** | | 1.04 (1.03–1.05)*** |
| Marital Status | | | | |
| Married | | 1.00 | | 1.00 |
| Divorced/separated | | 1.42 (1.37–1.47)*** | | 1.32 (1.27–1.37)*** |
| Widowed | | 1.42 (1.35–1.48)*** | | 1.25 (1.22–1.28)*** |
| Never Married | | 1.59 (1.51–1.67)*** | | 1.27 (1.21–1.33)*** |
| Number of Observations | 454,617 | 454,617 | 117,009 | 117,009 |

[a] Models 1 and 3 control only for age and year of interview (unadjusted model).
[b] Models 2 and 4 add socioeconomic covariates: education, family income, employment status, marital status, family size (adjusted model)
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

It is well known that recent immigrants to the US have the most favorable health profile (Ullmann, Goldman, & Massey, 2011), while greater duration of residence is associated with poorer health and mortality outcomes (Creighton, Goldman, Pebley, & Chung, 2012). In addition, those immigrants who arrived at younger ages experience higher mortality risk than those who arrived at older ages regardless of duration of residence (Holmes et al., 2015). Our results confirm the distinct mortality experiences of US-born and foreign-born Hispanics, a pattern that exists for nearly every region-of-origin subgroup. We find advantages for each foreign-born subgroup over non-Hispanic whites at older ages for both men and women. Mexicans are the only US-born subgroup to demonstrate a consistent advantage over non-Hispanic whites at older ages for both men and women. The advantages are quite large for foreign-born Mexicans, Central/South Americans, and Dominicans, corresponding to adult life expectancy 8 years greater than that of non-Hispanic whites.[5]

Our results also demonstrate that comparisons of the mortality experience of individual Hispanic subgroups to non-Hispanic whites depends on age. The advantages for Mexicans and Puerto Ricans at older ages do not extend to younger-adult ages, and these groups experience a mortality disadvantage relative to whites between ages 25 and 64. This finding is unlikely to reflect exclusively differences across migration cohorts, since more recent cohorts report better health than earlier cohorts (Hamilton et al., 2015). The disadvantage among adults aged 25–64 is mediated by socioeconomic disadvantage, primarily due to lower levels of education and higher rates of poverty in these populations. Similarly, the mortality advantage of many Hispanic subgroups would be even larger if they did not experience considerable socioeconomic disadvantage, a facet of the "weak Hispanic Paradox" (Hummer et al., 1999). The disadvantage for these subgroups at younger adult ages is partially due to external causes of death, which may reflect neighborhood conditions in high-poverty immigrant en-

[5] Calculated using standard life table methods applying the estimated mortality ratios from the adjusted models. These differences are similar to those found by Palloni and Arias (2004).

(footnote continued)

**Table 5**
Summary of mortality relative to non-Hispanic whites by Hispanic subgroup.

| | Mortality Experience Relative to non-Hispanic whites | | | |
|---|---|---|---|---|
| | Ages 25–64 | | Ages 65+ | |
| Subgroup | Unadjusted | Adjusted | Unadjusted | Adjusted |
| US Born | | | | |
| Mexican | Higher for men | Lower for women | Lower | Lower |
| Puerto Rican | Higher | No Difference | No Difference | No Difference |
| Cuban | No Difference | No Difference | No Difference | Lower for men |
| Dominican | No Difference | No Difference | No Difference | No Difference |
| Central/South American | No Difference | No Difference | No Difference | No Difference |
| other Hispanic | Higher | No Difference | No Difference | Lower for men |
| Foreign Born | | | | |
| Mexican | Higher | Lower for women | Lower | Lower |
| Puerto Rican | Higher | Lower for women | Lower for women | Lower |
| Cuban | Lower for women | Lower for women | Lower | Lower |
| Dominican | Lower for women | Lower | Lower | Lower |
| Central/South American | Lower | Lower | Lower | Lower |
| other Hispanic | Lower | Lower | Lower | Lower |

Notes: Differences refer to statistically significant higher or lower mortality risk of the Hispanic subgroup with respect to non-Hispanic white men and women of the same age. Unadjusted models control only for age and year of interview. Adjusted models control for socioeconomic covariates: education, family income, employment status, marital status, family size. Comparisons with no sex specified means that the advantage/disadvantage pertains to both men and women.

claves (Vega, Rodriguez, & Gruskin, 2009). Palloni and Arias (2004) found that the advantage for foreign-born Mexicans expanded substantially at older ages, which they interpreted as evidence for return migration of older individuals. Instead, this may reflect the greater impact of socioeconomic disadvantage on mortality risk among younger adults than older adults (Herd, 2006).

While the results here confirm that the Hispanic Paradox is not a characteristic of all Hispanic subgroups, most foreign-born Hispanic subgroups have an advantage over non-Hispanic whites. However, given the large number of Mexican-origin individuals among both US-born and foreign-born Hispanics, the consistent advantage for Mexicans makes a large contribution to the advantage of Hispanics when considered as a singular group (Fenelon, 2013; Lariscy et al., 2015). When data limitations preclude the analysis of detailed subgroups among Hispanics, researchers must be cognizant of the fact that the experience of the Mexican population drives much of the overall Hispanic mortality experience, and should convey that there is considerable variation among Hispanic subgroups.

### *Limitations*

The primary limitation of the analysis is that we are unable to specify explanations for the advantages of individual subgroups. Some advantages may reflect health-related behaviors (Fenelon & Blue, 2015), and advantages for other groups may reflect patterns of health-selective migration (Riosmena et al., 2013). Although the analysis provides a comprehensive analysis of the Hispanic mortality paradox, future work must investigate whether explanations for the mortality advantage vary across Hispanic subgroups.

The analysis is limited by two well-known data quality issues. First, record linkage between NHIS and NDI may differ in quality across Hispanic subgroups, with foreign-born Hispanics experiencing lower matching quality than non-Hispanic whites (Lariscy, 2011) The true impact of linkage differences on mortality differences is difficult to determine, specifically because differing linkage rates combine both differences in linkage given death and differences in death risks. Although record linkage likely differs by nativity, it is unknown whether it would vary by region of origin. Second, the current data cannot completely address the issue of health-selective return migration (Arenas et al., 2015). Certain subgroups, such as foreign-born Cubans, are unable to return to their origin country and one previous study (Turra & Elo, 2008) demonstrated that the magnitude of return migration would need to be very large to explain the substantial mortality differentials found in most data sources.

Finally, the analysis covers a relatively long time series, with interviews stretching across a 20-year period and mortality follow-up covering a period of up to 22 years. Considering such a long period makes it possible that death occurs many years after interview, and individual characteristics may change during the course of follow-up. The inclusion of a control for year of interview helps to assure that the observed mortality differences do not reflect secular trends in mortality over time, although it remains an issue cross-sectional data cannot completely address.

## Conclusions

The Hispanic mortality paradox is a theoretically significant finding for social science research in that it represents a case in which a lower-status group experiences better health outcomes than the higher-status majority. Expanding our knowledge of this process not only informs research on the health and mortality outcomes of Hispanics but also the nuances of the relationship between SES and health. As the Hispanic population has grown in the past several decades, it has also become more diverse, in terms of age, nativity, and country of origin. With this increase in diversity has come regional growth in Hispanic immigrant population across the United States, with new destinations emerging in places as far apart as Seattle and Atlanta. These trends have also led to increased interest in the health and mortality experience of Hispanic populations across the US. Many of the subgroups that exhibit the largest mortality advantages are also those that are growing the fastest (Fenelon & Blue, 2015), including Central Americans, South Americans, and Dominicans. This shift is combined with the aging of many Hispanic subgroups, whose mortality experience will become more relevant for the overall longevity of the US population in the coming decades.

## Disclaimer

The views expressed in this article are those of the authors and do not necessarily reflect the official position of the National Center for Health Statistics or the US Centers for Disease Control and Prevention.

## Appendix A1

see Table A1 here.

Our analysis seeks to present the most comprehensive analysis of the mortality experience of Hispanic subgroups in the United States. Our main analysis examines subgroups separately by sex. However, small sample sizes occasionally reduce statistical power for sex-separate analyses. Here we present the models from Tables 3 and 4 in a combined model for both sexes. Results are generally comparable, although sex-specific patterns in the size of the mortality advantage across subgroups cannot be identified.

**Table A1**
Hazard ratios of mortality by Hispanic subgroup with sexes combined.

| | Ages 25–64 | | Ages 65+ | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Subgroup | | | | |
| US-born | | | | |
| NH White | 1.00 | 1.00 | 1.00 | 1.00 |
| Mexican | 1.12 (1.07–1.18)*** | 1.03 (0.96–1.10) | 0.87 (0.81–0.94)*** | 0.77 (0.71–0.83)*** |
| Puerto Rican | 1.23 (1.08–1.41)** | 1.05 (0.88–1.26) | 1.05 (0.78–1.42) | 0.99 (0.33–1.34) |
| Cuban | 0.97 (0.73–1.29) | 0.74 (0.50–1.09) | 0.72 (0.48–1.07) | 0.63 (0.42–0.95)* |
| Dominican | 1.19 (0.38–3.73) | 0.50 (0.07–3.63) | 3.67 (0.37–36.8) | 3.22 (0.31–33.3) |
| Central/South American | 0.78 (0.441–1.38) | 0.65 (0.33–1.29) | 1.24 (0.52–2.95) | 1.14 (0.44–2.92) |
| other Hispanic | 1.19 (1.08–1.30)*** | 1.02 (0.83–0.99) | 0.95 (0.84–1.06) | 0.88 (0.79–0.99)* |
| Foreign-Born | | | | |
| Mexican | 1.22 (1.16–1.28)*** | 0.97 (0.91–1.03) | 0.71 (0.64–0.78)*** | 0.60 (0.55–0.66)*** |
| Puerto Rican | 1.32 (1.22–1.44)*** | 0.90 (0.80–1.01) | 0.88 (0.75–1.03) | 0.73 (0.62–0.86)*** |
| Cuban | 0.89 (0.80–0.99)* | 0.93 (0.81–1.07) | 0.83 (0.74–0.93)*** | 0.78 (0.69–0.87)*** |
| Dominican | 0.61 (0.42–0.88)** | 0.54 (0.32–0.92)* | 0.33 (0.16–0.66)** | 0.26 (0.13–0.54)*** |
| Central/South American | 0.46 (0.39–0.54)*** | 0.45 (0.36–0.57)*** | 0.49 (0.37–0.63)*** | 0.44 (0.33–0.57)*** |
| other Hispanic | 0.59 (0.53–0.65)*** | 0.52 (0.46–0.59)*** | 0.58 (0.49–0.69)*** | 0.56 (0.47–0.67)*** |
| Sociodemographic Characteristics | | | | |
| Education | | | | |
| 12 years or fewer | | 1.00 | | 1.00 |
| 13 years or more | | 0.71 (0.69–0.73)*** | | 0.86 (0.84–0.88)*** |
| Employment Status | | | | |
| Employed | | 1.00 | | 1.00 |
| Unemployed | | 1.38 (1.30–1.47)*** | | 1.08 (0.92–1.26) |
| Not in Labor Force | | 2.13 (2.07–2.20)*** | | 1.38 (1.34–1.43)*** |
| Family Income | | | | |
| Below 100% of Poverty | | 1.00 | | 1.00 |
| 100–399% | | 0.81 (0.78–0.84)*** | | 0.86 (0.83–0.90)*** |
| 400% and above | | 0.60 (0.58–0.63)*** | | 0.71 (0.67–0.74)*** |
| Household Size | | 0.96 (0.95–0.97)*** | | 1.01 (1.00–1.03) |
| Marital Status | | | | |
| Married | | 1.00 | | 1.00 |
| Divorced/separated | | 1.48 (1.42–1.53)*** | | 1.30 (1.24–1.36)*** |
| Widowed | | 1.45 (1.34–1.57)*** | | 1.16 (1.12–1.20)*** |
| Never Married | | 1.49 (1.43–1.55)*** | | 1.16 (1.11–1.23)*** |
| Number of Observations | 411,184 | 411,184 | 84,941 | 84,941 |

Notes: Models 1 and 3 control only for age, sex and year of interview (unadjusted results). Models 2 and 4 add socioeconomic covariates: education, family income, employment status, marital status, family size

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

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