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ORIGINAL RESEARCH

The Immigrant Health Advantage: An Examination of African-Origin Black Immigrants in the United States

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Abstract

The immigrant health advantage suggests that, despite significant socioeconomic disadvantage, immigrant populations report better-than-expected health relative to U.S.-born counterparts. This phenomenon has been repeatedly shown in Hispanic-origin immigrant population with little focus on other racial/ethnic groups. In this study, the immigrant health advantage is examined as it pertains to overweight, obesity, hypertension, and diabetes in African-origin black immigrants ($n=2748$) relative to U.S.-born non-Hispanic blacks ($n=71{,}320$). Additionally, to investigate within-immigrant heterogeneity in health deterioration associated with duration in the United States, the health of African-origin black immigrants is compared to non-Hispanic white and Mexican–American immigrants. Analyses are conducted on adults aged 18–85 + ($n=570{,}675$) from the 2000–2018 National Health Interview Survey using binomial logistic regressions. Findings support the notion of an immigrant health advantage and suggest that, relative to U.S.-born blacks, African-origin black immigrants are at lower odds for obesity, hypertension, and diabetes, regardless of duration in the United States. Further, when compared to non-Hispanic white and Mexican–American immigrants, African-origin black immigrants display similar probabilities of reporting overweight, obesity, and diabetes across four duration categories. These findings suggest that, despite potentially experiencing high rates of discriminatory and/or racist behaviors, African-origin black immigrants' health does not deteriorate differently than this sample of non-black immigrant counterparts. The findings presented here provide further insight into the health of African-origin blacks immigrants, a rapidly growing proportion of both the U.S.-black and foreign-born population.

Keywords Health disparities · International migration · Hypertension · Diabetes · Body mass index · NHIS

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Introduction

Since the 1960s, the number of African-origin immigrants has increased substantially within the United States (Anderson, 2017; Commodore-Mensah et al., 2015; Hamilton, 2019 Mehta et al., 2016). Despite notable growth, African immigrants are relatively underrepresented in health literature due to issues related to racial or ethnic misclassification and non-response to studies, among others (Commodore-Mensah et al., 2015). Extant literature on the health of African immigrants tends to focus on sexually transmitted diseases and infections (e.g., HIV/AIDs), perinatal health, and communicable disease, while only a handful have examined non-communicable health conditions, a central health concern in the United States (Commodore-Mensah et al. 2015). Consequently, a distinct gap in immigrant health literature has emerged, making it difficult for researchers, practitioners, and policy officials to fully understand the health trends and needs of African-origin black immigrants.

This study draws upon the immigrant health advantage to investigate four non-communicable cardiometabolic health conditions among African-origin black immigrants in the United States—overweight, obesity, hypertension, and diabetes—as compared to their U.S.-born non-Hispanic black counterparts. The immigrant health advantage, also known as the immigrant health or epidemiological paradox, suggests that immigrants, despite being socioeconomically disadvantaged, are in better-than-expected health and report lower rates of all-cause mortality relative to U.S.-born populations, including non-Hispanic whites (Ichou & Wallace, 2019; Singer, McElroy, & Muenning, 2017). These health advantages are not unwavering. As duration in the United States, or time since arrival, increases, the health status of immigrants deteriorates and begins to converge with that of U.S.-born populations (Riosmena & Dennis, 2012; Riosmena et al., 2015). Additionally, Elo et al. (2008) posit that, due to pronounced racialized discrimination, black immigrants, including those of African origin, may experience the immigrant health advantage differently than other non-black immigrants. These differences may take the form of muted protective effects or accelerated deterioration of health status with increased duration

Existing research shows that black immigrants, including those of African origin, tend to be healthier than their U.S.-born counterparts. For example, the work of Ford et al. (2015), Mehta et al. (2015), and Read and Emmerson (2005) examine diabetes, obesity, and overall black immigrant well-being, respectively. Each of these studies make important scientific contributions by showing that black immigrants are, indeed, healthier than U.S.-born blacks (Read & Emmerson, 2005) and report significantly lower rates of diabetes (Ford et al., 2015) and obesity (Mehta et al., 2015). The current study builds upon existing literature on the immigrant health advantage among African-origin blacks by extending the temporal scope of analysis, examining two previously under-studied outcomes, overweight and diabetes, and including several previously unexamined measures of health behaviors. In addition to these, the current study contributes an examination of within-immigrant heterogeneity in health outcomes. Specifically, do

African-origin black immigrants, due to their racially black identity, experience the immigrant health advantage differently than non-black immigrant counterparts. This line of inquiry draws heavily on the work of Elo et al. (2008) and their relatively untested proposition that, because of elevated exposure to discriminatory and racist behaviors in the United States, black immigrants will experience more rapid health deterioration than non-black counterparts. As such, this study poses the following research questions:

1. Is there continued evidence of the immigrant health advantage among self-identified African-origin black immigrants when compared to U.S.-born non-Hispanic blacks?
2. Considering the potential difference between African-origin black and other immigrants, is there evidence of accelerated health deterioration with increasing duration in the United States for African-origin black immigrants relative to non-Hispanic white and Mexican–American immigrants?

The findings presented here provide clear, continued support for the applicability of the immigrant health advantage to African-origin black immigrants when compared to U.S.-born non-Hispanic blacks. With the sole exception of overweight, African-origin blacks consistently report significantly lower probabilities for all outcomes examined. Additionally, findings suggest that, when compared to foreign-born non-Hispanic whites and Mexican–Americans, African-origin blacks do not experience accelerated health deterioration for overweight, obesity, and diabetes. Rather, the probability of reporting each of these outcomes closely mirrors those of their non-black immigrant counterparts.

Literature Review

African Immigration to the United States

The voluntary movement of Africans to the United States is a relatively recent phenomenon. Immediately following the cessation of the trans-Atlantic slave trade in 1807, there was little migration from Africa to the United States (Elo, Mehta, & Huang, 2011). The following century and a half are generally viewed as a period of white-privileged migration. The United States maintained immigration policies that emphasized preference to European immigrants while essentially barring entry for immigrants from Africa, Asia, and regions of Central and South America (Elo, Mehta, & Huang, 2008; Kent, 2007; Massey, 1995).

By the 1960s, the United States began to see an upsurge in the number of African immigrants as a result of two sociopolitical changes. After much of the African continent was colonized by different European powers, particularly between the late 19th and early 20th centuries, the mid-twentieth century marked a period of mass colonial independence across much of the African continent (Takougang, 2003). While sovereignty came with clear benefits, it brought with it an increased risk of political,

economic, and social instability (Takougang, 2003). Competition over resources, steep declines in the prices of exported goods, absence of reliable employment, and heightened risks of political conflict motivated many Africans to emigrate to regions of Europe and the Americas (Takougang, 2003). It was also during this period that the United States addressed its restrictive immigration laws. In 1965, the Immigration and Nationality Act, or Hart–Celler Act, was passed. Alongside relaxing nationality-based restrictions on immigrant allowances from the Eastern Hemisphere, the Hart–Celler Act broadened the scope of refugee and asylee classifications and established the diversity visa, a primary pathway to the United States for African-origin immigrants (Capps et al., 2012; Elo, Mehta, & Huang, 2011; Kent, 2007).

These changes ushered in a new period of immigration for the United States and saw drastic increases in the African-origin immigrant population (Commodore-Mensah et al., 2015; Mehta et al., 2016). Between 1970 and 2000, the number of African-origin immigrants increased more than ten-fold from 80,000 (Takougang, 1995) to 881,000 (Anderson, 2017). By 2015, over 2 million African-origin immigrants lived within the United States (Anderson, 2017). The majority of these immigrants racially identify as black, with less than one-quarter identifying as any other racial category (Capps et al., 2012; Kent, 2007). African-origin immigrants tend to be younger, higher proportion male, and more highly educated than their U.S.-born counterparts (Anderson, 2017). Despite this educational bump, the socioeconomic status of African-origin immigrants tends to mirror that of U.S.-born non-Hispanic blacks, suggesting low returns on education (Read & Emerson, 2005).

The Immigrant Health Advantage

Immigrants, particularly those of color, are disproportionately subject to socioeconomic disadvantage upon their arrival to the United States (Palloni & Arias, 2004; Singer, McElroy, & Muenning, 2017). In the general population, the restricted access to social, occupational, and economic resources are correlated with worse health status and increased risk of mortality relative to more socioeconomically advantaged groups (Singer, McElroy, & Muenning, 2017). Yet, despite clear disadvantages, immigrants are often shown to report better-than-expected health status and longevity when they are compared to U.S.-born populations, including the majority non-Hispanic whites (Ichou & Wallace, 2019; Singer, McElroy, & Muenning, 2017). Indeed, this immigrant health advantage, sometimes referred to as an "immigrant health paradox," has been well-documented in many immigrant populations within the United States, namely those of Hispanic origin. While it is difficult to completely understand the mechanisms behind this complicated phenomenon, one of the most widely accepted explanations relates specifically to the process of migrant selection. Through this explanation, it is thought that migrants do not represent a randomly selected group. Rather, migrants are positively selected on a number of social, economic, and health-related characteristics, resulting in them being more highly educated, of higher socioeconomic status, and healthier, both physically and psychologically, than their non-migrant counterparts (Elo et al., 2008; Ichou & Wallace, 2019; Mehta et al., 2016; Riosmena, Kuhn, & Jochem, 2017). Accordingly,

once in the United States, these migrants are healthier than U.S.-born populations. However, these health benefits may not always be long-lived.

A second component of the immigrant health advantage explains how duration within the United States impacts immigrant health status. Because migration is, presumably, based on positive selection, immigrants should be at their healthiest when they arrive to the United States. As duration in the United States increases, the health of immigrants deteriorates and begins to converge with that of the U.S.-born population (Riosmena & Dennis, 2012; Riosmena et al., 2015). While the reasons for this health deterioration may vary, stressors including, but not limited to, job insecurity, social isolation, and/or culturally/racially based discrimination are often cited as explanations for these declines (Riosmena & Dennis, 2012; Riosmena et al., 2015). In addition to these well-documented health declines over time, Elo et al. (2008) suggest that black immigrants in the United States may be further disadvantaged. Due to the historically racialized structure of the United States, particularly against those identified as racially black, black immigrants may both perceive and experience more interpersonal and institutional racism and discrimination. In turn, this heightened exposure to discrimination further exacerbates the effect of time on immigrant health, resulting in black immigrant health deteriorating at a notably faster rate than that of their non-black immigrant counterparts. This perspective aligns closely with the notion of cumulative disadvantage (Riosmena et al., 2015).

Cumulative disadvantage suggests that the health of immigrants may be negatively impacted by socioeconomic disadvantage, precarious legal status or trajectories, and discriminatory behaviors accrued over their life (Dannefer, 2003; Riosmena et al., 2015). Through this perspective, those who are exposed to these health insults across the life course experience more rapid deterioration in their health as well as a greater number of health issues relative to more advantaged groups at the same point in the life course. For black immigrants, it may be the accumulation of more perceived and/or experienced acts of discrimination or racism across their life span, particularly within the United States, that results in their hypothesized accelerated health deterioration. As such, it is imperative that African-origin black immigrants are compared to their U.S.-born black counterparts as well as to their non-black immigrant counterparts to better understand the ways in which the components of the immigrant health advantage apply.

The Health of African-Origin Black Immigrants

As a whole, U.S.-born non-Hispanic blacks have some of the highest burdens of overweight and obesity, hypertension, and diabetes in the United States. A growing body of literature has emerged to better understand how foreign-born black populations compare to their U.S.-born counterparts. Extant literature tends to support the presence of an immigrant health advantage for foreign-born blacks (Brown et al., 2017) and, more specifically, for African-origin blacks (Ford et al., 2015; Hummer & Hamilton, 2011; Mehta et al., 2015; Poston et al., 2001; Read & Emerson, 2005; Venters & Gany, 2011) relative to U.S.-born non-Hispanic blacks. The following

sections discuss overweight, obesity, hypertension, and diabetes as they pertain to African-origin blacks in the United States.

Body mass index: Overweight and obesity

Body mass index, henceforth BMI, is a score derived from the quotient of an individual's weight by their height $\left(\frac{\text{weight}\,[\text{kg}]}{\text{height}\,[\text{m}^2]}\right)$ and is used as a standardized measure of body fat content (CDC 2018). Each score then aligns within the bounds of one of four categories: underweight (<18.5), normal weight (18.5–24.9), overweight (25.0–29.9), and obese (≥ 30.0). Both overweight and obesity are known health-threatening conditions that increase the risk of comorbid conditions like hypertension, diabetes, and heart disease (CDC, 2018). Although the pathways are complex, socioeconomic as well as behavioral characteristics tend to impact individual risk for both condition in the United States.

Albeit sparse, literature suggests that African-origin immigrants are at similar, perhaps slightly higher, risk for overweight when compared to U.S.-born groups (Oza-Frank & Narayan, 2010). This increased risk is more pronounced in women than men. Consistent with broader immigrant health literature, African-origin immigrants are consistently reported to be at lowered risk for obesity when compared to U.S.-born non-Hispanic blacks (Cunningham et al., 2008; Elo & Culhane, 2010; Mehta et al., 2015; Read & Emmerson, 2005).

Hypertension

Hypertension is a condition in which an individual has a repeated systolic blood pressure reading of 140 mmHg or higher and/or a diastolic blood pressure reading of 90 mmHg or higher (American Heart Association, 2017). Worldwide, hypertension is one of the leading causes of all cardiovascular disease and death (van de Vijver et al., 2013). Approximately one-third of all adults in the United States are hypertensive. Physicians remind us that those who are black/African American, overweight, obese, and/or physically inactive may be at heightened risk for hypertension (American Heart Association, 2017). Hypertension is one of the most frequently studied non-communicable health conditions in African-origin immigrants in the United States. Much of this research shows that, when compared to U.S.-born non-Hispanic blacks, African-origin immigrants are at a lower risk for hypertension (Brown et al., 2017; Cooper et al., 1997; Osei & Schuster, 1996; Poston et al., 2001; Venter & Gany, 2011).

Diabetes

Diabetes is a metabolic disorder in which the body cannot appropriately regulate insulin, which can lead to a heightened risk of infection and inflammation, nerve damage, stroke, kidney disease, and/or failure. Those with diabetes have a non-fasting blood glucose level of 200 mg/dL or higher and/or a fasting blood glucose level

of 126 mg/dL or higher (Mayo Clinic, 2018). Those who are overweight, obese, and/or over the age of 45 are at a heightened risk for diabetes (Mayo Clinic, 2018). Few studies have examined diabetes in African-origin immigrants. Oza-Frank and Narayan (2010) and O'Connor et al. (2014) find that African-origin immigrants tend to be at a higher risk for diabetes than other immigrant populations and U.S.-born non-Hispanic blacks. These findings echo the broader immigrant health literature, which suggests that immigrants are at higher risk for diabetes relative to U.S.-born groups (Cunningham et al., 2008). Recent work by Ford et al. provides contrary evidence on this claim by showing that black immigrants are at significantly lower risk for diabetes than U.S.-born non-Hispanic blacks (Ford et al., 2015).

Hypotheses

In this analysis, it can be reasonably assumed that African-origin immigrants will resemble other immigrant populations, showing lower odds for obesity and hypertension relative to U.S.-born populations. Although none of these studies directly investigate health deterioration as a result of increased duration in the United States, some assumptions can be drawn. Broader immigrant health literature has shown that the health of immigrants deteriorates with increased time in the United States, perhaps as a result of socioeconomic uncertainty and, thus, limited access to resources (Riosmena & Dennis, 2012; Riosmena et al., 2015). This health deterioration should be further pronounced among African-origin black immigrants due to increased exposure to racially oriented discrimination (Elo et al., 2008). These processes may worsen the cardiometabolic health of African-origin black immigrants through a number of socioeconomic-behavioral factors including, but not limited to, inequities in access to preventative health services, neighborhood environments, low-quality diet, and increased stress associated with economic uncertainty and instability (Williams & Jackson, 2005).

Hypothesis 1 There will be evidence of the immigrant health advantage for African-origin black immigrants, as shown by significantly lower probability for reporting overweight, obesity, hypertension, and diabetes when compared to U.S.-born non-Hispanic blacks.

Hypothesis 2 Duration in the United States will impact African-origin black immigrants differently than non-Hispanic white and Mexican–American immigrants due to black immigrants' racial presentation.

Hypothesis 2a African-origin black immigrants with <5 years in the United States will show similar probability for overweight, obesity, hypertension, and diabetes when compared to non-Hispanic white and Mexican–American immigrants in the same duration category, potentially reflecting health selectivity.

Hypothesis 2b African-origin black immigrants with increased duration in the United States (5-9.99, 10-14.99, and ≥ 15 years) will show significantly higher

probabilities for overweight, obesity, hypertension, and diabetes when compared to non-Hispanic white and Mexican–American immigrants in the same duration categories, suggesting accelerated health deterioration.

Data and Methods

Data and Sample

This study uses data from the 2000–2018 National Health Interview Survey (NHIS), a repeated cross-sectional survey conducted annually within the United States by the National Center for Health Statistics (NCHS; Blewett et al., 2019). It monitors and reports demographic, socioeconomic, and health characteristics of non-institutionalized populations. A dataset with variables harmonized across survey cycles was extracted using the Integrated Public Microsample (IPUMS) public-access NHIS website maintained by the University of Minnesota (Blewett et al., 2019).

The total sample is 1,762,659 across all 18 waves of the survey. This sample is restricted to include only those in the Sample Adult survey file. The restricted analytic sample includes 572,339 respondents: 71,320 U.S.-born non-Hispanic black (12.5%), 2748 African-origin non-Hispanic black (0.5%), 343,063 U.S.-born non-Hispanic white (60.0%), 16,981 foreign-born non-Hispanic white (3.0%), 25,983 U.S.-born Mexican–American (4.5%), 31,682 foreign-born Mexican–American (5.5%), and 80,526 respondents of some other racial/ethnic identity (14.1%). Survey weighting is conducted using the sample weights, stratum, and primary sampling units (PSU) provided by the NHIS (NCHS, 2019).

Measures

The three dependent variables in this study are BMI, hypertension, and diabetes. BMI is recoded from a continuous to categorical variable, reflecting four potential outcomes: underweight (<18.5), normal weight (referent; 18.5–24.9), overweight (25.0–29.9), and obese (≥ 30.0). Hypertension and diabetes are dichotomous variables for respondents' self-report of each health condition where those without the condition are coded "0." NHIS sources for diabetes do not differentiate between type 1 or type 2 and, thus, the measure for diabetes reflects any diagnosis.

Racial/ethnic identity, the central independent variable, is recoded from the existing race variable in conjunction with region of birth and Hispanic ethnic identity. The seven categories captured in this race/ethnicity variable are U.S.-born non-Hispanic black (referent), African-origin non-Hispanic black, U.S.-born non-Hispanic white, foreign-born[1] non-Hispanic white, U.S.-born Mexican–American,[2]

[1] Foreign-born reflects those respondents with any region of birth besides the United States.

[2] For both U.S.- and foreign-born groups, Mexican–American reflects an ethnic and/or national identity and, as such, may contain any racial identity.

foreign-born Mexican–American, and Other racial/ethnic identity. To investigate the health of African-origin black immigrants, as outlined in hypothesis 1, duration is measured in two ways. In the first, duration is measured to capture those who are U.S.-born (referent), have been in the United States < 10 years, or have been in the United States ≥ 10 years. This duration category is used specifically for comparisons between U.S.-born and foreign-born groups.[3] To investigate hypothesis 2 and its associated sub-hypotheses, duration is adjusted to include five categories: U.S.-born, < 5 years in the United States, 5–9.99 years in the United States, 10–14.99 years in the United States, and ≥ 15 years in the United States. The expanded duration categories allow for a more detailed investigation of within-immigrant health, specifically, how duration may be differentially associated with health for each group.

Other controls include sex, year of interview, age at interview in years, educational attainment by degree, family income-to-needs ratio (INR), smoking status, alcohol use, and frequency of vigorous activity. Sex is dichotomized as male (referent) or female. Educational attainment is categorical with less than high school (referent), high school/GED/equivalent, some college, and bachelors or higher as potential outcomes. INR is a categorical variable reflecting the ratio of reported family income to the respective annual national poverty threshold: < 1.00 (referent), 1.00–1.99, 2.00–2.99, 3.00–3.99, and ≥ 4.00. A ratio below 1.00 indicates a familial income below the threshold, whereas any value of 1.00 or greater indicates a family income above the threshold. INR includes imputed values provided by NCHS for years 2002–2017. Smoking status is coded as non-smoker (referent), former smoker, current smoker: ≤ 1 pack per day, current smoker: 1–2 packs per day, and current smoker: ≥ 3 packs per day. Alcohol use is coded as non-drinker (referent; reports < 12 drinks in lifetime), former drinker (reports ≥ 12 drinks in lifetime and none in last year), and current drinker (reports ≥ 12 drinks in lifetime and has drank in last year). Vigorous activity is dichotomized as < 75 min per week (referent) and ≥ 75 min per week. These cutoffs are based on the U.S. Office of Disease Prevention and Health Promotion's adult physical activity recommendations (ODPHP, 2018).

Analytic Approach

Multivariate analyses are conducted using binomial logistic regression models in Stata 15.1. Binomial logistic regression models are ideal for these analyses because the identified outcomes are dichotomized (Pampel, 2000). The decision to analyze BMI as a pair of dichotomized variables in lieu of a single continuous measure lies in the research question. This study is not interested in assessing single-unit changes in BMI, rather, the interest lies in measuring the odds of different racial/ethnic groups being overweight relative to normal weight and obese relative to normal weight. Note that, because of this distinction, respondents who fall into the underweight category of BMI are excluded from analyses. Hypertension and diabetes are

[3] This is done to ensure parsimony and preserve sample size. Sensitivity analyses with more detailed duration categories show no differences when comparing foreign- and U.S.-born groups.

measured dichotomously as whether a respondent has been diagnosed by a physician with either respective condition.

To address issues of missingness in model covariates, all models are conducted using multiple imputation for educational attainment, INR, smoking status, alcohol use, and vigorous exercise. Imputations are conducted using the "mi" function in Stata 15. The variables used to impute these missing values are calendar year, sex, age, racial/ethnic identity, and each respective outcome using 15 imputed datasets. Note that imputations are not conducted on outcome variables. In each analysis, model 1 reports baseline odds ratios for each racial/ethnic group while maintaining controls for calendar year of interview, sex, mean-centered age, and the quadratic form of mean-centered age. Model 2 maintains the same set of control variables and adds duration in the United States. Model 3 reports main effects for race/ethnicity and duration; maintains controls for calendar year, sex, mean-centered age, and the quadratic form of mean-centered age; and introduces an interaction term for race/ethnicity and duration (race/ethnicity x duration). Models 4 and 5 introduce controls for socioeconomic status (educational attainment and INR) and health behaviors (smoking status, alcohol use, and activity levels), respectively. Model 6 represents the unrestricted model and, thus, includes all controls. Unlike linear probability models, it is infeasible to compare and interpret the odds ratios derived from logistic regression models in a nested modeling structure (Karlson, Holm, & Breen, 2012; Mood, 2010; Mustillo et al., 2018). As such, average marginal effects at means are reported alongside odds ratios and model fit statistics for each model in the nested structure. These average marginal effects at means are the primary coefficients used in all model interpretations.

To investigate the importance of duration in the United States when examining the health of African-origin black immigrants, models 2 through 6 are repeated for all four outcome measures with expanded duration categories (<5, 5–9.99, 10–14.99, ≥ 15 years in the U.S.). The marginal probability of reporting each health condition is reported and compared between foreign-born racial/ethnic groups both within and between duration categories. To serve as a reminder, these data are not longitudinal, and the comparisons of marginal effects are drawn from cross-sectional data.

Results

Univariate Results

Table 1 presents survey-weighted descriptive statistics for the total NHIS analytic sample and for each racial/ethnic group.[4] There are distinct differences in the reported rates of overweight, obesity, hypertension, and diabetes between U.S.-born non-Hispanic blacks and African-origin black immigrants. Indeed, regardless of time spent in the United States, African-origin blacks show signs of an immigrant

[4] Full descriptive statistics may be found in Table 1 of the Supplement.

Table 1 Sample-weighted univariate descriptive statistics by racial/ethnic identity: adults aged 18–85 +, NHIS 2000–2018

	Total	USB NH black	African-origin black		USB NH white	FB NH white		USB Mexican–American	FB Mexican–American		Other
N	570,675	71,320	2748		343,063	16,556		25,983	30,579		80,526
Years in the U.S.			< 10	≥ 10		< 10	≥ 10		< 10	≥ 10	
N			1269	1479		3092	13,464		7678	22,901	
Body mass index (%)											
Underweight (< 18.5)	1.78	1.30	2.60	1.15	1.84	4.04	1.59	1.25	1.25	0.65	2.44
Normal weight (18.5–24.9)	34.55	25.50	43.10	32.32	35.92	51.62	39.36	27.47	35.32	24.06	40.43
Overweight (25.0–29.9)	33.44	31.68	34.12	41.85	33.27	29.04	35.82	33.38	36.12	41.15	32.98
Obese (≥ 30.0)	26.24	37.33	14.42	21.91	25.10	10.41	19.57	34.54	16.64	29.53	20.72
Missing	4.00	4.19	5.75	2.77	3.88	4.88	3.67	3.36	10.67	4.61	3.42
Hypertension (%)											
No reported hypertension	69.10	58.06	88.81	74.24	68.09	88.81	67.63	76.16	92.64	78.56	74.73
Reports hypertension	30.75	41.81	11.19	25.56	31.76	10.96	32.26	23.72	7.27	21.23	25.11
Missing	0.15	0.13	0.00	0.20	0.15	0.23	0.11	0.12	0.09	0.21	0.15
Diabetes (%)											
No reported diabetes	89.27	84.93	96.85	89.66	90.07	96.93	90.00	87.97	97.26	87.91	89.11
Reports diabetes	9.17	13.25	2.84	8.65	8.41	2.52	8.22	10.48	2.32	10.86	9.16
Missing	1.56	1.81	0.32	1.69	1.52	0.55	1.79	1.55	0.42	1.24	1.74
Age (mean)	48.22	47.15	34.29	43.44	50.54	35.50	55.14	40.25	31.18	43.88	44.47
Sex (%)											
Men	44.28	38.26	50.99	53.62	48.10	48.12	43.45	43.16	50.23	46.64	44.11
Women	55.72	61.74	49.01	46.38	51.90	51.88	56.55	56.84	49.77	53.36	55.89

Source 2000–2018 NHIS Family, Person, and Sample Adult files, adults aged 18 or older. Restricted to respondents who appear in the Sample Adult file

health advantage for obesity, hypertension, and diabetes relative to their U.S.-born black counterparts. In the earliest duration category, African-origin blacks also fare quite well when compared to all U.S.-born groups, while those in the later duration category report lower rates of obesity and hypertension and comparable rates of diabetes relative to U.S.-born whites. Overweight is the sole exception to these favorable rates. African-origin blacks in the earliest and latest duration categories, respectively, report rates of overweight nearly 3 and 10% points higher than their U.S.-born black counterparts. These comparisons sit juxtaposed to African-origin blacks in the earliest duration category reporting rates over half those of U.S.-born blacks for obesity and approximately one-quarter those for hypertension and diabetes. African-origin blacks in the later duration category show similar, albeit higher, rates. This sample of African immigrants reports rates of nearly 16 percentage points lower for both obesity and hypertension and approximately 7% points lower for diabetes relative to U.S.-born blacks. The differences in these reported rates are also interesting when compared to the relative differences between U.S.-born whites or Mexican–Americans and their foreign-born counterparts.

Take hypertension as the primary example. As stated, the difference in the reported rates of hypertension for U.S.- and African-origin blacks is nearly 30 percentage points for the earliest duration category and 16% points for the later duration category. In contrast, U.S.- and foreign-born non-Hispanic whites show a difference of 21 and −0.5% points for the same duration categories. Similarly, U.S.- and foreign-born Mexican–Americans report a difference of 15 and 2 percentage points. In each case, the difference between U.S.- and African-origin blacks is notably larger than those seen in either other comparison. This trend remains consistent for obesity and diabetes.

Multivariate Results

BMI

Table 2[5] presents the results for survey-weighted, multiple-imputation binomial logistic regression models for overweight relative to normal weight. When reading Table 2, note that the odds ratios are reported in the first panel, while the average marginal effects at the means (henceforth AMEMs) are reported in the second panel for each model. Recall that, due to the incomparability of odds ratios from nested logistic regression models, all interpretations will be done using the AMEMs. Additionally, all comparisons of AMEMs, by definition, hold all other model covariates at their means. Beginning with model 1, the AMEMs show that African-origin blacks' probability of reporting overweight is no different than that of U.S.-born blacks. Upon introducing duration into the model, the

[5] Tables 2, 3, 4, and 5 present the odds ratios, confidence intervals, and average marginal effects at means only for each racial/ethnic group, duration category, and whether an interaction term is present. For the odds ratios and confidence intervals of all model covariates, see Tables S2–S5 in the Supplement.

Table 2 Results of sample-weighted, multiple-imputation binomial logistic regression models for BMI—overweight relative to normal weight: adults aged 18–85+, NHIS 2000–2018

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	0.78***	0.70, 0.88	1.11	0.98, 1.25	1.24*	1.05, 1.47	1.37***	1.15, 1.64	1.21*	1.03, 1.43	1.37***	1.14, 1.63
USB NH White	0.72***	0.69, 0.74	0.72***	0.69, 0.74	0.72***	0.69, 0.74	0.74***	0.72, 0.77	0.72***	0.69, 0.74	0.75	0.73, 0.78
FB NH White	0.65***	0.61, 0.68	0.87***	0.81, 0.93	0.89**	0.83, 0.97	0.93	0.85, 1.01	0.90*	0.84, 0.98	0.96	0.88, 1.04
USB Mexican–American	1.15***	1.09, 1.22	1.15***	1.09, 1.22	1.15***	1.09, 1.22	1.14***	1.07, 1.21	1.13***	1.07, 1.20	1.12***	1.05, 1.19
FB Mexican–American	1.24***	1.18, 1.30	1.68***	1.56, 1.80	1.73***	1.60, 1.87	1.68***	1.54, 1.83	1.69***	1.56, 1.83	1.60***	1.47, 1.74
Other	0.64***	0.62, 0.66	0.79***	0.75, 0.83	0.79***	0.75, 0.83	0.82***	0.78, 0.86	0.78***	0.74, 0.82	0.82***	0.78, 0.86
Duration (U.S.-Born)												
< 10 Years			0.65***	0.61, 0.69	0.68***	0.64, 0.73	0.69***	0.65, 0.74	0.66***	0.62, 0.70	0.67***	0.62, 0.72
≥ 10 Years			0.78***	0.74, 0.82	0.76***	0.72, 0.80	0.77***	0.72, 0.81	0.75***	0.71, 0.79	0.74***	0.70, 0.79
Race/ethnicity × duration					Included		Included		Included		Included	

Table 2 (continued)

Average marginal effect	Model 1		Model 1		Model 1		Model 1		Model 1		Model 1	
	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	0.00	−0.11, 0.11	0.29***	0.17, 0.71								
African-Origin Black < 10					−0.38***	−0.55, −0.21	−0.36***	−0.54, −0.18	−0.37***	−0.54, −0.20	−0.35***	−0.53, −0.17
African-Origin Black ≥ 10					0.30***	0.14, 0.45	0.39***	0.22, 0.56	0.28***	0.12, 0.44	0.39***	0.22, 0.56
FB NH White	−0.19***	−0.24, −0.15	0.05	−0.01, 0.11								
FB NH White < 10					−0.56***	−0.66, −0.46	−0.52***	−0.63, −0.41	−0.54***	−0.64, −0.44	−0.49***	−0.60, −0.37
FB NH White ≥ 10					−0.03	−0.08, 0.02	−0.01	−0.06, 0.05	−0.01	−0.06, 0.04	0.03	−0.02, 0.09
FB Mexican–American	0.46***	0.42, 0.50	0.71***	0.65, 0.76								
FB Mexican–American < 10					0.11**	0.04, 0.18	0.07	−0.01, 0.15	0.09*	0.02, 0.16	0.03	−0.05, 0.10
FB Mexican–American ≥ 10					0.63***	0.58, 0.68	0.59***	0.53, 0.64	0.61***	0.56, 0.66	0.55***	0.49, 0.60
Hosmer–Lemeshow goodness of fit test	*F*(10,1242)	1371.85	*F*(12,1242)	1170.18	*F*(15,1242)	940.06	*F*(22,1242)	558.11	*F*(23,1242)	632.85	*F*(30,1242)	430.55
Prob > *F*	0.00		0.00		0.00		0.00		0.00		0.00	

N = 313, 068

Source 2000–2018 NHIS Family, Person, and Sample Adult files, adults aged 18 or older. Restricted to respondents who appear in the Sample Adult file

*$p < .05$; ** $p < .01$; *** $p < .001$

story changes. In model 2, African-origin black respondents display a significantly higher marginal probability of reporting overweight than U.S.-born counterparts. This rise in marginal probability is consistent with both other foreign-born groups. It is in model 3 that the story becomes clearer regarding immigrant status and duration. Here, African-origin blacks with < 10 years in the United States are at significantly lower marginal probability of reporting overweight, whereas those with ≥ 10 years in the United States actually report significantly higher marginal probability for overweight relative to U.S.-born blacks (Riosmena & Dennis, 2012; Riosmena et al., 2015). Following the addition of socioeconomic controls in model 4, African-origin blacks with < 10 years continue to show significantly lower probability of overweight, however, the relationship between racial/ethnic identity and the probability of reporting overweight has attenuated slightly from model 3. The opposite can be said for African-origin blacks with greater duration. In model 4, the relationship between race/ethnicity and the probability of reporting overweight has increased notably from 0.30 to 0.39. In model 5, there is little change in the marginal probability of reporting overweight for African-origin blacks with < 10 years but a noteworthy attenuation for those with ≥ 10. One potential interpretation of this attenuation is that socioeconomic status may have a stronger influence on the relationship between racial/ethnic identity and the probability for overweight than do health behaviors for African-origin black immigrants.

Table 3 presents the results of survey-weighted, multiple-imputation binomial logistic regression models for obesity relative to normal weight. Consistent with extant literature, African-origin blacks, when examined in the aggregate, are at significantly lower probability for reporting obesity than their U.S.-born black counterparts (Mehta et al., 2015). However, this finding is only present when duration is not accounted for in the model. Indeed, once duration is accounted for in model 2, African-origin blacks are at significantly higher marginal probability for obesity relative to U.S.-born blacks. This finding emphasizes both the importance of duration and the importance of accounting for duration correctly. In model 3, once the interaction term is included, the marginal probability of reporting obesity among African-origin blacks realigns with existing literature. African-origin blacks in both duration categories are at significantly lower marginal probability for reporting obesity when compared to their U.S.-born counterparts. Following the same nested structure as overweight, African-origin blacks continue to show significantly lower probability of reporting obesity than U.S.-born blacks across all models and regardless of duration category.

Hypertension

Table 4 presents the results of survey-weighted, multiple-imputation binomial logistic regression models for self-reported diagnosis of hypertension. In models 1 and 2, African-origin blacks are at significantly lower probability of reporting hypertension than U.S.-born black counterparts. Following the introduction of the interaction of race/ethnicity and duration, both duration groups of African-born blacks are

Table 3 Results of sample-weighted, multiple-imputation binomial logistic regression models for BMI—obese relative to normal weight: adults aged 18–85+, NHIS 2000–2018

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	0.31***	0.27, 0.36	0.96	0.82, 1.13	0.97	0.79, 1.18	1.20	0.95, 1.51	1.00	0.82, 1.23	1.22	0.96, 1.55
USB NH White	0.46***	0.44, 0.47	0.46***	0.44, 0.47	0.46***	0.44, 0.47	0.53***	0.52, 0.55	0.48***	0.47, 0.50	0.55***	0.53, 0.57
FB NH White	0.28***	0.26, 0.30	0.75***	0.69, 0.82	0.77***	0.70, 0.84	0.95	0.86, 1.04	0.86***	0.78, 0.94	1.04	0.94, 1.15
USB Mexican American	1.03	0.97, 1.09	1.03	0.97, 1.09	1.03	0.97, 1.09	1.03	0.97, 1.09	1.03	0.97, 1.09	1.01	0.95, 1.07
FB Mexican American	0.67***	0.63, 0.71	1.84***	1.70, 2.00	1.84***	1.69, 2.01	1.57***	1.43, 1.72	1.80***	1.64, 1.97	1.53***	1.40, 1.68
Other	0.33***	0.31, 0.34	0.61***	0.58, 0.64	0.61***	0.58, 0.64	0.68***	0.64, 0.72	0.62***	0.59, 0.66	0.69***	0.65, 0.73
Duration (U.S.-Born)												
< 10 Years			0.25***	0.23, 0.27	0.25***	0.23, 0.28	0.25***	0.23, 0.27	0.22***	0.20, 0.24	0.27***	0.20, 0.24
≥ 10 Years			0.41***	0.38, 0.44	0.41***	0.38, 0.43	0.40***	0.37, 0.42	0.38***	0.36, 0.41	0.42***	0.34, 0.39
Race/ethnicity × duration					Included		Included		Included		Included	

Table 3 (continued)

Average marginal effect	Model 1		Model 1		Model 1		Model 1		Model 1		Model 1	
	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	−0.77***	−0.91, −0.63	0.20**	0.05, 0.35								
African-Origin Black < 10					−1.28***	−1.50, −1.06	−1.34***	−1.57, −1.11	−1.31***	−1.53, −1.09	−1.36***	−1.59, −1.12
African-Origin Black ≥ 10					−0.39***	−0.58, −0.21	−0.23*	−0.45, −0.01	−0.39***	−0.58, −0.21	−0.24*	−0.46. −0.01
FB NH White	−0.88***	−0.94, −0.83	−0.05	−0.13, 0.02								
FB NH White < 10					−1.63***	−1.78, −1.48	−1.52***	−1.69, −1.34	−1.55***	−1.70, −1.40	−1.45***	−1.62, −1.27
FB NH White ≥ 10					−0.63***	−0.69, −0.56	−0.46***	−0.53, −0.39	−0.55***	−0.62, −0.49	−0.40***	−0.47, −0.33
FB Mexican American	−0.01	−0.05, 0.04	0.84***	0.77, 0.91								
FB Mexican American < 10					−0.62***	−0.70, −0.53	−0.82***	−0.92, −0.72	−0.69***	−0.78, −0.59	−0.88***	−0.99, −0.78
FB Mexican American ≥ 10					0.25***	0.20, 0.30	0.04	−0.01, 0.10	0.19***	0.13, 0.24	−0.01	−0.07, 0.05

Table 3 (continued)

Average marginal effect	Model 1		Model 1		Model 1		Model 1		Model 1		Model 1	
	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI
Hosmer–Lemeshow goodness of fit test	*F*(10,1244)	1400.42	*F*(12,1244)	1164.51	*F*(15,1244)	935.19	*F*(22,1244)	683.83	*F*(23,1244)	772.89	*F*(30,1244)	601.14
Prob > *F*	0.00		0.00		0.00		0.00		0.00		0.00	

N = 284,136

Source 2000–2018 NHIS Family, Person, and Sample Adult files, adults aged 18 or older. Restricted to respondents who appear in the Sample Adult file

*$p < .05$; **$p < .01$; ***$p < .001$

Table 4 Results of sample-weighted, multiple-imputation binomial logistic regression models for hypertension: adults 18–85+, NHIS 2000–2018

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	0.45***	0.37, 0.49	0.66***	0.57, 0.76	0.69***	0.58, 0.83	0.81***	0.67, 0.98	0.70***	0.58, 0.84	0.78*	0.64, 0.95
USB NH White	0.48***	0.47, 0.49	0.48***	0.47, 0.49	0.48***	0.47, 0.49	0.55***	0.54, 0.57	0.49***	0.48, 0,51	0.55***	0.53, 0.56
FB NH White	0.36***	0.34, 0.38	0.53***	0.49, 0.57	0.51***	0.47, 0.56	0.62***	0.56, 0.67	0.52***	0.48, 0.57	0.60***	0.55, 0.66
USB Mexican American	0.58***	0.55, 0.62	0.58***	0.55, 0.62	0.59***	0.55, 0.62	0.60***	0.56, 0.63	0.59***	0.56, 0.63	0.60***	0.56, 0.64
FB Mexican American	0.37***	0.36, 0.39	0.54***	0.51, 0.58	0.54***	0.50, 0.58	0.46***	0.42, 0.49	0.52***	0.48, 0.55	0.45***	0.42, 0.49
Other	0.46***	0.44, 0.47	0.59***	0.56, 0.62	0.59***	0.56, 0.62	0.62***	0.59, 0.66	0.59***	0.56, 0.62	0.61***	0.58, 0.65
Duration (U.S.-Born)												
< 10 Years			0.55***	0.51, 0.59	0.53***	0.49, 0.58	0.50***	0.45, 0.55	0.52***	0.47, 0.57	0.49***	0.45, 0.54
≥ 10 Years			0.72***	0.68, 0.75	0.72***	0.68, 0.76	0.71***	0.67, 0.75	0.74***	0.70, 0.78	0.72***	0.68, 0.76
Race/ethnicity × Duration					Included		Included		Included		Included	

Average marginal effect	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	−1.40***	−1.52, −1.27	−1.02***	−1.16, −0.89								

Table 4 (continued)

Average marginal effect	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI
African-Origin Black < 10					−2.54***	−2.75, −2.32	−2.50***	−2.74, −2.27	−2.53***	−2.74, −2.32	−2.48***	−2.71, −2.25
African−Origin Black ≥ 10					−1.07***	−1.24, −0.90	−0.97***	−1.16, −0.79	−1.06***	−1.23, −0.88	−0.98***	−1.17, −0.79
FB NH White	−1.56***	−1.61, −1.51	−1.25***	−1.31, −1.18								
FB NH White < 10					−2.46***	−2.61, −2.32	−2.34***	−2.50, −2.18	−2.42***	−2.57, −2.27	−2.32***	−2.48, −2.16
FB NH White ≥ 10					−1.37***	−1.42, −1.32	−1.24***	−1.30, −1.18	−1.35***	−1.40, −1.30	−1.25***	−1.31, −1.19
FB Mexican American	−1.53***	−1.57, −1.49	−1.22***	−1.28, −1.16								
FB Mexican American < 10					−2.62***	−2.74, −2.51	−2.84***	-2.97, −2.71	−2.65***	−2.77, −2.54	−2.83***	−2.96, −2.69
FB Mexican American ≥ 10					−1.32***	−1.36, −1.28	−1.54***	−1.59, −1.50	−1.36***	−1.40, −1.32	−1.53***	−1.58, −1.49
Hosmer–Lemeshow goodness of fit test	*F*(10,1244)	5178.69	*F*(12,1244)	4311.64	*F*(15,1244)	3496.73	*F*(22,1244)	2231.54	*F*(23,1244)	2337.44	*F*(30,1244)	1668.58
Prob > *F*	0.00		0.00		0.00		0.00		0.00		0.00	

N = 457,087

Source 2000–2018 NHIS Family, Person, and Sample Adult files, adults aged 18 or older. Restricted to respondents who appear in the Sample Adult file

*$p < .05$; **$p < .01$; ***$p < .001$

at significantly lower probability of reporting hypertension than U.S.-born blacks. It is important to note that, while both duration categories remain at lower probability, African-origin blacks with ≥ 10 years are at consistently higher probability for reporting hypertension than those with < 10 years (Riosmena & Dennis, 2012; Riosmena et al., 2015). African-origin black immigrants, regardless of duration category, remain at significantly lower probability of reporting hypertension than their U.S.-born blacks in models 4 and 5. In the final, unrestricted model, African-origin blacks in both duration categories are at significantly lower probability for reporting hypertension than their U.S.-born black counterparts, holding consistent with extant research (Cooper et al., 1997; Osei & Schuster 1996; Poston et al., 2001; Venters & Gany, 2011).

Diabetes

Table 5 presents the results of survey-weighted, multiple-imputation binomial logistic regression models for self-report diagnosis of diabetes. In both models 1 and 2, African-origin blacks are at significantly lower probability of reporting diabetes than U.S.-born blacks. After the introduction of the interaction term, both duration categories of African-origin blacks display significantly lower probabilities of reporting diabetes than U.S.-born blacks. With the introduction of socioeconomic and health-behavior controls in models 4 and 5, African-origin blacks in both duration categories remain at significantly lower marginal probability for reporting diabetes. In line with all three other outcome measures, those with greater duration are at consistently higher marginal probability for reporting diabetes than those with lesser duration (Riosmena & Dennis, 2012). In the final, unrestricted model, and consistent with extant literature, both duration categories of African-origin black immigrants report significantly lower probabilities of reporting diabetes relative to U.S.-born black counterparts (Ford et al., 2015).

Importance of Duration

Recall the second set of hypotheses regarding the role of duration in immigrant health status: African-origin immigrants, apart from those most recent arrivals, will show higher marginal probabilities for overweight, obesity, hypertension, and diabetes relative to foreign-born non-Hispanic whites and Mexican–Americans in the same duration categories. To test these hypotheses, turn to Fig. 1,[6] which displays the AMEMs for each health condition for African-origin blacks, foreign-born non-Hispanic whites, and foreign-born Mexican–Americans across four duration categories using cross-sectional data. The AMEMs presented in these four panels are drawn from the survey-weighted, multiple-imputation unrestricted models (model 6) for each health condition.[7] In each panel, note that a value of 0 denotes no difference

[6] See Supplementary Tables S6, S7, S8, and S9 for interaction model coefficients corresponding with Fig. 1. See Supplementary Table S10 for *T* Test comparisons of Average Marginal Effects at Means presented in Fig. 1. .

[7] Analyses were also conducted for baseline models controlling for only calendar year, mean-centered age, and mean-centered age^2 and the trends remain consistent..

Table 5 Results of sample-weighted, multiple-imputation binomial logistic regression models for diabetes: adults aged 18–85+, NHIS 2000–2018

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	0.57***	0.47, 0.70	0.79*	0.63, 0.98	0.79	0.61, 1.01	1.07	0.83, 1.38	0.80	0.61, 1.04	0.99	0.77, 1.29
USB NH White	0.49***	0.48, 0.51	0.49***	0.48, 0.51	0.49***	0.48, 0.51	0.62***	0.60, 0.64	0.55***	0.53, 0.57	0.63***	0.61, 0.66
FB NH White	0.40***	0.37, 0.43	0.51***	0.45, 0.57	0.51***	0.45, 0.57	0.65***	0.57, 0.74	0.61***	0.54, 0.68	0.70***	0.61, 0.80
USB Mexican American	1.16***	1.08, 1.24	1.16***	1.08, 1.24	1.16***	1.08, 1.24	1.21***	1.12, 1.31	1.25***	1.16, 1.34	1.27***	1.17, 1.37
FB Mexican American	0.93*	0.88, 0.99	1.20***	1.08, 1.33	1.23***	1.10, 1.36	1.02	0.92, 1.13	1.21***	1.09, 1.34	1.07	0.96, 1.18
Other	0.73***	0.70, 0.77	0.88***	0.81, 0.95	0.88**	0.81, 0.95	0.97	0.90, 1.04	0.92*	0.86, 0.99	0.98	0.91, 1.05
Duration (U.S.-Born)												
< 10 Years			0.59***	0.52, 0.67	0.61***	0.53, 0.70	0.53***	0.46, 0.62	0.53***	0.46, 0.61	0.49***	0.42, 0.57
≥ 10 Years			0.80***	0.74, 0.87	0.80***	0.73, 0.86	0.79***	0.73, 0.86	0.77***	0.71, 0.83	0.77***	0.71, 0.83
Race/ethnicity × duration					Included		Included		Included		Included	

Table 5 (continued)

Average marginal effect	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI	Margin	95% CI
Race/ethnicity (USB NH Black)												
African-Origin Black	−2.99***	−3.18, −2.80	−2.71***	−2.92, −2.51								
African-Origin Black < 10					−4.11***	−4.49, −3.74	−4.13***	−4.52, −3.74	−4.13***	−4.50, −3.75	−4.13***	−4.52, -3.74
African-Origin Black ≥ 10					−2.68***	−2.91, −2.43	−2.47***	−2.71, −2.23	−2.76***	−3.01, −2.51	−2.58***	−2.83, −2.34
FB NH White	−3.35***	−3.43, −3.27	−3.15***	−3.25, −3.04								
FB NH White < 10					−4.36***	−4.64, −4.07	−4.10***	−4.38, −3.81	−4.25***	−4.53, −3.97	−4.03***	−4.32, −3.75
FB NH White ≥ 10					−3.12***	−3.20, −3.04	−2.97***	−3.06, −2.87	−3.04***	−3.12, −2.95	−2.94***	−3.03, −2.85
FB Mexican American	−2.50***	−2.55, −2.44	−2.29***	−2.38, −2.20								
FB Mexican American < 10					−3.90***	−4.11, −3.69	−4.23***	−4.48, −3.97	−3.97***	−4.18, −3.76	−4.19***	−4.44, −3.94
FB Mexican American ≥ 10					−2.23***	−2.29, −2.18	−2.52***	−2.58, −2.45	−2.34***	−2.40, −2.29	−2.52***	−2.58, 2.46
Hosmer–Lemeshow goodness of fit test	*F*(10,1244)	1400.42	*F*(12,1244)	1181.97	*F*(15,1244)	953.42	*F*(22,1244)	686.19	*F*(23,1244)	743.51	*F*(30,1244)	550.91
Prob > *F*	0.00		0.00		0.00		0.00		0.00		0.00	

N = 450, 316

Source 2000–2018 NHIS Family, Person, and Sample Adult files, adults aged 18 or older. Restricted to respondents who appear in the Sample Adult file

*$p < .05$; **$p < .01$; ***$p < .001$

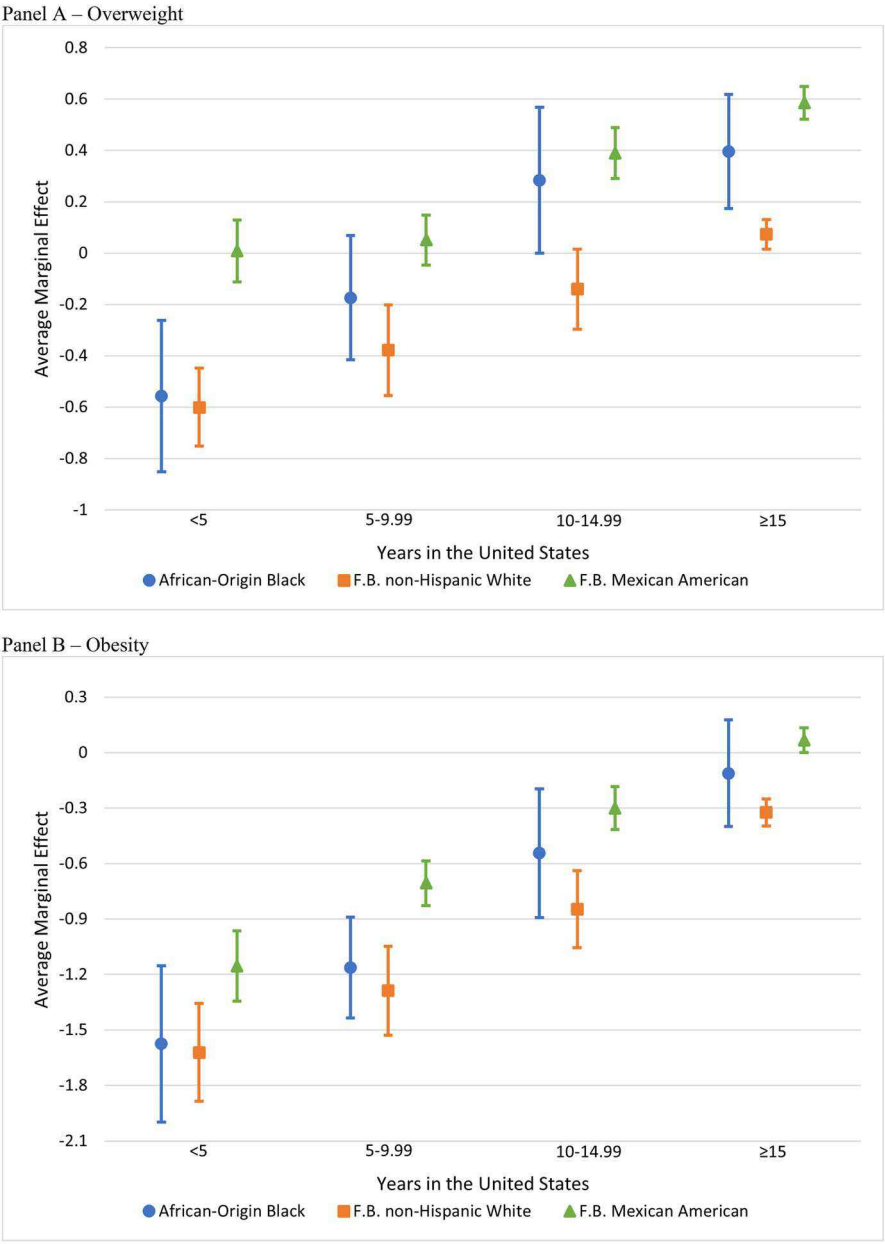

Fig. 1 Average marginal effect at means for reporting **a** overweight, **b** obesity, **c** hypertension, and D) diabetes for African-origin black, non-Hispanic white, and Mexican–American immigrants by duration in the United States: adults aged 18–85+ NHIS 2000–2018. *Note:* All panels are presented in differing scales. Error bars reflect 95% confidence intervals. **a** Overweight, **b** Obesity, **c** Hypertension, **d** Diabetes

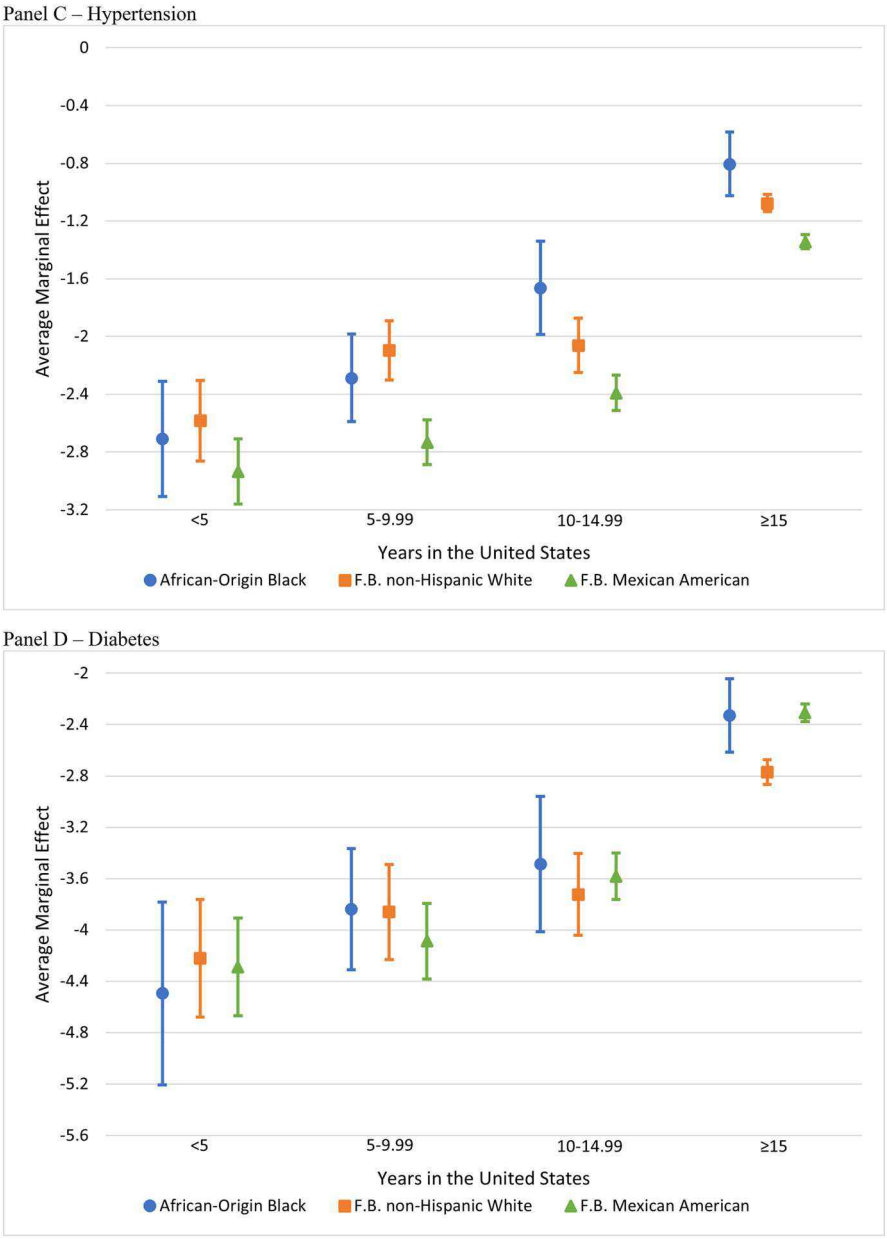

Fig. 1 (continued)

in the marginal probability of reporting the respective condition relative to U.S.-born non-Hispanic blacks. Additionally, these data are cross-sectional and, thus, do not reflect true individual change, but rather that of a synthetic cohort.

Consistent with extant literature on the immigrant health advantage, there is a positive correlation between duration in the United States and the AMEMs of reporting any of the four health conditions for all three foreign-born groups. As time spent within the United States increases, health correspondingly deteriorates and converges with that of the referent, U.S.-born blacks. Hypothesis 2a states that African-origin black immigrants with <5 years in the United States will show similar probability for overweight, obesity, hypertension, and diabetes when compared to non-Hispanic white and Mexican–American immigrants in the same duration category. Consistent with this hypothesis, the AMEMs reported for African-origin blacks typically fall between those of foreign-born whites and Mexican–Americans and are not significantly different from either group. The sole exception is seen for overweight. African-origin blacks show no significant difference in their AMEMs relative to foreign-born whites but are significantly less likely than Mexican–Americans to report overweight (see Supplementary Table S10).

Hypothesis 2b states that African-origin black immigrants with increased duration in the United States (5–9.99, 10–14.99, and ≥ 15 years) will show significantly higher probabilities for overweight, obesity, hypertension, and diabetes when compared to non-Hispanic white and Mexican–American immigrants in the same duration category. Inconsistent with this hypothesis, the relationship between duration and health status does not appear to be significantly worse for African-origin blacks relative to the other foreign-born groups examined. In most cases, the AMEMs for African-origin blacks fall between those of foreign-born whites and Mexican–Americans, fixing them in a middlemost position. Diabetes differs slightly from this general trend in that African-origin blacks report nearly identical marginal probabilities as peer immigrants. In cases where there are significant differences in AMEMs, African-origin blacks report significantly higher values than foreign-born whites but significantly lower values than Mexican–Americans. For example, for overweight, African-origin blacks in the last two duration categories maintain significantly higher marginal probability than foreign-born whites but remain statistically indistinguishable from foreign-born Mexican–Americans. The major exception to these trends can be seen in the AMEMs for hypertension among African-origin blacks with ≥ 15 years in the United States. In this duration category, African-origin blacks maintain significantly higher marginal probability for hypertension than either comparison group. This suggests that there may be an exacerbated effect of duration on African-origin blacks for this outcome.

Taken together, these findings have two key implications. The first relates to the work of Elo et al. (2008), a motivating perspective for the second set of hypotheses. The authors posit that black immigrants may experience more rapid health declines than non-black immigrants, potentially as a result of heightened exposure to racially based discrimination and the historically racialized social structure of the United States. While this perspective may ring true for other black immigrant groups or for health conditions not examined in this study, the findings presented here do not provide clear support for these propositions. Rather, it seems that African-origin blacks

experience similar rates of health deterioration for overweight, obesity, and diabetes as associated with duration relative to foreign-born whites and Mexican–Americans. Further research may be warranted to better understand the pronounced health deterioration seen for hypertension among more tenured African-origin blacks. Continuing this line of thought, the second implication is that, within this sample of immigrants, the deleterious effects of duration accumulate similarly for all three immigrant groups. These findings suggest that there may be more similarities than differences among first-generation immigrants, despite heterogeneity in racial/ethnic identity and origin country.

Conclusion

Drawing on self-report, cross-sectional health data from the 2000–2018 waves of the NHIS, this study examines the health of African-origin black immigrants in the United States. Consistent with existing literature and in partial support of the first hypothesis, African-origin blacks display lower probabilities for reporting overweight, obesity (Mehta et al., 2015), hypertension (Brown et al., 2017; Poston et al., 2001; Venters & Gany, 2011), and diabetes (Ford et al., 2015) when compared to U.S.-born non-Hispanic blacks. These findings provide initial support for the notion of an immigrant health advantage for African-origin blacks. Across all four health conditions, and for all duration categories, African-origin blacks in the United States consistently report significantly lower probabilities than their U.S.-born counterparts. Consistent with the central tenants of the immigrant health advantage, African-origin blacks who report more recent arrival to the United States consistently report lower probabilities for each health condition examined relative to those African-origin blacks who report earlier arrivals to the United States (Risomena & Dennis, 2012; Riosmena et al., 2015). The lone exception to this trend is seen for overweight among those African-origin blacks with ≥ 10 years of duration in the United States whose probability is significantly higher than that of the referent. The findings here provide continued support for the notion of an immigrant health advantage among African-origin blacks when compared to their U.S.-born black counterparts. Further, these findings are consistent with existing literature and suggest that African-origin blacks are in significantly better cardiometabolic health than U.S.-born blacks (Hamilton & Hummer, 2011; Mehta et al., 2016; Read & Emmerson, 2005).

Generally, existing research attributes the existence of an immigrant health advantage to two factors: cultural buffering and positive selection (Hamilton, 2019). Cultural buffering often refers to the fact that immigrants, when compares to U.S.-born populations, display lower rates of negative health behaviors, such as cigarette smoking, alcohol consumption, and illicit drug usage (Hamilton, 2019). While this position is not a central tenant of either the hypotheses or analyses of this study, the data lend itself in support of this argument. Relative to all other racial/ethnic groups examined, African-origin blacks report the lowest rates of smoking and alcohol use (see Supplementary Table S1). Further, with the sole exception of foreign-born non-Hispanic whites with <10 years duration, African-origin blacks have the lowest rates of sedentary behavior based on weekly vigorous exercise. These lowered rates

may have a noteworthy impact on the cardiometabolic health of these immigrants, particularly because smoking, alcohol use, and regular exercise are predictive of all four health conditions examined. Marginal effects for interaction terms for these variables and racial/ethnic identity, particularly smoking and alcohol use, cannot be interpreted due to the small cell sizes for African-origin immigrants. Future research should make efforts to better investigate how cultural buffering may impact African immigrant health as it relates to these and other health behaviors.

The second central argument put forward in immigrant health literature is that of positive selection. Through this perspective, immigrants are not random members of the origin country's population. Rather, immigrants are positively selected on a number of measurable (e.g., educational attainment, socioeconomic status, physical/psychological health) and unmeasurable (e.g., work ethic, drive, motivation) traits (Elo et al., 2008; Hamilton, 2019; Ichou & Wallace, 2019; Mehta et al., 2016; Riosmena, Kuhn, & Jochem, 2017). Once in the United States, these positively selected individuals display better health, alongside other social and economic, outcomes than one may expect relative to U.S.-born peers. The findings here provide some support for this proposition, as those immigrants who arrived most recently report better health than those with greater tenure. Those immigrants who have recently arrived may still be reaping the greatest benefits from this positive selection process, while those who have been in the United States for progressively longer periods have had those benefits chipped away. This, however, is only one component of testing immigrant selectivity. The other component is to compare immigrants in the United States to non-immigrants in their respective countries of origin. Unfortunately, these speculations are unfeasible to substantiate because data on country of origin are unavailable in the public NHIS data. Therefore, any attempt at making meaningful comparisons of movers to non-movers impossible, even if reliable data on non-movers were available.

Much of the research on the immigrant health advantage focuses on comparisons of immigrant to U.S.-born populations. Despite this trend, it is worthwhile to investigate the heterogeneity in health within the immigrant population of the United States. The work of Elo et al. (2008) postulates one such line of inquiry. The authors propose that racially black-identified immigrants may experience the immigrant health advantage differently than other non-black immigrant populations. Namely, the authors suggest that the health of racially black immigrants, over time, will deteriorate at a faster rate than non-black immigrants. Their primary reason for this proposition rests in the potentially high rates of interpersonal and institutional discrimination and racism experienced by blacks in the United States relative to other racial groups, foreign-born, or otherwise. It is this discriminatory behavior that may exacerbate the deleterious effect of time in the United States on black immigrants' health, resulting in more rapid health deterioration when compared to non-black immigrants with the same tenure. These propositions motivate this study's second hypothesis and its accompanying sub-hypotheses.

In support of Hypothesis 2a, the results show that African-origin blacks with <5 years of duration in the United States are at similar probability of reporting overweight, obesity, hypertension, and diabetes when compared to non-Hispanic white and Mexican–American immigrants within the same duration category. Indeed,

these most recent African-origin blacks often report AMEMs between those of foreign-born non-Hispanic whites and Mexican–Americans. One explanation for these similar rates draws again from the notion of immigrant selection. Immigrants with the shortest time in the United States are often healthier, or appear healthier, than those with greater tenure. The protective effect of immigrant status is still relatively strong for these recent migrants, allowing immigrants to remain resilient against physical and psychological health insults. Further, returning to the discussion of racial identity and its association with black immigrant health, African-origin black immigrants who have most recent arrived have not yet experienced the breadth of discrimination and racism relative to their more tenured co-ethnics. The absence of these racially charged experiences leaves African-origin blacks in a relatively protected position as black immigrants. Perhaps more interesting are the null findings of hypothesis 2b.

Standing in contrast to Hypothesis 2b, the results show that African-origin blacks with increased duration in the United States do not show significantly higher probabilities for reporting overweight, obesity, and diabetes when compared to foreign-born non-Hispanic whites and Mexican–Americans in the same duration categories. Indeed, much like those results seen in the examination of Hypothesis 2a, African-origin black immigrants consistently report AMEMs between those of foreign-born non-Hispanic whites and Mexican–Americans. As such, one can conclude that African-origin blacks are not clearly disadvantaged relative to these two non-black immigrant groups. Further, the upward trend denoting health deterioration as associated with time in the United States is approximately the same for the three immigrant groups, suggesting that the deleterious role of time on health is not notably accelerated for African-origin blacks. These null findings are shocking given the potentially high rates of discrimination and racism experienced by black immigrants. So, why might this be?

One explanation for the lack of perceived differences between these black African immigrants and their non-black counterparts is simply that the outcomes chosen for analyses do not clearly capture the accelerated association between time in the United States and health deterioration. An interesting exception to the findings for Hypothesis 2b is that African-origin blacks with increased duration are at significantly higher probability of reporting hypertension than their foreign-born counterparts in the same duration categories. It may be the case that the rapid health deterioration for black immigrants manifests only for specific health outcomes. African-origin blacks may remain protected from overweight, obesity, and diabetes, relative to other immigrants, however, hypertension, a condition more keenly rooted in cardiovascular health, captures some of the deleterious association with discrimination and racism that black immigrants likely experience. To move beyond speculation and better understand this complex relationship, future research should better interrogate measures of both experienced and perceived discrimination among black immigrants as well as additional health outcomes beyond those examined in this study. One place researchers may want to begin is with other measures of cardiovascular health, such as coronary heart disease, heart attack, or stroke. If there are similar signs of accelerated health deterioration for these cardiovascular outcomes,

it would be indicative that cardiovascular health outcomes more readily capture the effects of discrimination and racism.

A second potential interpretation of these findings places higher importance on the context of the sending countries rather than the context of the United States. In their 2005 article, Read and Emmerson stress the importance of racial context of different black immigrant groups' countries of origin with their "racial context of origin" hypothesis (Hamilton, 2019; Read & Emmerson, 2005). Through this hypothesis, black immigrants from sending countries with similar racial hierarchies as well as similar forms of discrimination and racism to that of the United States will experience comparable health outcomes to the U.S.-born black population. In contrast, those black immigrants from white-minority regions, such as sub-Saharan African, or racially mixed regions, such as the West Indies, will display superior health to U.S.-born blacks (Read & Emmerson, 2005). The results of their analyses suggest that, in the gradient of health, Africans fare the best while European blacks faring the worst, relative to U.S.-born blacks. It may be because the population of interest in the current study is of African origin that there is not a clear disadvantage in health across time relative to non-black peers. It may be the case that African-origin black immigrants are more resilient against racial discrimination in the United State, therefore, protecting their health from exacerbated deterioration.

Similarly, some research has postulated that black immigrants to the United States may be protected from the full extent of racial discrimination because they originate from countries that were not colonial subjects of the United States. It has been shown that West Indian immigrants in London display worse outcomes than West Indians in New York (Grosfoguel, 2003; Hamilton, 2019). Nigerians have also been shown to have worse outcomes in Great Britain relative to Nigerians in the United States (Hamilton, 2019; Imoagene, 2017). Both countries are former colonies of Great Britain, while neither the West Indies nor Nigeria were ever under colonial control by the United States. Through this perspective, it is this colonial history which places West Indian and Nigerian immigrants lower in the discrimination hierarchy in Great Britain. In the United States, however, these immigrants, along with those from other black sending countries never colonized by the United States, occupy a position higher in the discrimination hierarchy than U.S.-born blacks, due to their connection to the history of slavery (Hamilton 2019). Because of the higher position in the discrimination hierarchy, black immigrants may be less exposed to racially charged discriminatory behaviors, protecting their health from the hypothesized accelerated deterioration.

Finally, the null findings of Hypothesis 2b may reflect differences between first- and second-generation immigrants. Maintaining the assumption that first-generation black immigrants are resilient against discriminatory or racist behaviors, it may be the case the exacerbated health deterioration is more prominent not within-immigrant lifetimes but, rather, between immigrant generations. In their 2015 article, Riosmena et al. confirm the notion that second-generation Hispanics experience negative assimilation in terms of health. One of their primary explanations for this negative assimilation, or worse health than their first-generation parents, is nested in a discussion of cumulative disadvantage—a process through which socioeconomic disadvantage and discrimination accumulate across the life course, which may

reverberate across generations (Riosmena et al., 2015). If this notion holds among black, non-Hispanic immigrants, it may well be the case that it is second-generation black immigrants that bear the brunt of this accelerated health deterioration relative to other second-generation immigrants.

These potential explanations for the null findings of Hypothesis 2b present several avenues for future research on the health of African-origin black immigrant populations. Researchers intrigued by the notion of variation in both perceived and experienced discrimination may seek to explore more qualitative avenues of research to better identify and contextualize the ways in which these forms of discrimination vary between immigrants and non-immigrants, as well as how discrimination may differentially impact the health of blacks living in the United States. Those drawn toward the idea of racial context in the country of origin may be more interested in acquiring data on national origin through the use of different data sources or through restricted data provided by the NCHS. Finally, the comparisons of first- and second-generation black immigrants could, potentially, be conducted using the NHIS. These analyses would better utilize the Sample Child files than the current study.

A final point that was not previously hypothesized is the relationship between diabetes and BMI among African-origin blacks. As is well-known, diabetes is positively associated with BMI, namely obesity—as one's BMI increases beyond 30.0, so too does their risk of diabetes (Mokdad et al., 2003). This may not be the case for African-origin blacks. While multivariate analyses here showed that African-origin blacks are at consistently significantly lower probability for reporting diabetes than U.S.-born blacks, descriptive analyses showed an interesting disparity. Among African-origin blacks, there are more cases of diabetes among overweight than obese respondents—the only racial/ethnic group where this occurs. Previous research shows that African-origin blacks are at heightened risk of undiagnosed pre-diabetes and diabetes relative to their U.S.-born black counterparts (Ukegbu et al., 2011; Yu et al., 2013). Apart from inequities in access to health care, this may be one explanation for the observed heightened rates of underdiagnosis. African-origin blacks may simply not be receiving screenings for diabetes due to their lower-than-expected BMIs (Ukegbu et al., 2011; Yu et al., 2013).

The analyses here are not without limitations. First, the NHIS provides only self-report health status, which are based on diagnoses by a physician. As such, the measures used in these analyses likely do not capture all respondents positive for the health condition due to under-reporting and a lack of formal diagnosis. Second, this study analyzes the importance of duration on health deterioration among immigrant groups. The NHIS is purely cross-sectional and, therefore, cannot capture time-based trends. Third, publicly available NHIS data are only able to identify those respondents of "African" birth, significantly restricting any understanding of an extremely heterogenous population (Hamilton, 2014). Additionally, as noted by Commodore-Mensah et al. (2015), there is a non-negligible group of African-origin immigrants who do not self-identify as racially black who would otherwise be considered black by an observer. Without information on country of origin, these data are unable to capture and categorize such respondents effectively. Fourth, these data are unable to identify precise duration in the United States, as duration is reported as mutually exclusive ranges. The lack of detailed information of arrival makes it difficult to truly understand how duration may

impact health. Finally, African-origin black immigrants in the United States cannot be compared to non-migrants in their origin regions, making it impossible to truly assess health selection processes. These limitations, however, offer opportunities for future research. The ascertainment of longitudinal data of immigrant groups would allow researchers the opportunity to truly investigate the importance of duration in immigrant health, among other intriguing outcomes. Obtaining and analyzing data on country of origin, year of arrival, and other restricted measures through NCHS research data centers would further the understanding of the health of African-origin immigrants. Further, these data would allow researchers to better conduct important age-, period-, and cohort-based analyses.

Since the 1960s, immigration from sub-Saharan Africa has increased substantially. African-origin black immigrants are a steadily growing portion of the foreign-born population of the United States and are major drivers of black population growth in many regions of the country (Hamilton, 2019). As this population continues to burgeon, it becomes increasingly important to understand the complexities surrounding their health and well-being. Albeit sparse, existing research on the subject suggests that the immigrant health advantage pertains to these African-origin blacks (Ford et al., 2015; Hamilton & Hummer, 2011; Mehta et al., 2015, 2016; Okafor et al., 2013; Venters & Gany, 2011). These findings provide furthered support of these important contributions and emphasize the notion that African-origin blacks are in better cardiometabolic health than their U.S.-born black counterparts. The findings here illustrate that, while variation in immigrant health may exist, African-born black immigrants do not appear to be in any worse health or in any more rapidly deteriorating health than foreign-born non-Hispanic whites or Mexican–Americans for the four conditions examined. As the composition of the foreign-born population continues to grow and diversify, it becomes increasingly important for researchers to investigate the relevance of the immigrant health advantage for new immigrant groups. By establishing a better understanding of the health of new and growing populations, practitioners will be better equipped to provide care for a diverse range of patients while public health officials can better assess and respond to health risks and concerns.

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Declarations

Conflict of interest None.

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