

## ABSTRACT

Title of Dissertation: FOREIGN VERSUS U.S.-BORN BLACK ADULT OBESITY AND DEPRESSION: AN ANALYSIS OF ENDURING PATTERNS AND MECHANISMS

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Foreign-born Blacks have better health outcomes than U.S.-born Blacks. The extent to which the health status of foreign-born Blacks change with increased exposure to the U.S. socio-cultural environment is less known than for other immigrant groups. Two prominent theories used to understand foreign and U.S.-born health disparities are the immigrant health paradox theory and immigrant health assimilation theory.

The literature is conclusive that foreign-born Blacks have better health outcomes than U.S.-born Blacks, but this dissertation questions the appropriateness of framing this pattern as an immigrant health paradox due to the better socioeconomic status (SES) of foreign-born Blacks, relative to U.S.-born Blacks in general. The literature has been inconclusive on the extent to which immigrant health assimilation describes the health trajectories of foreign-born Blacks with increased duration of residence of the first generation in the U.S. or in comparing the first generation to subsequent generations. This dissertation interrogates the utility of immigrant health assimilation theory to describe the health trajectories of Black immigrants. Specifically, the dissertation focuses on the health outcomes of body mass index (BMI), obesity, depressive symptoms

and depressive disorder. The sample of the dissertation includes foreign and U.S.-born Blacks generally, first generation foreign-born Afro Caribbeans, second and third generation U.S.-born Afro Caribbeans and U.S.-born African Americans.

Collectively the three papers of this dissertation confirm a healthy immigrant effect for the health outcomes studied, when comparing the foreign-born to U.S.-born Blacks generally or African Americans specifically. In these comparisons first generation foreign-born Blacks have better socioeconomic status than the U.S.-born or African Americans. There is an immigrant health paradox for the health outcomes studied when comparing foreign born Afro Caribbeans to U.S.-born Afro Caribbeans, where U.S.-born Afro Caribbeans have better SES than the foreign-born.

The dissertation does not find support for immigrant health assimilation. For BMI and obesity, the foreign-born Black trajectories compared to U.S.-born Blacks indicates patterns of no convergence or divergence. Intergenerationally, while first generation foreign-born Afro Caribbeans had lower obesity rates than second and third generation U.S.-born Afro Caribbeans, U.S.-born Afro Caribbeans had higher rates of obesity than African Americans. A similar intergenerational pattern was found for depressive disorder. Immigrant health assimilation theory predicts convergence of health outcomes between U.S.-born Afro Caribbeans and African Americans, not worse outcomes.

The dissertation uncovers two mechanisms that help to explain the observed health trajectories of foreign-born Blacks. The lower first generation foreign-born Afro Caribbean obesity rates compared to second and third generation U.S.-born Afro Caribbeans is explained by differential rates of return on characteristics: the same characteristics provide more obesity protection for the foreign-born than the U.S.-born.

Also perceived discrimination was informative in explaining variations in depression.

U.S.-born Blacks reported higher levels of perceived discrimination than the foreign-born and foreign and U.S.-born Black women experienced higher depressive symptoms with increased perceived discrimination than men.

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AN ANALYSIS OF ENDURING PATTERNS AND MECHANISMS

By

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## Dedication

This dissertation is dedicated to my family; without whom I could not have made it.

Balancing being a mother, a wife and a daughter has added the most complexity to my journey to the PhD, but has also been my biggest source of inspiration, strength and joy.

Francois, Jonathan, Makina, Darina, Bill and mom, je vous aime.

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## Chapter 1: Introduction and Overview

An individual's quality of life is immensely impacted by their health status (Fletcher 2010; Goldney et al 2004; Gortmaker et al 1993; Mason 2012; Stunkard and Sorenson 1993). Additionally, health related expenses and funding consume both individual household incomes and national budgets (Finkelstein et al. 2009). Ideally for such an important and financially costly factor of life the benefits and burdens should be shared across groups. However certain groups consistently benefit from better health, while others suffer from worse health, causing health disparities – many of which are persistent over time.

Health disparities exist in both physical and mental health outcomes. Race is an important characteristic in health disparity research because it also serves as a proxy for noted socioeconomic differences between groups, and there is an inverse relationship between socioeconomic status (SES) and health (Kawachi, Daniels and Robinson 2005; Williams and Collins 1995; Williams and Collins 2001). Blacks are particularly disadvantaged in their health outcomes relative to other groups in the U.S. For example, they have the highest rates of infant and (MacDorman and Matthews 2008) adult mortality (Sorlie, Backlund and Keller 1995), hypertension (Egan, Zhao and Axon 2010), obesity (Flegal et al. 2012) and depression (Pratt and Brody 2008). An important nuance in the observed Black health disparity, is that this burden is carried almost entirely by U.S.-born Blacks not foreign-born Blacks (Cunningham, Ruben and Narayan 2008). Foreign-born Blacks have more advantageous physical and mental health outcomes than U.S.-born Blacks (Lucas, Barr-Anderson and Kington 2005; Dey and Lucas 2006; Elo, Mehta and Huang 2008; Jackson Antonucci 2005; Mehta et al. 2015; Miranda et al. 2005;

Singh and Hiatt 2006) and unlike many other immigrant groups this advantage appears to be enduring over time.

The theoretical phenomenon of better foreign-born health outcomes relative to the U.S.-born is called the immigrant health paradox. The theory posits that the foreign-born have better health outcomes than their native-born counterparts, even when the foreign-born do not have better group characteristics that promote health (McDonald and Kennedy 2004; Palloni and Arias 2004; Riosmena Wong and Palloni 2013; Rumbaut 1997; Teruya and Bazargan-Hejazi 2013). Current interrogations of the theory model nativity as the key explanatory reason for the better health outcomes, but controlling for nativity alone in statistical models does not explain the better foreign-born health advantage. Immigrant health assimilation explores changes in immigrant health trajectories over time. The theory hypothesizes that with increased duration in the receiving country, the immigrant health advantage declines both for first-generation immigrants relative to their native-born counterparts and for first generation immigrants relative to their native-born progeny (Antecol and Bedard 2006; Bates et al. 2008; Harker 2001; Oza-Frank and Narayan 2009; Park et al. 2009). However, this theory was largely based on the experiences of Hispanic immigrants and may not be applicable to describe patterns for Blacks.

Using the National Survey of American Life (NSAL) and the IPUMS National Integrated Health Interview Survey (IPUMS NHIS), this dissertation offers a further interrogation of the immigrant health paradox and immigrant health assimilation theories for Blacks. A three paper dissertation model is used to achieve this goal. The first paper replicates and extends current knowledge on U.S. and foreign-born Black BMI and

obesity patterns, relative to the U.S-born. The paper employs a synthetic cohort model and explores BMI and obesity patterns for foreign and U.S.-born Blacks overall and explores patterns across birth cohorts and immigrant arrival cohorts. This paper is the first to employ a synthetic arrival cohort model for a 25-year period to understand obesity patterns of foreign-born Blacks.

Paper two explores intergenerational patterns in obesity for foreign and U.S.-born Afro Caribbeans and looks at mechanisms that explain variations in outcomes. A novel feature of this paper is that it introduces non-linear decomposition into the analytical strategy, which is less used in the health disparities literature and when used is primarily in relation to healthcare or health insurance access (i.e. Bustamante et al. 2009; Waidmann and Rajan 2000; Zuvekas and Taliaferro 2003).

Finally paper three is the mental health contribution of the dissertation, exploring variations in depressive symptoms and depressive disorder for U.S. and foreign-born Afro Caribbeans and the explanatory power of perceived discrimination and neighborhood crime on outcomes. This paper reflects one of the first attempts to integrate neighborhoods into the mental health discussion for foreign and U.S.-born Afro Caribbeans and extends the dearth of literature we have on discrimination and health outcomes for foreign born Blacks.

There is a central tenant guiding the path of inquiry for this dissertation – that race interacts in important ways with nativity and ethnicity in the U.S., producing qualitatively different experiences, opportunities, and outcomes. As intersectionality theory shows us, it is important to consider the full breadth of the social positions groups inhabit, which when taken together shape their experiences, resources, and outcomes (Choo and Ferree,

2010; Lamont and Molnar 2002; McCall 2005). Specifically, this dissertation focuses on the following social positions: race, ethnicity, socioeconomic status (SES) and gender. Race is defined as a socially constructed category based on the individual's skin tone (Bonilla-Silva 2006). For this dissertation the race of all groups studied is Black. Ethnicity is defined as a common ancestry among individuals (Eriksen 1993; Waters 1996). In this dissertation ethnicity is inferred from either region of birth or region of birth of parents or grandparents (Jackson et al. 2004).

Socioeconomic status is an individual's relative income, education and occupational status. Individuals with higher incomes, education and occupational status occupy a higher SES (Williams and Collins 1995). All three measures of SES are used in this dissertation across the three papers. It is important to note that there is also a relationship between subjective SES and health, with higher subjective SES producing better health outcomes, net of objective SES measures (Cohen et al. 2008). This may be relevant, considering the different socioeconomic contexts of immigrants in their country of origin compared to the U.S. This dissertation, however, focuses on objective measures of SES as observed in the U.S. Gender is a socially constructed category often linked to an individual's biological sex, but not necessarily. Gender is more than just an individual's sexual organs, but also encompasses the social expectations, norms and experiences that accompany being perceived as male or female (West and Zimmerman 1987). Gender is inferred by the respondent's self-identified sex in the dissertation.

The dissertation specifically answers the following overarching research questions in three papers: 1) Does the immigrant health paradox or the healthy immigrant effect best explain the BMI, obesity and depression comparisons between U.S. and foreign-born

Blacks? 2) Does immigrant health assimilation theory explain the health trajectories of foreign-born Blacks for first generation Blacks with increased duration in the U.S. and intergenerationally between first generation Blacks and subsequent generations? 3) What mechanisms can help to explain observed variation in outcomes between U.S. and foreign-born Blacks? Paper one addresses research questions 1 and 2. Papers two and three address research questions 1, 2 and 3.

### **Physical and Mental Health as Quality of Life Factors**

There is a strong relationship between lower socioeconomic status and obesity (Gortmaker et al 1993; Mason 2012; Stunkard and Sorenson 1993). Obesity usually exacerbates such situations through social stigma which can limit work and educational opportunities and negatively impact experiences in these areas (Puhl and Brownell 2001). At the psychological level obesity impacts an individual's self-esteem, effectively lowering self-esteem for the obese relative to non-obese individuals (French et al. 1995; Tiggemann 2005), although some have found this not to be strongly correlated for Black women and girls (Lovejoy 2001). Depression is linked to lower educational attainment (Fletcher 2010). Also, depression is often comorbid with other physical and mental health illness, exacerbating the impacts of the illness and likewise decreasing the quality of life of individuals (Goldney et al 2004; Visser and Smets 1998).

The strong quality of life implications of health makes it an important topic for individuals and medical practitioners. There is also a strong social justice aspect of this subject. If health is linked to better quality of life and racial and ethnic minorities, especially Blacks, experience the greatest health disparities, then it brings up the question – who has the right to a better quality life and why aren't we doing more to make sure



everyone has equal access to this right? Currently Blacks are disproportionately impacted by poor health outcomes and therefore we have an entire segment of the U.S. population at risk of having a lower quality of life, based on their health status. Conducting research to improve the quality of life for the most vulnerable populations is important, relevant, and needed.

### **Limited Understanding of Mechanisms that Explain the Immigrant Paradox**

A partial answer to the question posed in the previous section – who has the right to a better life and why aren't we doing more to make sure everyone has equal access to this right – is that we still are not fully clear about the causes of the existing Black health disparity. Studying the health trajectories of foreign-born Blacks relative to U.S.-born Blacks is an additional way to explore the Black health disparity.

The extent of our knowledge in this area is that foreign-born Blacks have better health outcomes than U.S.-born Blacks. Although nativity is an important characteristic, it does not fully explain the presence of better health outcomes for the foreign born. Studies on the immigrant health paradox for other immigrant groups are unable to fully explain the immigrant health advantage, even with the inclusion of key characteristics (Blue and Fenelon 2011; Palloni and Arias 2004; Riosmena, Wong, Palloni 2013). Scholars in search of reasons to explain the decline in foreign-born health have turned to acculturation – the adoption of the behaviors and practices of the host country by immigrants – as an explanatory mechanism (Abraido-Lanza, Chao and Florez 2005; Gordon-Larsen et al. 2003; Okafor et al. 2013). While reducing the disparity some, acculturation falls short of doing the heavy lifting of fully explaining the foreign-born health advantage. Additionally, there are numerous methodological challenges in the

introduction of acculturation into studies in terms of measurement of the construct (Carter-Pokras and Bethune 2009; Thomson and Hoffman-Goetz 2009). There are also larger socio-political implications of the use of acculturation, because by using it as an explanation of better health for immigrant populations, it essentially blames racial and ethnic native-populations for creating a culture of their own health demise – a culture of illness. Cultural explanations ignore the role of structural inequality and SES (Viruell-Fuentes 2007; Zambrana and Carter-Pokras 2010).

There is a need to move beyond descriptive analyses of foreign- and U.S.-born health disparities and to better understand the mechanisms that cause these disparities. The need to focus more on mechanisms for disparity research on minority groups has been noted elsewhere in the sociological literature (Reskin 2003). A focus on mechanisms is particularly important for studies on the health status of Blacks who are disadvantaged across various health outcomes. Mechanisms get us closer to solutions for disparities than descriptives, which only documents the presence of the disparity. Mechanisms help us to understand macro, meso and micro level processes that translate into disparities. The second and third papers of the dissertation place a strong emphasis on mechanisms as a point of inquiry, moving beyond descriptive patterns.

### **Race, Ethnicity and Nativity as Important Lines of Inquiry**

There is important nuance that exists when research takes into consideration the multiple axes that delineate the research sample's social position (Bowleg 2012; Choo and Ferree 2010 and Lamont and Molnar 2002; Williams et al. 2012). The experiences and opportunities of Blacks differ in the U.S. across different combinations of ethnicity and nativity. For example, Afro-Caribbean immigrants are more preferred in the

workforce than African Americans (Waters 1999). Additionally, despite their high educational attainment African immigrants experience a high degree of occupational mismatch, being relegated to jobs below their qualifications (Doodoo 1997). Also, while first generation Afro-Caribbean immigrants do not connect with the negative stereotypes of being Black at the psychological level, their second generation children do in similar ways as African Americans (Deaux et al. 2007). Blacks differ in important ways in terms of their demographic characteristics and experiences when taking into consideration their race, ethnicity and nativity. It is therefore likely that they will also differ in important ways in their health outcomes.

Health disparities research on foreign and U.S.-born Blacks typically ignore the ethnic variations among Blacks (Arthur and Katkin 2006). Research that does acknowledge variations in U.S. and/or foreign-born Black ethnicity provide support that ethnicity matters for Blacks in health patterns, where outcomes differ by a combination of ethnicity and nativity (Brewton-Tiayon et al. 2015; Erving 2011; Hamilton 2014; Miranda et al. 2005; Read and Emerson 2005; Venters and Gary 2011; Williams et al. 2007b). Some key findings from these studies include variations in foreign-born Black health by country of origin (Hamilton 2014; Read and Emerson 2005), worse health outcomes for U.S.-born Afro-Caribbeans (Erving 2011) and worse mental health for U.S.-born Blacks relative to foreign born Blacks when controlling for ethnicity (Williams et al. 2007a). All of these findings help to fill in pieces to the puzzle of what might potentially be the cause of the Black health disparity in the U.S. Further exploring these patterns and identifying others along the lines of race, ethnicity and nativity for Blacks is important. Several health scholars cite a need for a more diverse analysis of observed

health disparities among Blacks that recognizes within group diversity (Arthur and Katkin 2006; Jackson et al. 2004). Papers two and three of this dissertation responds to this call and contributes to such analysis by specifying foreign born and U.S.-born Blacks by ethnicity.

### **Theoretical Framework**

In this section, I provide a theoretical overview of the key theories that serve as the framework for the dissertation and note any controversies in the theory as it relates to Blacks.

### **Immigrant Health Paradox Theory**

Earlier research focusing on the health trajectories of immigrant groups found that immigrants who were socioeconomically worse off than the U.S.-born, fared better in their health outcomes (Rumbaut 1997), thus presenting a health paradox that is in conflict with our common understanding about the link between SES and health. Immigrant health paradox theory states that foreign-born groups have better health outcomes than their native-born counterparts, even when the foreign born do not have better group characteristics that promote health (Dey and Lucas 2006; McDonald and Kennedy 2004; Palloni and Arias 2004; Riosmena Wong and Palloni 2013; Teruya and Bazargan-Hejazi 2013). The presence of an immigrant paradox in the dissertation is operationalized by a lower prevalence rate of a negative health outcome relative to the U.S.-born comparator and an accompanying lower SES profile for the foreign-born group. In absence of a lower socioeconomic profile any foreign-born health advantage is referred to as a healthy immigrant effect, not an immigrant health paradox (McDonald and Kennedy 2004).

The concept of the immigrant health paradox is largely based on studies on Mexicans in the U.S. and the pattern continues to be most consistent for this group and other Hispanics (Palloni and Arias 2004). The immigrant paradox pattern has been noted for other immigrant groups as well and continues to be a staple theoretical perspective in foreign and U.S.-born health research. The key characteristic of interest of the immigrant paradox theory is nativity. Comparisons are made based on nativity between either the foreign-born and non-Hispanic Whites in the U.S. or the foreign born and their U.S.-born counterpart. Many studies on Hispanic immigrant groups attempt to match the foreign-born with their U.S.-born counterpart on ethnicity (i.e. Hispanic) and often times country of origin (i.e. Mexico) as well. Research on foreign and U.S.-born Black health disparities have not benefited from the same level of U.S.-born comparator group specification on both race and ethnicity as studies on Hispanics (i.e. Bates et al 2008; Kaplan et al. 2004; Martorell et al. 1992). Studies exploring nativity variations in health for Blacks typically classify Blacks as foreign or U.S.-born, without any ethnic distinction.

Sociological and public health research is consistent that when U.S.-born Blacks are treated as an aggregate group, foreign-born Blacks fare better than U.S.-born Blacks in both self-reports of health and physical and mental health measures (Cunningham, Ruben and Narayan 2008; Dey and Lucas 2006; Lucas, Barr-Anderson, Kington 2003; Mehta et al. 2015; Sanchez-Vaznaugh 2008; Singh and Hiatt 2006). The pattern of better foreign-born health outcomes is strongest for first-generation immigrants (Jackson 2011) and more so for those who have recently arrived (Cairney and Osbye 1999) compared to

immigrants with longer duration (Creighton et al. 2012; Oza-Frank and Cunningham 2009) or subsequent generations (Creighton et al. 2012; Jackson 2011).

Disaggregation of foreign and U.S.-born Blacks by country of origin allows for the exploration of intergenerational patterns between the first and subsequent generations. There is an indication that second and third generation immigrant U.S.-born Blacks, whose parents or grandparents were born outside of the U.S., fare worse in their mental health outcomes than both their parents' and grandparents' generation and African Americans (Brewton-Tiayon et al. 2015). Disaggregation of foreign and U.S.-born Blacks by ethnicity, as indicated by country or region of origin, has been less explored in the health disparities literature for Blacks.

### **Immigrant Health Assimilation Theory**

One of the first formalized theoretical descriptions of assimilation came from Milton Gordon (1964). Gordon conceptualized a unidirectional process of assimilation whereby the foreign-born initially acculturate, adopting the cultural norms of the host country, and then assimilate with the host society. Assimilation per Gordon is marked by the entry of immigrants into the key social groups of the host society; immigrants essentially become integrated into the social, spatial and economic spheres of the host society (Alba and Nee 1997; Gordon 1964; Waters and Jimenez 2005). Gordon's theory highlights two important things, the first is that acculturation is an integral part of assimilation, but a separate process and concept. Acculturation measures the presumed adoption of the behaviors and practices of the host society (Lara et al. 2005).

Assimilation is focused on the resulting outcomes of acculturation – the integration or

convergence of the foreign-born with the U.S.-born in outcomes, be them social or health related.

A more recent contribution to the immigrant assimilation literature is the theory of segmented assimilation (Portes and Zhou 1993). Segmented assimilation theory asks the question – assimilation with who? – and for the first time formalizes the idea that there are various segments in the host society that immigrants can assimilate with, not just the mainstream. The theory hypothesizes three potential pathways of mobility for minority immigrants, assimilation with: 1) mainstream Whites into the middle class, 2) with their lower socioeconomically positioned U.S.-born counterparts, into the “underclass” and 3) maintaining their own distinctive ethnic niche, while achieving upward mobility (Portes and Zhou 1993). Segmented assimilation posits that due to a mix of social and structural constraints racial and ethnic minorities may find it difficult to assimilate into the mainstream, whereas previous theories of assimilation ignored the assimilation challenges for non-White immigrants.

From its earliest accounts, assimilation theory was defined and theorized in relation to race. For example, one of the earliest discussions of assimilation by Park and Burgess (1921) conceptualized assimilation as the final stage of a cycle of race relations which included competition, conflict, accommodation and assimilation (Alba and Nee 1997; Rumbaut 1997). Straight line assimilation theory, by Warner and Srole (1945), envisioned assimilation as a process that occurs over subsequent generations, but the duration of this process is largely determined by the cultural and racial difference of the immigrant group from the host society (Rumbaut 1997). Although race was featured prominently in early ideas and the subsequent development of later assimilation theories,

it was largely based on White racial groups. Even segmented assimilation theory which acknowledges the assimilation challenges of racial and ethnic minorities in contemporary society, ignores the option of the possibility to assimilate with the U.S.-born racial and ethnic minority middle class (Neckerman and Lee 1999), an option which is particularly feasible for the more highly educated Black immigrant population in comparison to other immigrant groups. Thus many of the prevailing assimilation theories may not be applicable to the experiences of foreign-born Blacks.

This dissertation interrogates the utility of assimilation theory to understand the health trajectories of foreign-born Blacks in the U.S. The dissertation uses Gordon's (1964) conceptualization of assimilation and operationalizes assimilation in two ways. First as a decline in the health status of foreign-born Blacks and convergence of health outcomes with U.S.-born Blacks. Second as a decline in the health status of second generation and higher immigrant Blacks, relative to the first generation, and convergence with the health status of African Americans (non-immigrant U.S.-born Blacks). Assimilation is operationalized in this way to understand the BMI and obesity trajectories of foreign-born Blacks. Further the dissertation explores important social and structural mechanisms relevant for minorities that may explain variations in foreign and U.S.-born Black obesity and depression outcomes.

### **The Stress Process Model**

**[Figure 1 about here]**

The stress process model is a social psychological model used to demonstrate the interconnectedness of the factors that shape individual's psychological wellbeing



(Aneshensel 2005; Pearlin 1999). The model posits that psychological wellbeing is largely based on the impact of the unique combination of an individual's social and economic statuses (e.g. class, race, gender). These statuses impact the type of life stressors an individual experiences, the moderating resources available to them to attenuate stressors and ultimately their mental health outcomes (Glavin, Schieman, Reid 2011; McLeod 2013). Understanding mental health outcomes from the perspective of social and economic statuses shows how mental health and social inequality are linked. The importance of social inequality for mental health is indicated by the model being enclosed in a circle that reflects social and economic statuses (Figure 1). Indicating that status impacts all aspects of the mental health process (Pearlin 1999; Thoits 2006). One way this manifests is in the neighborhoods where people live. Individual's statuses select them into neighborhoods (Lacy 2007; Massey and Denton 1993) and neighborhoods represent key spaces for the culmination of stressors and resources. Producing both health promoting and health depreciating environments (Acevedo-Garcia and Osypuk 2008).

The stress process reinforces the intersectional stance of this dissertation, which places an importance on integrating as many of the social and economic statuses an individual occupies to understand health trajectories. This is particularly important when studying marginalized populations. Foreign and U.S.-born Blacks occupy the racial category of Black, which brings with it a host of stressors due to racism (Jones 2000). Nativity, however, may serve as a moderating resource for foreign-born Blacks buffering the effects of race on mental health outcomes (Bryce LaPorte 1972; Deaux et al. 2007). The stress process model fits most prominently in the mental health contribution of this dissertation, Paper 3. However, it is also instrumental in providing alternative

explanations to observed results such as stress from a conflict in the social identity process for second generation U.S.-born Afro Caribbeans (Owen 2003; Wheaton 1999).

### **Literature Review**

A detailed review of the literature related to the health patterns of foreign and U.S.-born Blacks is included with each paper that makes up this dissertation. However, there are some overarching themes that merit discussing in the introduction that are important to the development of the dissertation as a whole. I will focus on these topics below. Specifically: 1) setting the context for who constitutes the Black immigrant population in the U.S.; 2) clarifying the implications of immigrant selectivity; and 3) reinforcing the importance of gender in the dissertation.

### **Who are the Black Immigrants in the U.S.?**

Immigration to the U.S. surged with the passing of the 1965 Immigration and Nationality Act, also known as the Hart-Cellar Act. The Hart-Cellar Act removed the national origins formula for immigration, which set immigration limits by country to a fixed percentage between 2 to 3 percent of persons from that country currently living in the U.S. The Hart-Cellar Act also privileged immigration based on family reunification and skilled workers (Shaw-Taylor 2007; Zong and Batalova 2016). Africans and Caribbean migration to the U.S. benefited from the Hart-Cellar Act – national origin quotas were removed for African countries and replaced by a country specific cap (7% of total visas being offered per country). Country quotas for the Caribbean were removed all together because they are in the Western Hemisphere (Shaw-Taylor 2007).

Among the Black population in the U.S., an estimated 8.7 percent (approximately 3.8 million) are foreign-born (Anderson 2015). Current trends suggest that the stream of

Black immigrants to the U.S. is not expected to slow down with a projected percent of the foreign-born within the Black population to rise to 16.5 percent by 2060 (Brown 2015). Half of the foreign-born Black population is represented by immigrants from the Caribbean, with Jamaica (18%) being the largest sending country, followed by Haiti (15%) (Anderson 2015). The biggest sending countries from Africa are Nigeria (6%), Ethiopia (5%) and Ghana (4%). Forty-two percent of Caribbean immigrants migrated prior to 1990 as compared to only 13 percent of African immigrants (Anderson 2015). Between 2000 to 2013, more than half of Caribbean immigrants migrated for family reunification (Anderson 2015; Zong and Batalova 2016) whereas only 39 percent of African immigrants migrated for the same reason. During the same period there was a much larger refugee (28% vs. 5%) and diversity visa (19% vs. 0%) representation among African than Caribbean immigrants (Anderson 2015). Foreign-born Blacks from all sending regions formulate the population of interest for this paper.

From a demographic standpoint African and Caribbean immigrants look quite different (Anderson 2015; Doodoo 1997; Kalmijn 1996; Kasinitz et al. 2008). Caribbean immigrants are older with a median age of 47, compared to 37 for African immigrants. Fifty-two percent of African immigrants are married, compared to 45 percent of Caribbean immigrants. African immigrants are one of the most highly educated immigrant groups in the U.S. with 35 percent holding a Bachelor's degree or higher compared to only 20 percent for Caribbean immigrants (Anderson 2015). Some reports even show African immigrants with higher education rates than Whites (Anderson 2015; Doodoo 1997; Logan and Deane 2003). Despite the higher education of African immigrants, they have the same median household income of \$43,000 as Afro-Caribbean

immigrants (Anderson 2015). The unexpected comparable incomes in light of disparate educational attainment may be linked to the fact that African immigrants suffer from a high degree of occupational mismatch – working jobs that are below their qualifications (Dodoo 1997). This is further outlined by the percent living below poverty – 22 percent of African immigrants live below poverty compared to 18 percent of Caribbean immigrants (Anderson 2015). African immigrants primarily live in the Midwest while Caribbean immigrants primarily live in the Northeast (Anderson 2015; Logan and Deane 2003).

### **Immigrant Selectivity**

One factor that can impact immigrant health outcomes is immigrant selectivity. Immigrant selectivity is the phenomenon in which immigrants are positively selected for migration based on their existing health status – the fittest are more likely to migrate (Jasso et al. 2004). Immigrants can also be positively selected based on other factors that positively impact health outcomes such as socioeconomic status (those with more means are more likely to migrate) or age (those who are younger are more likely to migrate). The salmon-bias theory takes health selection one step further and states that, not only are the fittest more likely to migrate, but that the sickest are most likely to return back to their country of origin (Riosmena, Wong and Palloni 2013), leaving the truly fittest of the fit as a representation of the immigrant group. Thus, if immigrants are positively selected on health, then it weakens the validity of the immigrant health paradox, because we are essentially comparing the fittest of the immigrant population with the native population of mixed health status. Therefore, there is no paradox that a more fit population will have better health outcomes than a less fit population.

There are methodological challenges in measuring health selection. The best way to measure health selection is to compare the health status of persons residing in the sending country with migrants (Riosmena, Wong and Palloni 2013). Data limitations preclude this level of analysis for many immigrant groups. As a result, we know very little about health selection for foreign-born Blacks. The one study found on this subject examined immigrant self-reports of their health status relative to the health status of those in their country of origin. Results indicated that more than 80 percent of the African immigrant sample were positively selected on health (Akresh and Frank 2008). There is also a strong relationship between health selection and English language proficiency for foreign-born Blacks (Akresh and Frank 2008; Okafor et al. 2013). Also, immigrants who migrated on a family reunification visa were less likely to be positively selected on health than those who migrated on an employment or diversity visa (Akresh and Frank 2008).

Absent of more studies to understand health selection for foreign-born Blacks, we can use what we know about the demographic profiles of foreign-born Blacks to infer health selectivity. The African immigrant positive health selection is not surprising considering the high educational attainment of African immigrants (Anderson 2015; Dadoo 1997; Logan and Deane 2003) and there is a known positive relationship between education and health (Kennedy, McDonald and Biddle 2006). Also African immigrants are much more likely to migrate on employment or diversity visas than family reunification visas than Afro-Caribbean immigrants (Anderson 2015; Read and Emerson 2005; Zong and Batalova 2016). African immigrants are also 10 years younger on average than Afro Caribbean immigrants (37 years vs. 47 years) and age is inversely correlated with health, up until the late life period (Brewton-Tiayon et al. 2015; Hedley et

al. 2004; Park et al. 2009). Thus African immigrants are much more likely to be positively selected on health.

### **Gender and Health Disparities**

Gender is an important factor in understanding within group health disparities. The health outcomes of women differ from those of men across racial and ethnic groups and health measures (Antecol and Bedard 2006; Flegal et al. 2012; Krieger et al. 2003). Health disparities by gender are often more stark for racial and ethnic minority women than non-Hispanic Whites relative to men in their group (Cooper 2002). Gender also interacts with other social factors impacting health (Denton and Walters 1999). There are the unseen and often unmeasured social burdens that women face in their roles as mothers, wives and care takers, all of which can add to the stress they endure and impact their health outcomes (Pearlin 1999). Although one study found that differential vulnerability to stressors did not help to explain gender health disparities (McDonough and Walters 2001), the likely reason for gender health disparities is a combination of both socio-structural and biological reasons (Bird and Rieker 1999).

With respect to different socio-structural experiences, indeed, women immigrants face different challenges than men (Llacer et al 2007) – transnational parenting due to having to leave children behind in the country of origin (Hondagneu-Sotelo and Avila 1997), victimization and exploitation at work (Foner 1998; Hondagneu-Sotelo 2007) and intimate partner violence, which increases with increased duration (Hyman et al. 2006). We also know that the degree of the immigrant health paradox for obesity and depression varies by gender for Blacks (Brewton-Tiayon et al. 2015; Cairney and Ostbye 1999). Thus it is important to take into consideration the role of gender in foreign and U.S.-born

health disparities research. This dissertation is sensitive to this need and integrates gender analysis into the dissertation.

## **Summary**

Blacks in the U.S. are disproportionately disadvantaged in their health outcomes. However, this burden is shared primarily by U.S.-born Blacks, not the foreign-born. Foreign-born Blacks represent an important key to understanding the Black health disadvantage and developing key prevention and mitigation strategies. However, health disparities research on this group has just begun to grow over the past decade. Thus there is more work to do in understanding the health patterns of foreign-born Blacks.

The two key theories that frame research on immigrant health patterns and trajectories are the immigrant health paradox theory and immigrant health assimilation theory. Using these two theories as the primary theoretical frame, this dissertation extends and adds to our knowledge on foreign and U.S.-born Black obesity and depression outcomes in important ways. The dissertation also refocuses our attention on SES gradients before marking patterns as an immigrant health paradox and interrogates the utility of immigrant health assimilation theory to inform our understanding of the health trajectories of foreign-born Black populations.

The first paper of the dissertation adds to the small but growing literature on foreign-born Black health patterns, compared to U.S.-born Blacks. The study uses the IPUMS IHIS to provide the longest period of observation to date, 25 years, on the subject of BMI and obesity patterns for foreign and U.S.-born Blacks. Following the trajectories of five arrival cohorts, the paper models predicted values of mean BMI and obesity prevalence for men and women separately to understand the trajectories of each group,

how men and women differ in these trajectories and if these trajectories results in immigrant health assimilation as the dominant health theory would suggest.

Delving further into the foreign-born Black BMI and obesity advantage, the second paper of this dissertation focuses on a more granular analysis of the subject. The paper differentiates U.S. and foreign-born Blacks by ethnicity producing three analytical groups - U.S.-born African Americans, U.S.-born Afro Caribbeans and foreign-born Afro Caribbeans. Moving beyond trajectories, this paper focuses on two important aspects: 1) intergenerational trends; and 2) mechanisms that explain the foreign-born health advantage. The paper employs a less commonly used strategy in the health disparities literature – decomposition analysis to elucidate the processes that explain the foreign-born Black health advantage.

The final paper is the mental health contribution of the dissertation and explores variations in depressive symptom and depressive disorder outcomes for foreign and U.S.-born Blacks, similarly differentiated by ethnicity as done in the second paper of the dissertation. Beyond understanding the depressive patterns of the sample, the paper explores the explanatory utility of neighborhoods and discrimination.

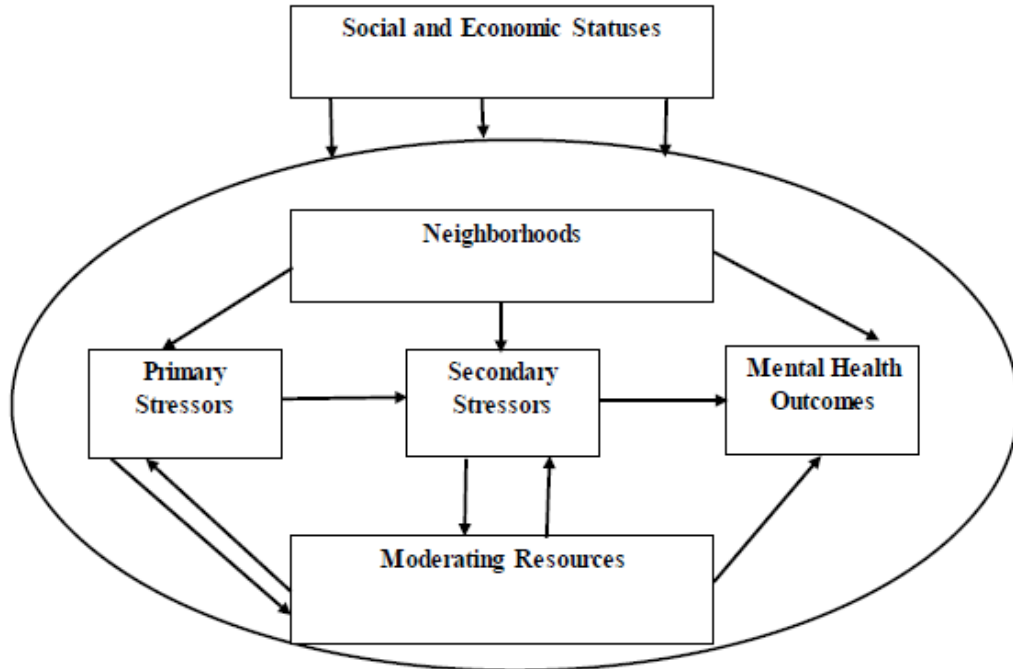
This dissertation is important for three primary reasons. First it challenges the applicability of the immigrant health paradox and immigrant health assimilation theories, two prominent theories in the immigrant health disparities literature, in explaining the health trajectories of foreign-born Blacks. Second, the dissertation disaggregates foreign and U.S. born Blacks by ethnicity to study obesity and depression and further by the language of the country of origin for obesity. This is particularly novel in obesity



research for Blacks. Lastly, the dissertation moves beyond identification of patterns and also explores mechanisms which explain observed phenomena.

**Tables and Figures**

**Figure 1 (Introduction). Stress Process Model (Pearlin 1999)**



## Chapter 2: An Enduring Positive Immigrant Health Effect 1989 to 2013: Foreign and U.S.-born Black BMI and Obesity Outcomes (Paper 1)

### **Abstract**

The healthy-immigrant and immigrant health assimilation theory are frameworks commonly used to study foreign and U.S.-born health disparities. The healthy-immigrant effect posits that immigrants arriving in a country will be healthier than individuals of a similar background in the destination country. Immigrants experience a decline in health with time spent in the country, and a subsequent narrowing of the native-born and foreign-born health status gap, or unhealthy assimilation, is expected. In the case of foreign-born Blacks in the U.S., there is strong prior evidence for a healthy-immigrant effect, but evidence claimed to support unhealthy assimilation has often lacked the conceptually appropriate groups for comparison. We use 25 years of pooled cross-sectional data from the National Health Interview Survey to model BMI and obesity outcomes for foreign and U.S.-born Blacks, separated by gender. Both BMI and obesity increase over time for foreign and U.S.-born Black men and women. Our results show increasing gaps over time in BMI and obesity between foreign-born Black arrival cohorts and U.S.-born Blacks, especially for men. We find minimal support for any immigrant unhealthy assimilation, and more recent arrival cohorts show divergence rather than convergence to U.S.-born Black men and women's BMI and obesity with time spent in the U.S.

## Literature Review

Social, socioeconomic and health data show that foreign-born Blacks differ in their patterns and outcomes, relative to other immigrant groups. For example, foreign-born Blacks do not socially assimilate with U.S.-born Blacks (Kasinitz et al. 2008; Waters 1999) as has been identified among White (Lieberson 1980; Waters 1996) and Hispanic immigrant groups such as Dominican Republicans (Kasinitz et al. 2008). Also, foreign-born Blacks fare better than U.S. born Blacks (Anderson 2015; Dadoo 1997; Logan and Deane 2003), whereas the socioeconomic profiles of Mexican immigrants are typically worse than their native-born counterparts (Gordon-Larsen et al. 2003; Viruell-Fuentes 2007). Additionally, foreign-born Blacks have better health outcomes than U.S.-born Blacks across most health measures (Cunningham, Ruben, Narayan 2008), for example mortality (Singh and Siapush 2002) and mental health (Williams 2007). For most other immigrant groups, health results are disease dependent, with a prominent immigrant advantage but not across all disease measures (Cunningham, Ruben and Narayan 2008). Thus there is evidence that suggests that the social and health patterns of foreign-born Blacks differ from those of other immigrant groups relative to their U.S.-born counterparts.

This is important because of the health disadvantage of Blacks in the U.S. Blacks have the highest rates of infant (MacDorman and Matthews 2008) and adult mortality (Sorlie, Backlund and Keller 1995), hypertension (Egan, Zhao and Axon 2010) and obesity (Flegal et al. 2012) relative to other groups. Blacks in the U.S. are particularly disproportionately disadvantaged in their obesity outcomes (Flegal 2012). However, this obesity burden is carried primarily by U.S.-born Blacks. Existing research shows that

while U.S.-born Blacks have an obesity prevalence higher than the national average (Flegal 2012), foreign-born Blacks are less obese than U.S.-born Blacks (Antecol and Bedard 2006; Dey and Lucas 2006). Some studies even show that foreign-born Blacks have obesity rates lower than U.S.-born Whites (Dey and Lucas 2006; Kaushal 2009; Singh et al 2011). Foreign-born Blacks account for 8.7 percent of the Black population (Anderson 2015). They are an important group in further understanding the context of the Black obesity disparity in the U.S. A commonly used framework for such analysis is the immigrant health assimilation theory.

According to classical assimilation theory, assimilation is the integration of foreign-born outcomes with the native born (Alba and Nee 1997). This integration is commonly referred to as convergence in the health literature (Park et al. 2009). There are two elements used in the health disparities literature to suggest health assimilation: a decline in the health status of the foreign born with increased duration of residency in the destination country; and a narrowing of the foreign and native-born health disparity gap. Most research has relied on the absolute decline in health status of immigrants with increased duration of residency (Barcenas et al. 2007; Goel et al 2004; Kaplan et al. 2004) and less so on the narrowing of the gap relative to comparable U.S.-born individuals (Park et al. 2009; Quesnel-Vallee et al. 2009) to assess assimilation. However classical assimilation theory would suggest that the narrowing of the gap between two groups is the true measure of assimilation (Alba and Nee 1997). A decline in the health status of the foreign-born alone is not enough to demonstrate assimilation, especially if the U.S.-born health status is also declining and conceivably at a much higher rate (Park et al. 2009).

This paper contributes to our understanding of foreign-born Black health assimilation patterns specific to obesity. We pooled together 25 years of cross-sectional data from the IPUMS National Health Interview Survey (IHIS) to understand obesity patterns specific to foreign and U.S.-born Blacks. Previous studies showing obesity patterns among this group used fewer years of data (Antecol and Bedard 2006; Barrington et al. 2010; Krueger, Coleman-Minahan, Rooks 2014; Mehta et al. 2015; Park et al 2009). By extending the analytical period we increase our sample size of foreign-born Blacks and we are able to understand if patterns observed in previous studies hold or change for more recent immigrant cohorts. The larger sample size also allows us to conduct separate analyses by gender, something that is notably missing from some of the previous studies on foreign-born Blacks (Oza-Frank and Narayan 2009; Park et al. 2009; Kaushal 2009; Krueger, Coleman-Minahan, Rooks 2014). We compare mean BMI and obesity prevalence between five five-year immigrant arrival cohorts with their age-and-education matched U.S.-born counterparts and follow three arrival cohorts over a 15-year period and one arrival cohort over a 10-year period. These latter analyses are of immigrants with under 15 years' duration in the United States. To our knowledge, this is the first study to make such arrival cohort comparisons for foreign-born Blacks and for such an extensive period. Supplementing these duration analyses, we estimate age profiles from age 20-24 through 40-54, comparing mean BMI and obesity prevalence for all Black male and female immigrants (regardless of when they arrived) to a matched cohort of U.S.-born Black adults as it ages from 1989 to 1993 through 2009 to 2013.

## **Distinguishing Health Assimilation from Acculturation**

Prior to a review of the extant literature, it is important to clarify how we are conceptualizing immigrant health assimilation. Our conception of immigrant health assimilation is based on classical assimilation theory as developed by Milton Gordon (Alba and Nee 1997). Gordon conceptualized a unidirectional process of assimilation whereby the foreign-born first acculturate, adopting the cultural norms of the destination country, and then assimilate to the outcomes of the native-born population. Assimilation per Gordon is marked by the entry of immigrants into the key social groups of the society; immigrants essentially become integrated into the social, spatial and economic spheres of the destination country (Alba and Nee 1997; Waters and Jimenez 2005).

We do not address the limitations of a unidirectional theory of assimilation as elaborated by Gordon, but instead use the theory as a point of conceptual clarity on how assimilation is used in this paper. Gordon's theory highlights that acculturation is an integral part of assimilation, but a separate process and concept. Some scholars use the terms assimilation and acculturation interchangeably (i.e. Akresh 2007); however, we argue for the conceptual distinction between the two terms due to their measurement of two separate processes. Acculturation measures the presumed adoption of the behaviors and practices of the destination country (Lara et al. 2005; Carter-Pokras et al. 2008). Assimilation, the principal subject of this paper, is focused on the resulting outcomes of acculturation – the integration or convergence of the foreign-born with the U.S.-born in outcomes, be they social or health related.

The U.S. is among the countries with the highest rates of adult obesity (Finucane et al. 2011). Thus conceptually, in order to identify a health disparity pattern as

assimilation we should not only observe a decline in the health outcomes of immigrants with time spent in the destination country, but also a narrowing of the foreign- and native-born disparity gap as an indication of convergence. Based on this theory, immigrants' health outcomes are expected to start from a more advantaged level, but then experience more rapid health decline (i.e. increase in BMI) than the native-born as immigrants age in the destination country. This has been referred to as “unhealthy assimilation” (Antecol and Bedard 2006; Park et al. 2009).

### **Who are the foreign-Born Blacks in the U.S.?**

Among the Black population in the U.S., an estimated 8.7 percent (approximately 3.8 million) are foreign-born (Anderson 2015). Current trends suggest that the stream of Black immigrants to the U.S. is not expected to slow down with a projected percent of the foreign-born within the Black population to rise to 16.5 percent by 2060 (Brown 2015). The majority of the current foreign-born Black population is represented by immigrants from the Caribbean, with Jamaica (18%) being the largest sending country, followed by Haiti (15%) (Anderson 2015). The biggest sending countries from Africa are Nigeria (6%), Ethiopia (5%) and Ghana (4%). The majority of Caribbean immigrants migrated prior to 1990 as compared to only 13 percent of African immigrants (Anderson 2015)<sup>1</sup>.

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<sup>1</sup> Immigration to the U.S. surged with the passing of the 1965 Immigration and Nationality Act, also known as the Hart Cellar-Act. The Hart-Cellar Act removed the national origins formula for immigration which set immigration limits by country to a fixed percentage between 2 to 3 percent of persons from that country currently living in the U.S. The Hart-Cellar Act also privileged immigration due to family reunification and skilled workers (Shaw-Taylor 2007; Zong and Batalova 2016). Africans and Caribbean migration to the U.S. benefited from the Hart-Cellar Act – national origin quotas were removed for African countries and replaced by a country specific cap (7% of total visas being offered per country). Country quotas for the Caribbean were removed all together because they are in the Western Hemisphere (Shaw-Taylor 2007).



Between 2000 to 2013, more than half of Caribbean immigrants migrated for family reunification (Anderson 2015; Zong and Batalova 2016) whereas only 39 percent of African immigrants migrated for the same reason. During the same period there was a much larger refugee (28% vs. 5%) and diversity visa (19% vs. 0%) representation among African than Caribbean immigrants (Anderson 2015). Foreign-born Blacks from all sending regions constitute the population of interest for this paper.

### **The Immigrant Health Paradox and the Healthy Immigrant Effect**

The immigrant health paradox theory states that immigrants will have better health outcomes than the native born, despite having less favorable health promotion characteristics (Dey and Lucas 2006; McDonald and Kennedy 2004; Palloni and Arias 2004; Riosmena Wong and Palloni 2013; Teruya and Bazargan-Hejazi 2013). The immigrant paradox theory is thus largely predicated on the belief that immigrants will arrive in the U.S. with less favorable demographic characteristics and increased social stress related to migration. Indeed, immigrants who migrate from countries with a lower gross national product (GNP) experience greater stress the first five years after migration compared to immigrants who come from countries with higher GNPs (Wheaton and Montazer 2017). However, the immigrant health paradox theory was developed primarily based on the study of immigrant groups who have lower socioeconomic profiles than their U.S.-born counterparts, in particular Mexican immigrants (Palloni and Arias 2004; Rumbaut 1997), hence the paradoxical nature of the better health findings for the foreign-born despite the known SES and health gradient.

The demographic patterns of foreign-born Blacks, however, differ from other immigrant groups. Although research suggests that the increased social stress component

related to migration does hold for foreign-born Blacks (Kamya 2007), their demographic patterns are more favorable than their U.S.-born Black counterparts. They have more education and higher incomes (Anderson 2015; Doodoo 1997; Logan and Deane 2003), factors which we know favorably impact health. Thus in the case of Black immigrants, a “healthy immigrant effect,” as indicated by lower BMI and obesity rates compared to the U.S.-born of the same age and SES, is expected. This will not, however, be an “immigrant paradox” given the equal or better SES of foreign-born than U.S.-born Blacks<sup>2</sup>. The literature is conclusive that foreign-born Blacks have lower BMIs and obesity rates than U.S.-born Blacks of comparable age and SES (Antecol and Bedard 2006; Bennett et al. 2007; Dey and Lucas 2006; Mehta et al. 2015; Park et al 2009; Singh et al. 2011), although the appropriateness of BMI as an indicator of Black immigrants’ good health has been challenged (O’Connor et al 2014). Although the obesity rates for both U.S.-born Blacks and foreign-born Black arrival cohorts has increased over time, the rate of increase for U.S.-born Black has been found to be higher than foreign-born Blacks (Park et al. 2009; Singh et al. 2011).

#### *Immigrant Health Selectivity*

The healthy-immigrant effect may work through processes of immigrant selectivity. Immigrant health selectivity theorizes that immigrants are positively selected for migration based on their pre-migration health status – the fittest are more likely to migrate (Jasso et al. 2004). This can be assessed based on comparing the health status of individuals in the country of origin with immigrants in the destination country

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<sup>2</sup> SES also influences other aspects that impact obesity, such as health behaviors (Cutler and Lleras-Muney 2010) and exposure to stress (Lantz et al. 2005; Williams, Yu and Jackson 1997). These aspects in turn impact health outcomes.

(Riosmena, Wong and Palloni 2013). Due to limitations in health survey data for the continent of Africa or the Caribbean, assessing health selectivity in this way is a challenge for Black immigrants. One study that did try to approximate this approach by using immigrant responses on their health status relative to the health status of those in their country of origin classified more than 80 percent of the African immigrant sample as positively selected on health (Akresh and Frank 2008).

Health selectivity can also be inferred based on demographic characteristics known to be positively correlated with health, like income and education. We already discussed the better socioeconomic status of foreign-born Blacks above. The visa category used to enter the U.S. is also an indication of selectivity, where family reunification visas do not have as stringent socioeconomic or skills-based criteria as other visas such as diversity or employment preference visas. Immigrants who migrated on a family reunification visa are less likely to be positively selected on health than those who migrated on an employment or diversity visa (Akresh and Frank 2008). Using SES and visa type as criteria for health selection, African immigrants are the most likely to be positively selected on health, because they have more years of education than other Black immigrant groups, reporting even more years of education than Whites (Anderson 2015; Doodoo 1997; Logan and Deane 2003). Also they are less likely to migrate for family reunification and more likely to migrate on a diversity visa (Anderson 2015; Read and Emerson 2005).

### *Arrival Cohorts*

The healthy immigrant effect and health selectivity are expected to be found especially at the time of arrival in the destination country. With BMI and obesity rates increasing globally (Finucane et al. 2011), it is not surprising that they are likewise increasing in Black immigrant sending countries (Finucane et al. 2017; WHO 2017). As a result, the obesity prevalence rates of foreign-born Black arrival cohorts has increased. For example, comparing the arrival cohorts for 1990 to 1995, 1992 to 1997 and 1994 to 1999, the obesity rates were 15, 17 and 18 percent respectively (Kaushal 2009). The pattern of increased BMI among arrival cohorts has been observed for other immigrant groups as well (Xi, Takyi and Lamptey 2015). Looking at the rising arrival-cohort obesity levels within the context of the healthy-immigrant effect, an increase in the healthy immigrant effect for BMI compared to U.S.-born Blacks is present for foreign-born Black men and women between the 1986 to 1990 and the 1991 to 1995 arrival cohorts (Antecol and Bedard 2006). Thus despite the increased global obesity rates and the resulting increase in obesity rates for Black arrival cohorts, the healthy-immigrant effect has been maintained and increased between the late 1980s and early 1990s.

Country of origin may also impact the obesity of arrival cohorts (Hamilton and Hummer 2011; Riosmena, Wong and Palloni 2013). Variations in the obesity of Black immigrants across country of origin is likely related to variation in the socioeconomic patterns of the country (Frank and Akresh 2012; Hamilton et al. 2014). The primary sending regions for Black immigrants are the Caribbean and Africa, but half of Black immigrants come from the Caribbean (Anderson 2015). Due to sample size constraints, studies looking at differences in the sending region for Black immigrants combine the Caribbean with South America or Central America (Mehta et al. 2015; Oza-Frank and

Narayan 2009). With respect to BMI, African-origin women have lower BMIs than Caribbean and South American-origin women. Mehta et al. (2015) found that African-origin women have higher levels of Obesity Class I (BMI of 30-34.9) but lower prevalence of Obesity Class II and III (BMI 35+). African-origin men have lower outcomes across all obesity measures. Overall African-origin immigrants have lower odds of obesity than those from the Caribbean or South America, but Caribbean and South American Black immigrants still maintain better outcomes than U.S.-born Blacks (Elo, Mehta and Huang 2008; Mehta et al. 2015). Based on these results the healthy immigrant effect for obesity is likely to be stronger for African-origin immigrants.

### **Unhealthy Assimilation: BMI and Obesity**

The immigrant health assimilation theory suggests that with increased duration in the U.S. the health outcomes of immigrants will decline and converge with those of the U.S.-born. Studies supporting this have been predominantly of, or emphasizing, Hispanic populations (Palloni and Arias 2004; Antecol and Bedard 2006). Research supporting Hispanic obesity assimilation, however, has been argued by Park et al. (2009) to be an artifact of analytical problems in how assimilation is operationalized. Studies of BMI and obesity prevalence and duration find that the BMI and obesity rates of Black immigrants with longer residence in the U.S. is higher than more recently arrived immigrants, both in gender-pooled and gender-separated models (Kaushal 2009; Mehta 2015; McDonald and Kennedy 2005; Oza-Frank and Narayan 2009; Singh et al 2011). For example, this pattern of higher obesity with time in the U.S. within the immigrant group has been observed for the 1986 to 1995 arrival cohorts (Kaushal 2009). However, worsening BMI or obesity within foreign-born Blacks does not tell us if the gap between

foreign and U.S.-born BMI or obesity is increasing or decreasing with increased duration of the foreign-born. A related methodological issue is the use of a cross-sectional rather than a cohort approach to evaluate change in health with increased duration in the U.S. The cross-sectional approach is extensively critiqued by Park et al. (2009), who find that the estimated assimilation of Mexican immigrants' obesity is an artifact of combining different arrival cohorts. When they follow the same cohort 10 years apart, they find no convergence to U.S.-born patterns.

Other studies have used analytical approaches that pool Black immigrants of different arrival cohorts and then estimated coefficients for duration in the U.S. across different arrival cohorts. The relationship between duration in the U.S. and obesity outcomes vary by the age of arrival of the foreign-born, with duration gradients changing by age, such that those migrating at younger than 20 years having higher odds of obesity across durational periods as compared to those who migrate at older ages at the same duration period (Roshania, Narayan and Oza-Frank 2008). Goel et al. (2007) used data from 2000 only and found that living in the U.S. for 15 or more years was statistically significant for all immigrant groups studied (White, Latino and Asian), except Black immigrants. Mehta et al (2015) pooled together cross sectional data from 2000 to 2013 and found that Black immigrants, of African and Caribbean origin, with 15 or more years in the U.S. had higher obesity rates than those with less than 5 years. Oza-Frank and Narayan (2009) similarly pooled together data from 1997 to 2005 and found that African-origin immigrants with 15 or more years of residence in the U.S. had higher overweight prevalence rates than those with less than 5 years. A study focusing on the period of 1989 to 2011 found that there was a decrease in the foreign and U.S.-born BMI gap as

foreign-born Blacks moved from less than 15 years in the U.S. to more than 15 years, but that they still maintained lower obesity than U.S.-born Blacks (Krueger et al. 2014).

Pooling the data together helps to increase the sample size for Black immigrants, but may be misleading in the interpretation of results. For unhealthy assimilation to be tested appropriately, data must be pooled across multiple years to represent any given immigrant arrival cohort's trajectory of BMI or obesity, thereby ruling out the Goel et al. (2007) approach. The specification of a regression model pooling across multiple years must then include year of arrival in its regressors, and appropriately interact this with year of observation. Antecol and Bedard (2006) attempt to do this, but because they include a "15 or more years" duration, they are unable to code year of arrival with any acceptable level of specificity for over half of their sample, as noted by Kaushal (2009).

### **Gender Patterns in Obesity for Foreign-Born Blacks**

Pooling together men and women, as many of the studies cited above have done, may mask gender patterns. Foreign and U.S.-born Black women and men differ in their outcomes across health measures (Erving 2011). In addition to the gendered health assimilation patterns mentioned above there is further support that women and men's obesity patterns differ. Highlighting the gendered patterns of obesity is particularly informative because while the overall Black obesity disparity in the U.S. is large, it is worse for Black women (Flegal 2012). Notably, the Black female BMI and obesity disparity observed in the U.S. is reflected among Black populations globally. Foreign-born Black women from the Caribbean/South America and Africa have BMIs and obesity prevalence rates higher than men from those regions (Mehta et al. 2015; Roshania, Narayan and Oza-Frank 2008). The disparity appears to be greatest for women from

Africa, who are almost three times more likely to be obese than foreign-born African men (Mehta et al. 2015).

The magnitude and pattern of the impact of age at arrival on obesity outcomes vary by gender (Oza-Frank and Narayan 2009). Women have more adverse outcomes than men within the same age at arrival period, particularly after 15 or more years in the U.S. Additionally, Black women in general do not always receive the obesity protection of SES as men or White women (Barrington et al. 2010; Burke et al. 1992; Coogan et al. 2011). Therefore, the differences in the effects of education for men and women should be taken into consideration. Antecol and Bedard (2006) found the BMI gap between foreign-born Black men and U.S.-born Black men, but not the BMI gap between foreign-born Black women and U.S.-born Black women, increased with increased duration.

In summary, the current literature on the BMI and obesity patterns of foreign-born Blacks compared to U.S.-born Blacks is small, but growing. The public health imperative of obesity for Blacks in the U.S. compels us to further understand U.S. and foreign-born Black obesity patterns as a key to the obesity epidemic in the U.S. The literature is clear that there is a healthy immigrant effect for foreign-born obesity outcomes relative to U.S.-born Blacks, despite an increase in BMI and obesity for both groups over time. The literature is less compelling regarding whether there is a pattern of convergence for foreign-born Blacks with U.S.-born Black outcomes, in fact the literature points at least as much towards divergence in outcomes. However, additional research is needed to further interrogate patterns of divergence, particularly with more recent arrival cohorts. Using the theoretical framework of immigrant health assimilation as the point of interrogation this paper seeks to answer the research question if obesity convergence



(assimilation) or divergence better explains the foreign-born Black obesity outcomes in the U.S. between 1989 to 2013.

## **Methods**

### **Data**

Data for the study come from the IPUMS National Health Interview Survey (IHIS), (Minnesota Population Center 2016) from 1989 to 2013. The IHIS is a harmonized set of data and documentation that integrates public use the National Health Interview Survey (NHIS) data, harmonizing variables and weights across years. The NHIS is an in-person survey of the civilian, non-institutionalized population. The survey is an annual cross-sectional survey assessing physical and mental health measures and access to health services, using a complex, multistage probability sampling strategy. During the period of 1989 to 2013, approximately 43,000 households and 99,000 individuals were surveyed each year. Every 10 years the NHIS undergoes a sample redesign. Beginning with the 1985 sample redesign, NHIS oversampled for Blacks, and in 1995 for Hispanics (some of whom identified as Black). The NHIS underwent a major survey redesign in 1997, switching from providing health details on all adults in the household to providing in-depth health details on only one randomly selected adult in the household. This reduced the number of persons surveyed as compared to earlier years.

For the present study, pooled IHIS cross-sections are used from the 1989 to 2013 period to conduct analyses of adult U.S. and foreign-born Black men and women aged 20 to 54. Our sample includes both Hispanic and non-Hispanic Blacks. The race and ethnicity of the respondent was determined by self-reports. Our overall analytical strategy for using these data, given in more detail below, is an extension of that

implemented by Park et al. (2009) to investigate the trajectories of immigrant cohorts. A dichotomous nativity variable is used to categorize the foreign-born and the U.S.-born. Their duration in the U.S. comes in the IHIS as four categories, 0-4, 5-9, 10-14, and 15+ years. Following previous studies (e.g., Kaushal 2009; Singh et al. 2011), we use education to represent socioeconomic status (SES).

Our sample is restricted to persons who were not missing data on age, BMI, duration in the U.S., or education. We use two groups of Black foreign-born women and men in our analyses. We use samples inclusive of those with duration in the U.S. for 15 or more years, to understand the general patterns of foreign-born versus U.S.-born BMI and obesity by age and period. This group yields sample sizes of 5,476 foreign-born Black women ages 20-54 (see Table 1) and 4,401 foreign-born Black men ages 20-54 (see Table 2). Because of the lack of an upper limit of the 15 years or longer duration category we are unable to effectively match this group to a specific arrival cohort, as is required by our strategy for analyzing immigrant assimilation. The analyses that meet this requirement restrict foreign-born women and men to those who have lived in the U.S. under 15 years. The samples of women and men with under 15 years' duration in the U.S. included 2,882 foreign-born Black women and 2,472 foreign-born Black men ages 20-54. We also conducted analyses of the healthy-immigrant effect for foreign-born Black women and men newly arrived in the U.S. These "immigrant arrival cohorts" are defined as those whose duration in the U.S. was under 5 years at the time of observation, and included 767 women and 667 men. All analyses are weighted using the person sample weights provided with the IHIS data. Because the study pools together 25 years

of cross-sectional data, the person weight is divided by 25 as suggested in the sample weight guidance provided by IHIS (Minnesota Population Center 2016).

**[Tables 1 and 2 about here]**

The focal outcomes of interest are Body Mass Index (BMI) and obesity. BMI was assessed using self-reported height and weight. We do not make any corrections for potential errors in self-reported height and weight, noting that previous research shows that attempts to do so result in no substantive variations in analytical outcomes (Antecol and Bedard 2006). Obesity was coded as a dichotomous variable: respondents are categorized as obese if their BMI is 30 or higher (Flegal 2012).

In Tables 1 (women) and 2 (men), we provide descriptive statistics for U.S.-born Blacks and for foreign-born Blacks with residence in the U.S. for less than 5 years, less than 15 years and all foreign-born Blacks. We first note that U.S.-born Black women and men have statistically significantly higher mean BMIs than foreign-born Black women and men across all foreign-born groups.

The descriptives for the foreign-born who have been in the U.S. for less than 5 years allow us to understand the socio-demographic patterns of immigrant arrival cohorts. We see in both Tables 1 and 2 that foreign-born Black women and men with less than 5 years of residence in the U.S. are younger than the other two immigrant groups. Approximately two thirds of recently-arrived (0-4 years) foreign-born Black women and men ages 20-54 were between the age of 20 and 34. Age 20-24 is the single largest group, accounting for 24.3 percent of all Black women and 25.8 percent of all Black men in the U.S. who had been in the U.S. for less than 5 years.

Approximately 47 percent of all foreign-born Black women and 43 percent of all foreign-born Black men have resided in the U.S. for 15 or more years. Of those in the U.S. for under 15 years, the “arrival cohorts” (duration 0-4 years) are less represented (26.6% of women and 27.3% of men) than are those at durations 5 to 9 and 10 to 14 years. This is suggestive with respect to two issues with methodological importance for our analyses of foreign-born Black men and women in the U.S. The first is that surveys of immigrants in the U.S. underrepresent those most recently arrived (Ibarraran, and Lubotsky 2007). This is the most likely reason that the proportion of women and men at duration 5-9 years exceed the proportion at duration 0-4 years. The other phenomenon that could have caused this would be a slowing of immigration over the period. However, that phenomenon would also produce a pattern of greater proportions at duration 10-14 years than at 5-9 years, and this is not seen. Instead, approximately equal proportions are seen at durations 10-14 years and 5-9 years. The underrepresentation of recently-arrived immigrants will introduce bias to the extent that those not covered by (or responding to) the NHIS differ from those covered by and responding to the NHIS. We unfortunately do not have data or results from prior studies that allow us to assess this, and we note that the previous studies of the NHIS cited above give us no guidance on this. The second issue, that is more reassuring, is that these patterns by duration are consistent with no major bias due to large-scale emigration (especially return migration) of the foreign-born Black population in the U.S. Such emigration would be indicated by smaller proportions at duration 5-9 than 0-4 years and smaller proportions at duration 10-14 than at 5-9 years, neither of which is seen. Emigration is a potentially much larger problem in using successive cross-sectional samples to infer cohort trajectories of the

Hispanic population (Arias and Palloni 2004), although again little attention to the issue is seen in previous studies.

The education distributions of foreign-born versus U.S.-born Black men and women govern whether our comparisons test for an immigrant health paradox or simply a healthy-immigrant effect. Testing for an immigrant health paradox presumes lower socioeconomic status for the foreign-born, relative to the U.S.-born. We will focus the discussion for the education descriptive statistics on all foreign-born, as their age distributions are the most similar to the U.S.-born Black population, whereas the under 5 years and under 15 years' duration groups are younger than the U.S.-born Black population. The foreign-born Black female and male populations are both seen to be overall more educated than the U.S.-born Black female and male populations. Foreign-born women have a lower percentage with a highest qualification of a high school diploma than U.S.-born Black women (29.8% versus 36.9%), and a higher percentage with a Bachelor's degree or higher (22.8% versus 16.2%). Foreign-born Black men have an even greater educational advantage over U.S.-born Black men, notably with twice as high a percentage with a Bachelor's degree or higher than U.S.-born Black men (29.1% versus 14.9%).

### **Analytical Strategy**

This study explores health assimilation among foreign-born Blacks, with respect to BMI and obesity. Unhealthy assimilation is operationalized by a decrease in the foreign and U.S.-born health disparity gap over time. We take the stance that in order to evaluate unhealthy assimilation, both a decline in foreign born health status and a decrease in the disparity gap with the U.S.-born with increased time in the U.S. must be

present. Model fit tests (AIC and F-test) were used to make analytical decisions to pool or separate men and women in the models and to include education main effects only or education-by-immigrant interaction effects<sup>3</sup>. The analytical strategy below reflects the results of those tests, resulting in models where women and men are analyzed separately and education-by-immigrant interactions are included for men but not for women.

First, to understand the general immigrant effect on BMI and obesity patterns for foreign and U.S.-born Black men and women, we estimate models that include all foreign-born, inclusive of those with residence in the U.S. for 15 years or more. The functions  $f(\ )$  here are linear for the OLS regression of BMI and logistic for a logistic regression of obesity, with equations (1) for women and (2) for men:

$$\begin{aligned} \text{BMI/Obesity} = & f(\text{Immigrant} + \text{Age} + \text{Education} + \text{Period} + \text{Immigrant} \times \text{Age} \\ & + \text{Immigrant} \times \text{Period}) \end{aligned} \quad (1)$$

$$\begin{aligned} \text{BMI/Obesity} = & f(\text{Immigrant} + \text{Age} + \text{Education} + \text{Period} + \text{Immigrant} \times \text{Age} \\ & + \text{Immigrant} \times \text{Period} + \text{Immigrant} \times \text{Education}) \end{aligned} \quad (2)$$

---

<sup>3</sup> Model fit tests for pooled or separate gender models was done by running an OLS regression of BMI with the regressors of age, duration, period, period and duration interactions and gender as a main effect only and then again with gender interactions with all variables. AIC values for both models were compared and an F-test was run between models. The F-test is a statistical test used to determine the best of two statistical models fit to a dataset, specifically which model best fits the data. The AIC output and F-test p values were used to make a final model determination. The same strategy was used to test the inclusion of education main effects or education and nativity interactions in the gender separated models.

Education categories are as shown in Tables 1 and 2, with High School Graduate as the reference category. Age and period are both in five-year intervals, again as shown in Tables 1 and 2. The immigrant-by-age interactions in Equations 1 and 2, in combination with the immigrant-by-period interactions, allow us to understand the difference in the change in BMI for foreign and U.S.-born when moving from the reference 20-24 age group to subsequent age groups. A positive coefficient on this term indicates an additional increase in BMI or obesity for immigrants with increased age, relative to the U.S.-born. Put differently, a positive coefficient implies a greater increase in BMI or obesity for immigrants when moving from one age group to the other than for U.S.-born moving between the same age groups. For an immigrant birth cohort's change in BMI or obesity prevalence to be represented, however, immigrant-by-age coefficients must be combined with immigrant-by-period coefficients. This is done in showing predicted values of mean BMI and probability of obesity for birth cohorts as they age from 20-24 in 1989-1993 to age 40-44 in 2009-2013 in Figure 1, using the coefficients estimated from Equations 1 and 2. These Figure 1 graphs are predicted values for a birth cohort of Black U.S.-born high school graduates (the reference category of the regressions) and for the same birth cohort of foreign-born high school graduates, conditional on their residing in the U.S. at each age. The graphed birth cohorts are those born 20-24 years before 1989-93. Because not all immigrants arrive at ages 20-24, however, the foreign-born series aggregates across multiple immigrant-arrival cohorts, conditional on their belonging to the same birth cohort.

Next, we use Equations 3 (women) and 4 (men) to estimate BMI and obesity outcomes for foreign and U.S.-born Black women and men, restricted to the foreign-born

with residence in the U.S. for less than 15 years. This allows us to estimate duration effects on BMI/obesity separately for four immigrant arrival cohorts. Equations 3 and 4 use a categorical duration variable (0-4 years, 5-9 years and 10-14 years) to follow the change in BMI and obesity for arrival cohorts over time, with U.S.-born as the reference category. The function  $g(\ )$  is again linear for the OLS regression of BMI and logistic for a logistic regression of obesity, with equation (3) estimated for women and equation (4) for men:

$$\text{BMI/Obesity} = g(\text{Age group} + \text{Education} + \text{Period} + \text{Duration} + \text{Period} \times \text{Duration}) \quad (3)$$

$$\begin{aligned} \text{BMI/Obesity} = g(\text{Age group} + \text{Education} + \text{Period} + \text{Duration} + \text{Period} \times \text{Duration} \\ + \text{Immigrant} \times \text{Education}) \end{aligned} \quad (4)$$

The Duration coefficients in Equations 3 and 4 allow us to understand the change in BMI/obesity with additional time spent in the U.S. in their first 15 years. Only in combination with the period-by-duration interactions, however, can they be used to assess the effect additional duration in the U.S. on BMI/obesity of any given immigrant arrival cohort. These models assume a uniform pattern across age groups of change in BMI and obesity with additional duration in the U.S. This assumption is necessary given the relatively small sample sizes of foreign-born Black women and men in cells of age by period by duration in the U.S. Predicted mean BMI and probabilities of obesity are first derived for five arrival cohorts, 1989-93 through 2009-13, relative to their age, period and education matched U.S.-born counterparts (Figure 2). Additional predicted values of



mean BMI and probabilities of obesity are then derived from equations (3) and (4) to follow the 1989-93, 1994-98, and 1999-03 arrival cohorts from 0 to 4 to 10 to 14 years residence in the U.S., and to follow the 2004-08 arrival cohort from 0 to 4 to 5 to 9 years residence in the U.S. (Figures 3 and 4).

## **Results**

### *Healthy-Immigrant Effects and Age-by-Period Trajectories Compared*

Table 3 shows age, period, and education relationships to BMI and obesity of U.S.-born and foreign-born Black women and men without taking into account their duration of residence in the U.S. This allows us both to maximize the sample sizes of foreign-born Blacks used in the estimation and to estimate trajectories of birth cohorts across as many as 20 years. By using a reference category of age 20-24, we analyze BMI and obesity trajectories of the cohort with the modal age of arrival in the U.S. (see again Tables 1 and 2). The reference group for education, high school graduate, is similarly the modal category. The reference period is 1999-2003, chosen to be the “half-way” period. The coefficients for both BMI and obesity are seen to have increased monotonically between 1989 to 1993 and 2009 to 2013 for both Black women and men. Summing the coefficients for 1989 to 1993 and 2009 to 2013, we see that mean BMI increased by almost 3 points for women and by almost 2 points for men aged 20-54 over these 20 years. The reference-category foreign-born effect is a decrease of 2.18 BMI points for women and 1.32 BMI points for men. These differences are estimated at age 20-24 for high-school graduates in 1999 to 2003.

**[Table 3 about here]**

BMI and obesity increases monotonically with age for U.S.-born Black women (through age 50-54) and monotonically to age 40-44 for U.S-born Black men, after which it plateaus. Black women's mean BMI and obesity rates decrease with increased education. Black women with a Bachelor's degree have a BMI of 1.56 less points and log odds of obesity 0.51 points less than Black women with only a high school diploma. The immigrant-by-education interactions were only used in Table 3 models for men, which means that the education main effect coefficients are for U.S.-born Black men. Interestingly, U.S.-born Black men with less than a high school diploma have lower BMI, by 0.25 points, than U.S.-born Black men with a high school diploma, which is contrary to the negative relationship usually identified between BMI and education. Only education at the Bachelor's level has a significant impact on the obesity rates of U.S.-born Black men, decreasing their log odds of obesity by 0.18 relative to U.S.-born Black men with a high school diploma. The immigrant-by-education interactions inform us about any differential benefit of changes in education for immigrants relative to the U.S.-born. Only the immigrant-by-Bachelor's degree interaction is significant, and the coefficient operates in the negative direction. This indicates that Black immigrant men receive an additional benefit from the attainment of a Bachelor's degree, decreasing their BMI by 0.53 points and their log odds of obesity by 0.31 points more than U.S.-born Black men.

The models in Table 3 have two additional sets of interactions. The immigrant-by-period interactions measure the differential change in mean BMI or gap in the probability of obesity between the U.S. and foreign-born from one period to another. A negative interaction coefficient indicates that the immigrant effect is greater for the

interacted period than for the reference period 1999 to 2003. Only the immigrant-by-2009-13 interaction is significant for women for both BMI and obesity. The negative coefficient for the BMI outcome tells us that the difference in mean BMI between immigrant and foreign-born Black women in 2009 to 2013 was greater by 0.735 points than in 1999 to 2013. That is, the healthy-immigrant effect increased during the most recent years.

The immigrant-by-age interactions provide us with another indication of differential rates of change in BMI and obesity for immigrants and the U.S.-born, by informing us of the differential impact of aging for immigrants versus the U.S.-born. They are of limited use, however, except in combination with immigrant-by-period coefficients, as only then can they be used to represent differences in age trajectories of BMI/obesity for any given birth cohort. This is done in Figure 1, where the predicted mean BMI and probability of obesity for foreign and U.S.-born Black men and women are derived for the U.S.-born and foreign-born birth cohort aged 20 to 24 in 1989 to 1993 to their ages 40 to 44 in 2009 to 2013. These graphs again compare U.S. and foreign-born men and women who have the reference-group high school education level. Noteworthy first are the large increases in mean BMI and obesity prevalence experienced by the reference U.S.-born birth cohort between ages 20-24 in 1989-1993 and ages 40-44 in 2009-2013. U.S.-born Black women's mean BMI at 20-24 was just at the edge of normal and overweight, at BMI=25, whereas at age 40-44, this same cohort had a mean BMI in the obese category (BMI=30.5). For U.S.-born Black men, their mean BMI at age 20-24 was similarly at the edge of normal and overweight (BMI=25), but rose slightly less than for U.S.-born women, to BMI=28.9 at age 40-44. Increases in obesity

prevalence, a discrete category, are noticeably greater between ages 20-24 and 40-44.

Among U.S.-born Black women, the percent obese grew from 17% at age 20-24 in 1989-1993 to 50% at age 40-44 in 2009-2013. Among U.S.-born Black men, the percent obese grew from 11% at age 20-24 in 1989-1993 to 40% at age 40-44 in 2009-2013.

For both BMI and obesity, neither foreign-born Black men's nor foreign-born Black women's trajectories experienced the same degree of growth with age, and so generally did not converge with the BMI and obesity outcomes of U.S.-born Blacks as they aged over the same period. Although the U.S. and foreign-born gap in outcomes oscillates between higher and lower values (analysis calculating the actual difference is not shown), the general trend is towards an increase in the gap, not a decrease. This is seen first in the slopes of the BMI lines for U.S.-born women and men, which are slightly steeper than those of foreign-born women and men. The divergence in upward slopes with age between U.S.-born and foreign-born women and men are clearer for obesity prevalence. For example, foreign-born Black men had an obesity prevalence between the ages of 20 to 24 of 5.3 percent and a 19.8 percent between the ages of 40 to 44, reflecting a total increase of 14.5 percentage points. U.S.-born Black men had double the increase, of 29.4 percentage points, between those same age groups. Divergence was somewhat less for women. Nevertheless, compared to foreign-born Black women's increase in obesity between the ages of 20-24 and 40-44 of 24 percentage points, U.S.-born Black women had an increase of 32.5 percentage points. This indicates that U.S.-born Black women's and men's BMI and obesity rates increased at a faster pace than foreign-born Black women's and men's BMI and obesity rates as they aged. This constitutes our first set of evidence against unhealthy assimilation.

**[Figure 1 about here]**

*Duration Effects*

Table 4 shows age, period, duration and education relationships to BMI and obesity of U.S.-born and foreign-born Black women and men that have lived in the U.S. less than 15 years. The inclusion of the duration variable, together with period-by-duration interactions, allows us to model trajectories of obesity and BMI for foreign-born arrival cohorts as their duration in the U.S. increases, and to compare them to U.S.-born Black individuals of the same age and education across the same periods. The reference categories for age, education, and period are unchanged from the age-by-period analyses (age 20 to 24, high school graduate, and 1999 to 2003). Looking at the period coefficients in these models in which duration in the U.S. is controlled for, again both BMI and obesity prevalence are seen to have increased monotonically between 1989 to 1993 and 2009 to 2013 for both Black women and men.

**[Table 4 about here]**

We first use these duration regressions to derive predicted mean BMI and obesity prevalence across five arrival cohorts (see Figure 2). We do this again at the modal immigrant arrival age of 20 to 24 and at the modal education category of high school graduate. By comparing their mean BMI and obesity prevalence to U.S.-born women and men, also at ages 20-24 and high-school graduate education, we are able to see changes in the healthy-immigrant effect over time. U.S.-born and recently-arrived foreign-born Black men are the closest in their obesity outcomes at the earliest arrival cohort (1989-1993). In this period, the 20-24 year old arrival cohort has a 6.6 percent

prevalence of obesity, compared to 11.2 percent for U.S.-born Black men, reflecting an approximately 5 percentage-point advantage for immigrants. The difference between foreign-born and U.S.-born men's percent obese increases markedly with subsequent arrival cohorts. The obesity prevalence in 2009 to 2013 is unchanged at 6.7 percent for foreign-born, high-school graduate men aged 20-24, but rises to 24 percent for U.S.-born 20-24 year old, high-school graduate men.

Among recently-arrived Black women, the gap increases from 11 percentage points for the 20-24 year old arrival cohort of 1989-1993 (17.1% U.S.-born versus 6.3% foreign-born) to 16 percentage points for the 20-24 year old arrival cohort of 2009-2013 (33.2% obese for U.S.-born versus 17.1% obese for foreign-born Black women). The BMI patterns follow suit, showing a similar pattern of U.S. and foreign-born divergence for women and men aged 20-24, although for women divergence for both BMI and obesity begins only from the 1994-1998 arrival cohorts onwards. In summary, the healthy-immigrant effect is found to be increasing quite substantially for Black women and men in arrival cohorts observed over the 25-year period from 1989 through 2013.

**[Figure 2 about here]**

We next evaluate the unhealthy assimilation hypothesis accounting explicitly for immigrant arrival cohorts' duration in the U.S. Specifically, we assess whether there is convergence in BMI and obesity prevalence towards the levels for U.S.-born Black women and men with duration in the U.S., as is predicted by the unhealthy assimilation hypothesis. We do this for the four immigrant arrival cohorts up to and including the 2004-2008 arrival cohort. The pattern indicated by the main effects of the duration coefficients (see Table 4) suggests that convergence occurs, implying unhealthy

assimilation, but this is ultimately misleading as it is a period-specific pattern and does not therefore apply specifically to any immigrant arrival cohort. Mean BMI for foreign-born women relative to the U.S.-born is 2.2 years lower (coefficient of -2.177) at 0 to 4 years -2.226 at 5 to 9 years, and -.984 at 10-14 years' duration in the U.S. For foreign-born men, the coefficients are -2.038 at duration 0-4 years, -1.422 at duration 5-9 years, and -0.584 at duration 10-14 years. These female and male series of main-effect duration coefficients therefore give the appearance of a classic "unhealthy assimilation" pattern (narrowing gap from the U.S.-born with increasing duration in the U.S.). However, these sets of three coefficients apply to three different arrival cohorts of women and men. They do not therefore apply to any single immigrant arrival cohort, as is required for an appropriate test of unhealthy assimilation.

The period-by-duration interaction coefficients are of some value in showing trends over time in foreign-born BMI/obesity divergence from the U.S.-born, although few attain statistical significance. The coefficients indicate the difference in the immigrant effect for outcomes between the U.S.-born and the foreign-born Black women and men for the specified duration period during the interacted year, compared to the immigrant effect for the same duration period during the reference year, 1999 to 2003. A negative interaction coefficient indicates a greater immigrant effect for the interacted period than in the reference, 1999 to 2003 period. For example, for Black women the 2009 to 2013 and 10 to 14 year interaction coefficient of -1.335 indicates that the immigrant effect for foreign-born with 10 to 14 years of residence in the U.S. was greater in 2009 to 2013 than in 1999 to 2003. Thus the immigrant effect for Black female immigrants with longer duration in the U.S. (10-14 years) is increasing in this most recent

period. This is in line with the greater immigrant-by-period interactions for women observed in the age-by-period model for all foreign-born Black women and men (see again Table 3). This effect of increasing the BMI difference between U.S.-born Black women at duration 10-14 years in 2009-13 is seen also for men's BMI and for women's obesity prevalence.

We combine the age, duration, and period coefficients to derive trajectories of mean BMI and obesity prevalence for four arrival cohorts in Figures 3a and 4a (for women) and Figures 3b and 4b (for men), each time in comparison to U.S.-born women and men of the same age and education. For Black women, only in the 1989 to 1993 arrival cohort do the mean BMI trajectories converge with duration in the U.S. to the trajectories of similar-aged U.S.-born Black women. The trajectories of mean BMI between the arrival cohorts and matched U.S.-born women are largely parallel from the 1994 to 1998 arrival cohort onwards (see Figure 3a). Regarding Black women's obesity trajectories (Figure 4a), again only for the 1989 to 1993 female immigrant arrival cohort is there a suggestion of convergence. The U.S. and foreign-born obesity gaps were as follows. At 0 to 4 years, -10.9 percentage points; at 5 to 9 years, -11.5 percentage points; and at 10 to 14 years, -7.0 percentage points. Divergence of foreign-born Black women's obesity prevalence trajectory with duration in the U.S. from the trajectories of similar-aged U.S.-born Black women, however, is clearly seen for the more recent, 1999 to 2003 and 2004 to 2008 arrival cohorts. The 1999 to 2003 female arrival cohort offers the most definitive example of divergence for obesity for women across the three durational periods observed. The foreign and U.S.-born gap increased from -10 percentage points for foreign-born with 0 to 4 years duration, to -14 percentage points for foreign-born with



5 to 9 years duration and to -20 percentage points for foreign-born with 10 to 14 years duration.

**[Figures 3a, 3b, 4a, and 4b about here]**

For men, the trajectories of mean BMI mostly run parallel between immigrant arrival cohorts as they age in the U.S. and matched U.S.-born men. Again, this is inconsistent with unhealthy assimilation. The trajectories of obesity prevalence, meanwhile diverge substantially from those of U.S.-born men as the foreign-born arrival cohort's duration in the U.S. moves from 0-4 to 10-14 years. For example, the 1994 to 1998 male immigrant arrival cohort's obesity gap with the U.S.-born increased as follows. At 0 to 4 years duration, -8 percentage points; 5 to 9 years duration, -11 percentage points; and 10 to 14 years duration, -15 percentage points. This divergence from matched U.S.-born men's obesity prevalence across the same ages is opposite to predictions from the unhealthy assimilation hypothesis. Together these findings of either no convergence to (with the exception of the female 1989-1993 immigrant arrival cohort), or of divergence from, the BMI and obesity trajectories of U.S.-born Black women and men constitute our second set of evidence contrary to the unhealthy assimilation hypothesis when applied to Black immigrants in the U.S. Because this evidence maps out the duration-in-country patterns of BMI and obesity as they apply to specific immigrant arrival cohorts, moreover, it represents our study's strongest evidence against unhealthy assimilation in the Black foreign-born population.

**Discussion**

Using pooled data from the IHIS over a 25-year period, this study follows the BMI and obesity trajectories of U.S. and foreign-born Black men and women aged 20 to 54, between the periods of 1989 to 2013. The study compares their changes in BMI and obesity with age by following a birth cohort, their changes over time across five arrival cohorts, and their changes by duration in the U.S. for four of these arrival cohorts. Similar to other studies (Antecol and Bedard 2006; Bennett et al. 2007; Dey and Lucas 2006; Mehta et al. 2015; Park et al 2009; Singh et al. 2011), this study confirms that foreign-born Blacks have lower mean BMI and obesity prevalence rates than U.S.-born Blacks. However, we categorize this as the health immigrant effect and not an immigrant paradox due to the higher education levels of foreign-born Black men and women relative to the U.S.-born.

This study adds to the finding of better foreign-born Black BMI and obesity outcomes by exploring the trajectories of a birth cohort and four arrival cohorts to test the applicability of the immigrant health assimilation theory for foreign-born Blacks. As foreign-born and U.S.-born Black women and men age, foreign-born BMI and obesity outcomes do not converge with those of the U.S.-born. Instead the rates of increase for BMI and obesity are mostly greater for the U.S.-born as they age. Exploring immigrant arrival cohort patterns, we found minimal evidence to support patterns of convergence in BMI or obesity outcomes in the first 15 years following arrival in the U.S. for foreign-born Black men and women. Foreign-born Blacks on arriving have lower BMI and obesity prevalence than U.S.-born Blacks, and these gaps have increased substantially across the five five-year arrival cohorts we examined for both foreign-born men and women.

We also compared to matched Black women and men, the mean BMI and obesity prevalence trajectories in the 10 to 15 years following arrival in the U.S. of immigrant cohorts arriving in the U.S. between 1989-1993 through 2004-2008. We found evidence that foreign born Black male and female arrival cohorts are overall increasing their BMI and obesity gaps with the U.S.-born with duration of residence in the U.S., not decreasing as immigrant health assimilation would imply. This divergence has become more prominent for recent immigrant arrival cohorts. Thus as previous studies suggested but did not explore in depth for foreign-born Blacks (Antecol and Bedard 2006; Goel et al. 2004; Park et al. 2009), convergence of BMI and obesity outcomes, or unhealthy immigrant assimilation, is not occurring for foreign-born Blacks. This suggests that the assimilation perspective provides an inadequate theoretical model to frame Black immigrants' health trajectories in relation to BMI and obesity. The immigrant health literature has come to rely so heavily on the immigrant health assimilation theory to guide inquiries into foreign and U.S.-born health disparities, that few consider the opposite as being the most appropriate framework (for an exception see Park et al. 2009).

Based on what we know about Black immigrants in the literature, this finding is not surprising. The literature suggests that socially foreign-born Blacks do not assimilate with U.S.-born Blacks (Bryce-LaPorte 1972; Kasinitz et al. 2008; Waters 1999). An integral component of assimilation theory is acculturation, the adoption of the behaviors and practices of the native born (Alba and Nee 1997), without this assimilation is unlikely. Acculturation, however, requires contact with the U.S.-born group. But not only are U.S. and foreign-born Blacks residentially segregated from Whites, they are also residentially segregated from each other (Logan and Deane 2003).

Another potential explanation for the increasing foreign and U.S.-born Black gap in BMI and obesity is found in changes in the composition of Black immigrants in the U.S. Although more than half of Black immigrants are of Caribbean origin, those from Africa have experienced the most rapid increase in immigration to the U.S. among Black immigrants in recent years. Between 2000 and 2013 immigration by Africans to the U.S. increased by 137 percent. In 1980, Africans represented 7 percent of Black immigrants in the U.S., in 2000 24 percent and currently they represent 36 percent of Black immigrants (Anderson 2015). Not only are African-origin immigrants more likely to be positively selected on health than Afro-Caribbeans (Akresh and Frank 2008) sending countries in Africa have relatively lower rates of obesity than those in the Caribbean. Looking at the obesity rates from the top two sending countries in the Caribbean, Jamaica and Haiti, and Africa, Nigeria and Ethiopia, can be informative. In 2013 the obesity rates for adults age 18 or over were as follows for each country: Jamaica: 32.3 percent for women and 14.5 percent for men; Haiti: 16.5 percent for women and 6.4 percent for men; Nigeria: 14.7 percent for women and 4.9 percent for men; and Ethiopia: 5.6 percent for women and 1.2 percent for men (WHO 2017). The rates of obesity are much lower for African sending countries than Caribbean sending countries. Thus the increasing obesity gap in arrival cohorts may be a reflection of the increased representation of African-origin immigrants among Black immigrants in the U.S.

The reasons for the increase in African migration to the U.S. are complex – a mix of push (i.e. sending country GDP) and pull (increase in diversity and refugee visas in the U.S.) (Thomas 2011). The changing mix of Black immigrant country origins may be especially important as an explanation for the expanding gaps in mean BMI and obesity

prevalence on arrival in the U.S. Because our duration analyses follow arrival cohorts, our findings of divergence (or at least lack of convergence) from U.S.-born Black trajectories of mean BMI and obesity prevalence with time in the U.S. are not confounded with changing country origins, as would be findings using the more traditional cross-sectional approach (e.g., Goel et al 2004). The trend towards more divergence in arrival cohorts' trajectories over the first 10 to 15 years after arrival in the U.S. from the trajectories in mean BMI and obesity for U.S.-born Black women and men, however, could be explained in part by a change in arrival-cohort composition towards African country origins.

An important contribution of this study is that we employ the correct modeling of assimilation to explore health assimilation patterns among foreign-born Blacks. Assimilation theory implies a comparison with the U.S.-born; thus any analysis of foreign-born assimilation patterns must be in reference to the U.S.-born. Assimilation theory is not a within-group measure as previous studies on Black immigrants have largely modeled it (e.g., Kaushal 2009). Although not explored in this study, we would argue for the same conceptual clarity for models of acculturation, that it be a foreign and native-born comparison not a within foreign-born comparison. Additionally, as argued by Park et al. (2009), in order to correctly assess assimilation, a cohort model is the appropriate approach. The use of cross-sectional comparisons can misrepresent duration patterns that stem from pooling together several years of data that include multiple immigrant arrival cohorts.

There are nevertheless several limitations in this study. The first limitation is the low sample numbers of foreign born Blacks in the NHIS. Although we developed a

creative analytical strategy to address this issue, the sample numbers overall were lower than what is available for other immigrant groups, such as Hispanics (e.g., Sanchez-Vaznaugh et al. 2008; Creighton et al. 2012). An increase in the number of foreign-born Blacks would increase the precision of the estimates, and allow for more disaggregation within foreign-born Black immigrants. Another shortcoming is our inability to follow arrival cohorts for a longer periods of time. Due to the coding of the duration in the U.S. variable for the NHIS, the largest group in this category are those who have resided in the U.S. for 15 or more years. Some of the patterns in the figures in the model showed an oscillating pattern of an increase and a subsequent decreasing the U.S. and foreign-born gap; additional years to follow the cohort would have provided clarity on the observed pattern. Others have similarly decided to not use the 15 or more year durational group (e.g., Kaushal 2009), while still others have worked within the constraints of the survey design (e.g., Antecol and Bedard 2006). Additional research is needed to further confirm and extend the findings of this study to create a robust literature that clearly supports divergence of foreign born Black health patterns. Finally, our analyses are based on BMI as an indicator of more and less healthy weight. Recent work has challenged this measure's appropriateness specifically with respect to Black immigrant health (O'Connor et al. 2014).

## Tables and Figures

**Table 1 (Chapter 2).** Summary Statistics, U.S. and Foreign-born Black Women, ages 20-54, from 1989-2013

Variable	FB <5 years duration	FB <15 years duration	FB All	U.S.-born	
Mean BMI	25.35	26.0	26.5	27.8	a, d,g
Obesity	0.164	0.200	0.223	0.322	a,d,g
<i>Age</i>					
20-24	0.243	0.165	0.120	0.160	d,g
25-29	0.229	0.198	0.152	0.165	a,f,g
30-34	0.215	0.215	0.177	0.166	a,h
35-39	0.137	0.177	0.167	0.152	b, e
40-44	0.082	0.111	0.148	0.137	a,f,g
45-49	0.051	0.081	0.131	0.118	a,f,g
50-54	0.044	0.053	0.106	0.102	a,g
F-Statistic compared to U.S.-born		p<.001	p<.001		
<i>Period</i>					
1989-1993	0.319	0.274	0.238	0.289	e
1994-1998	0.228	0.211	0.208	0.246	b,d
1999-2003	0.144	0.157	0.162	0.152	
2004-2008	0.138	0.162	0.176	0.155	f
2009-2013	0.171	0.195	0.217	0.157	b,d
F-Statistic compared to U.S.-born		p<.05	p<.001		
<i>Duration in U.S.</i>					
0-4 years	NA	0.266	0.140	NA	
5-9 years	NA	0.376	0.198	NA	
10-14 years	NA	0.358	0.189	NA	
15+ years	NA	NA	0.474	NA	
<i>Education</i>					
< HS	0.213	0.195	0.156	0.149	a,h
HS	0.349	0.325	0.298	0.369	a,d
Some College	0.245	0.288	0.318	0.320	b,g
BS+	0.193	0.192	0.228	0.162	a,d
F-Statistic compared to U.S.-born		p<.001	p<.001		
Observations	767	2,882	5,476	54,869	

significantly different: a: from FB<15 yrs. p<.001; b: FB<15 yrs. p<.01; c: FB<15 yrs. p<.05; d: from FB All p<.001; e: FB All p<.01; f: FB All p<.05; g: FB<5 yrs. p<.001; h: FB<5 yrs. p<.01, i: FB <5 yrs. p<.05

**Table 2 (Chapter 2).** Summary Statistics, U.S. and Foreign-born Black Men, ages 20-54, from 1989-2013

Variable	FB <5 years duration	FB <15 years duration	Foreign-born All	U.S.-born	
Mean BMI	25.20	25.5	25.9	27.2	a,d,g
Obesity	0.099	0.108	0.128	0.247	a,d,g
<i>Age</i>					
20-24	0.258	0.155	0.118	0.155	d,g
25-29	0.230	0.200	0.154	0.158	a,g
30-34	0.186	0.220	0.180	0.161	a,e
35-39	0.152	0.173	0.168	0.148	b,d
40-44	0.098	0.129	0.154	0.146	c,g
45-49	0.047	0.077	0.130	0.126	a,g
50-54	0.029	0.044	0.095	0.106	a,f,g
F-Statistic compared to U.S.-born		p<.001	p<.001		
<i>Period</i>					
1989-1993	0.286	0.278	0.239	0.313	d,i
1994-1998	0.209	0.212	0.217	0.257	a,d
1999-2003	0.179	0.137	0.148	0.137	i
2004-2008	0.149	0.167	0.174	0.146	e
2009-2013	0.177	0.206	0.222	0.147	a,d
F-Statistic compared to U.S.-born		p<.001	p<.001		
<i>Duration in U.S.</i>					
0-4 years	NA	0.273	0.155	NA	
5-9 years	NA	0.377	0.214	NA	
10-14 years	NA	0.351	0.199	NA	
15+ years	NA	NA	0.432	NA	
<i>Education</i>					
< HS	0.165	0.153	0.134	0.155	e
HS	0.263	0.285	0.278	0.411	a,d,g
Some College	0.281	0.285	0.297	0.285	
BS+	0.291	0.277	0.291	0.149	a,d,g
F-Statistic compared to U.S.-born		p<.001	p<.001		
Observations	661	2,472	4,401	36,088	

significantly different: a: from FB<15 yrs. p<.001; b: FB<15 yrs. p<.01; c: FB<15 yrs. p<.05; d: from FB All p<.001; e: FB All p<.01; f: FB All p<.05; g: FB<5 yrs. p<.001; h: FB<5 yrs. p<.01, i: FB <5 yrs. p<.05



**Table 3 (Chapter 2).** BMI and Obesity, 20-54 year old U.S.-born and Foreign-born Black Women and Men, 1989-2013

Characteristics	Women		Men	
	BMI	Obesity	BMI	Obesity
Immigrant	-2.140*** (0.273)	-0.743*** (0.158)	-1.214*** (0.276)	-0.595** (0.230)
<i>Age (Ref: 20-24)</i>				
25-29	1.074*** (0.108)	0.266*** (0.044)	1.137*** (0.106)	0.457*** (0.058)
30-34	1.864*** (0.104)	0.502*** (0.044)	1.634*** (0.101)	0.640*** (0.058)
35-39	2.427*** (0.107)	0.634*** (0.041)	1.903*** (0.107)	0.694*** (0.060)
40-44	2.581*** (0.108)	0.682*** (0.042)	2.031*** (0.109)	0.771*** (0.058)
45-49	2.823*** (0.113)	0.750*** (0.042)	2.006*** (0.104)	0.710*** (0.059)
50-54	3.261*** (0.118)	0.824*** (0.047)	2.017*** (0.111)	0.711*** (0.059)
<i>Period (Ref: 1999-2003)</i>				
1989-1993	-1.395*** (0.095)	-0.452*** (0.035)	-1.168*** (0.092)	-0.548*** (0.048)
1994-1998	-0.757*** (0.096)	-0.236*** (0.035)	-0.549*** (0.097)	-0.236*** (0.047)
2004-2008	0.647*** (0.115)	0.206*** (0.041)	0.418*** (0.110)	0.204*** (0.051)
2009-2013	1.467*** (0.115)	0.426*** (0.037)	0.755*** (0.116)	0.369*** (0.050)
<i>Immigrant x Period Interactions</i>				
Immigrant x 1989-1993	0.299 (0.233)	-0.082 (0.127)	0.089 (0.207)	-0.217 (0.175)
Immigrant x 1994-1998	0.029 (0.260)	-0.016 (0.143)	-0.098 (0.212)	-0.212 (0.164)
Immigrant x 2004-2008	-0.044 (0.284)	0.041 (0.130)	-0.325 (0.246)	-0.261 (0.167)
Immigrant x 2009-2013	-0.735** (0.242)	-0.227* (0.110)	-0.338 (0.241)	-0.156 (0.151)

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

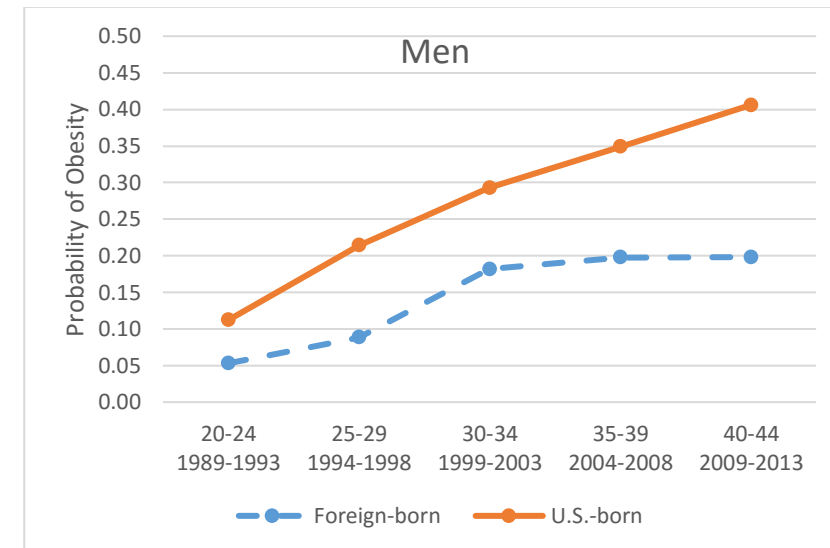
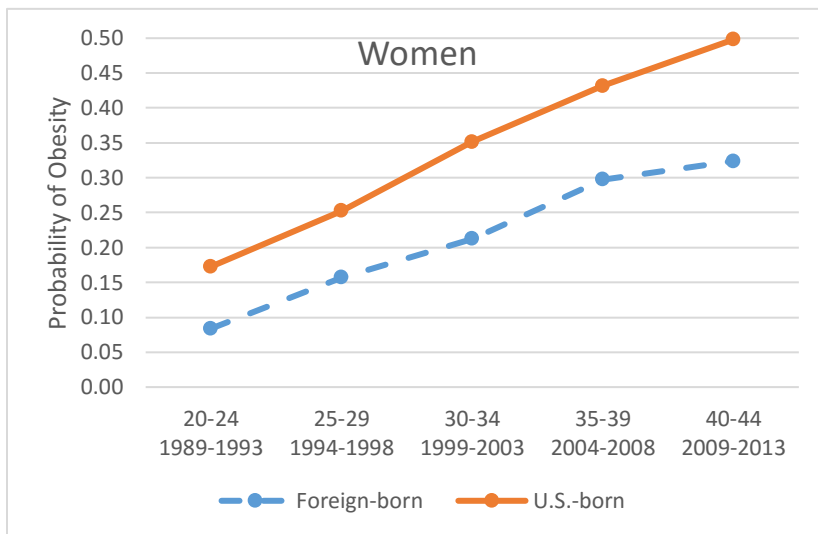
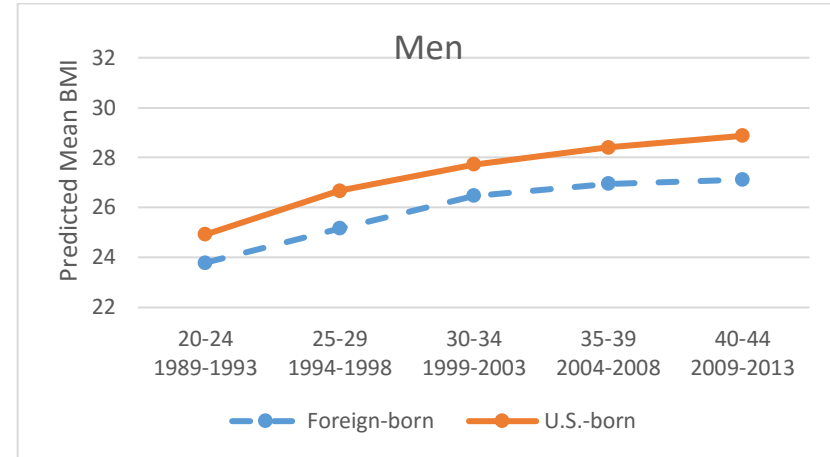
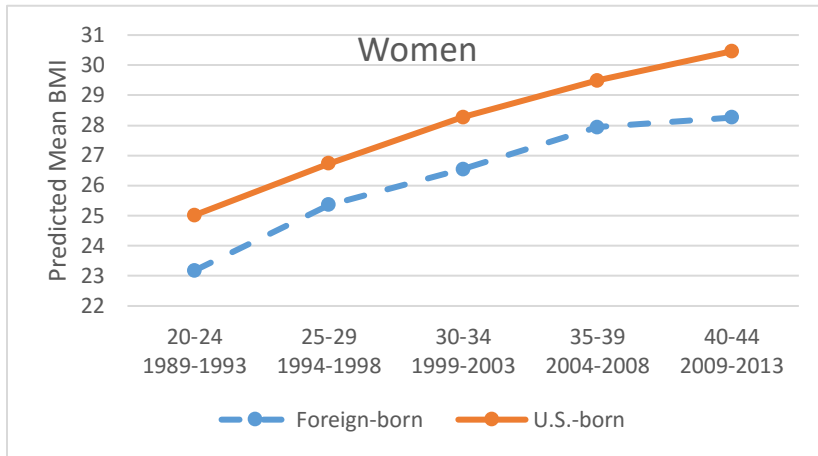
**Table 3 (Continued-Chapter 2).** BMI and Obesity, 20-54 year old U.S.-born and Foreign-born Black Women and Men, 1989-2013

Characteristics	Women		Men	
	BMI	Obesity	BMI	Obesity
<i>Education (Ref: High School)</i>				
< High School	0.985*** (0.090)	0.321*** (0.028)	-0.247** (0.082)	-0.045 (0.042)
Some College	-0.322*** (0.067)	0.094*** (0.025)	0.081 (0.069)	-0.047 (0.035)
Bachelors+	-1.555*** (0.083)	0.510*** (0.034)	-0.070 (0.084)	0.178*** (0.044)
<i>Immigrant x Education Interactions</i>				
Immigrant x Less HS	NA	NA	0.358 (0.212)	0.163 (0.157)
Immigrant x Some College	NA	NA	-0.312 (0.172)	-0.023 (0.131)
Immigrant x Bachelors+	NA	NA	-0.527** (0.177)	-0.313* (0.148)
<i>Immigrant x Age Interactions</i>				
immigrant * 25-29	0.737* (0.292)	0.165 (0.162)	-0.195 (0.277)	-0.228 (0.249)
immigrant * 30-34	0.403 (0.290)	0.046 (0.164)	-0.028 (0.270)	-0.029 (0.217)
immigrant * 35-39	0.640* (0.314)	0.118 (0.171)	0.088 (0.250)	0.080 (0.210)
immigrant * 40-44	0.671* (0.320)	0.241 (0.176)	-0.203 (0.274)	-0.266 (0.235)
immigrant * 45-49	1.322*** (0.346)	0.412* (0.169)	0.117 (0.241)	-0.155 (0.214)
immigrant * 50-54	0.965* (0.396)	0.460** (0.177)	0.491 (0.359)	0.142 (0.241)
Constant	26.413*** (0.109)	1.115*** (0.041)	26.085*** (0.113)	1.521*** (0.062)
Observations	60,345	60,345	40,849	40,849
R-squared	0.069		0.055	

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.



**Figure 1 (Chapter 2).** Predicted Mean BMI and Probability Obesity for Foreign and U.S.-born Black Women and Men who arrived in the U.S. 15+ years or earlier, Age 20-44, 1989-2013 (Estimated from Table 3 Models)



**Table 4 (Chapter 2).** BMI and Obesity, 20-54 year old U.S.-born and Foreign-born Black Women and Men who arrived in the United States less than 15 years earlier, 1989-2013

Characteristics	Women		Men	
	BMI	Obesity	BMI	Obesity
<i>Age (Ref: 20-24)</i>				
25-29	1.115*** (0.103)	0.271*** (0.043)	1.118*** (0.100)	0.449*** (0.057)
30-34	1.883*** (0.101)	0.502*** (0.043)	1.631*** (0.096)	0.637*** (0.056)
35-39	2.472*** (0.102)	0.637*** (0.040)	1.921*** (0.101)	0.705*** (0.059)
40-44	2.631*** (0.105)	0.692*** (0.041)	2.023*** (0.104)	0.763*** (0.057)
45-49	2.898*** (0.109)	0.770*** (0.042)	2.010*** (0.101)	0.711*** (0.058)
50-54	3.330*** (0.116)	0.847*** (0.046)	2.026*** (0.108)	0.715*** (0.059)
<i>Education (Ref: High School)</i>				
Less than High School	0.990*** (0.092)	0.317*** (0.029)	-0.249** (0.082)	-0.045 (0.042)
Some College	-0.300*** (0.069)	-0.088*** (0.025)	0.081 (0.069)	-0.047 (0.035)
Bachelors or Higher	-1.569*** (0.086)	-0.505*** (0.035)	-0.070 (0.083)	-0.178*** (0.044)
<i>Period (Ref: 1999-2003)</i>				
1989-1993	-1.390*** (0.094)	-0.449*** (0.035)	-1.167*** (0.092)	-0.548*** (0.048)
1994-1998	-0.754*** (0.096)	-0.235*** (0.035)	-0.548*** (0.097)	-0.236*** (0.047)
2004-2008	0.647*** (0.115)	0.206*** (0.041)	0.418*** (0.110)	0.203*** (0.051)
2009-2013	1.468*** (0.115)	0.425*** (0.037)	0.755*** (0.116)	0.369*** (0.050)
<i>Duration in U.S. (Ref: U.S.-born)</i>				
0-4 years	-2.177*** (0.462)	-0.644* (0.281)	-2.038*** (0.305)	-1.438*** (0.343)
5-9 years	-2.226*** (0.379)	-0.666** (0.202)	-1.422*** (0.410)	-0.737* (0.328)
10-14 years	-0.984** (0.310)	-0.348* (0.163)	-0.584 (0.346)	-0.713** (0.250)

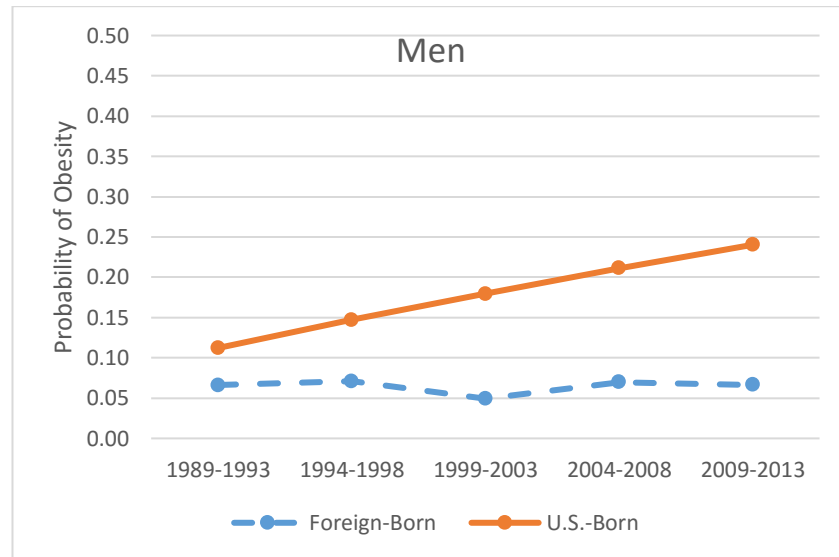
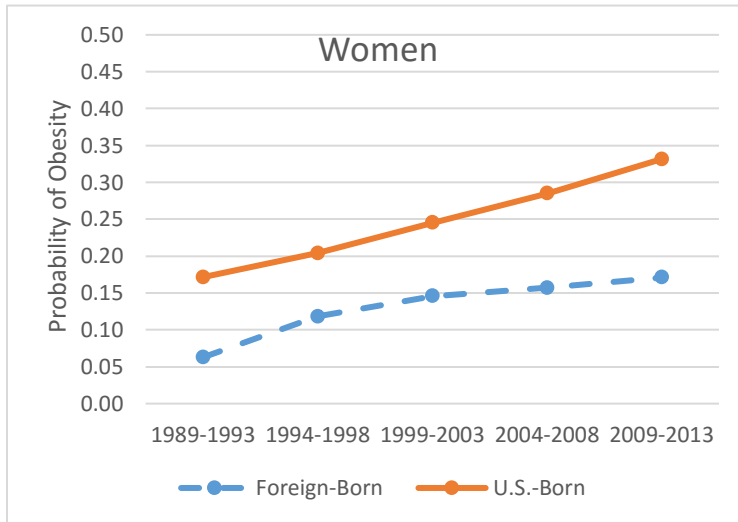
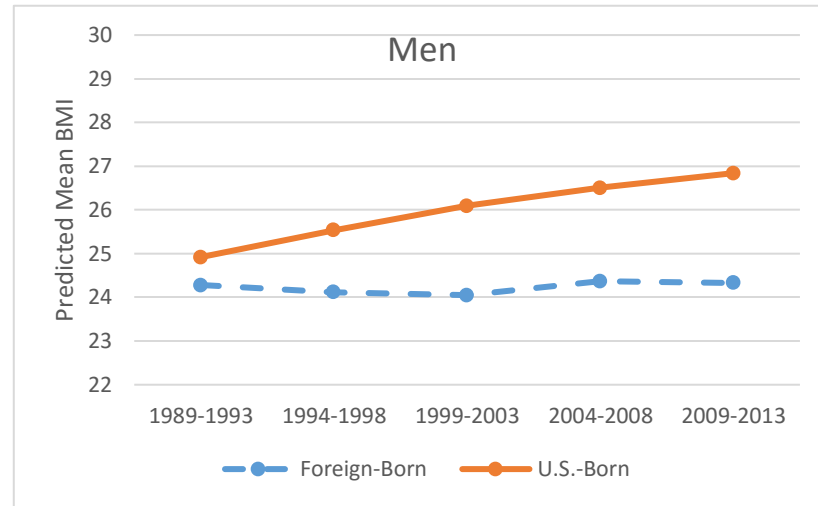
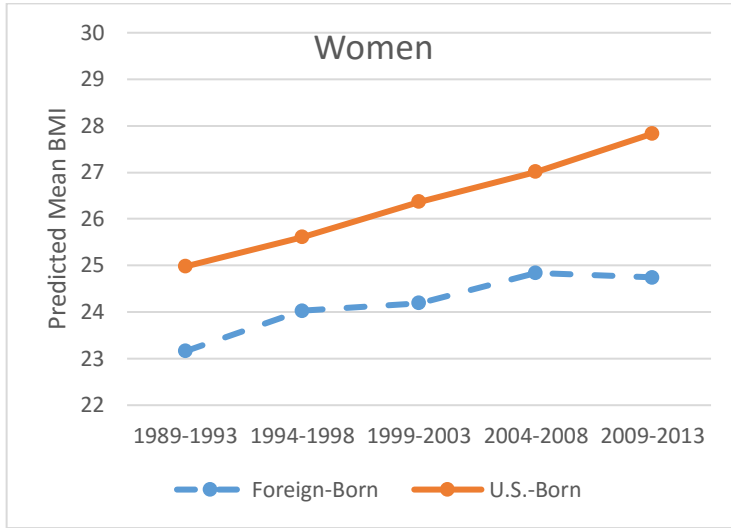
Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

**Table 4 (Continued – Chapter 2).** BMI and Obesity, 20-54 year old U.S.-born and Foreign-born Black Women and Men who arrived in the United States less than 15 years earlier, 1989-2013

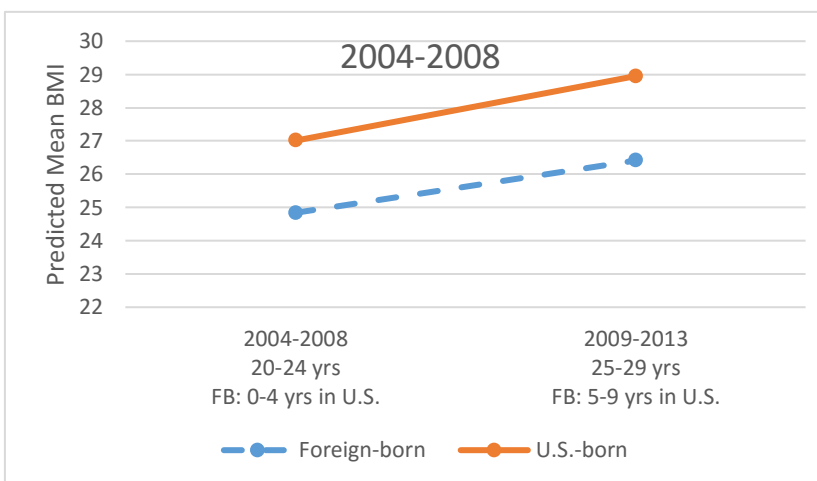
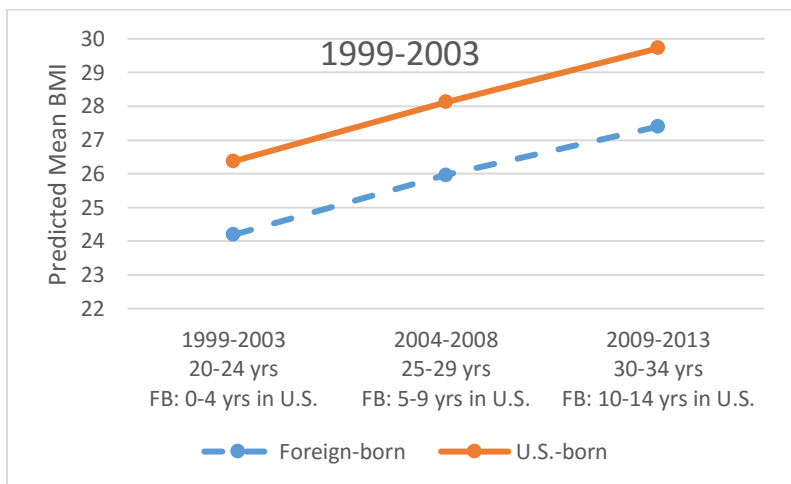
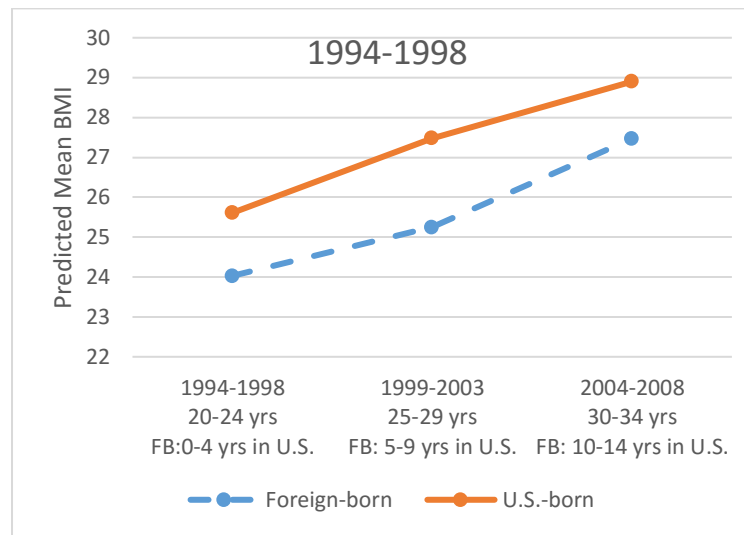
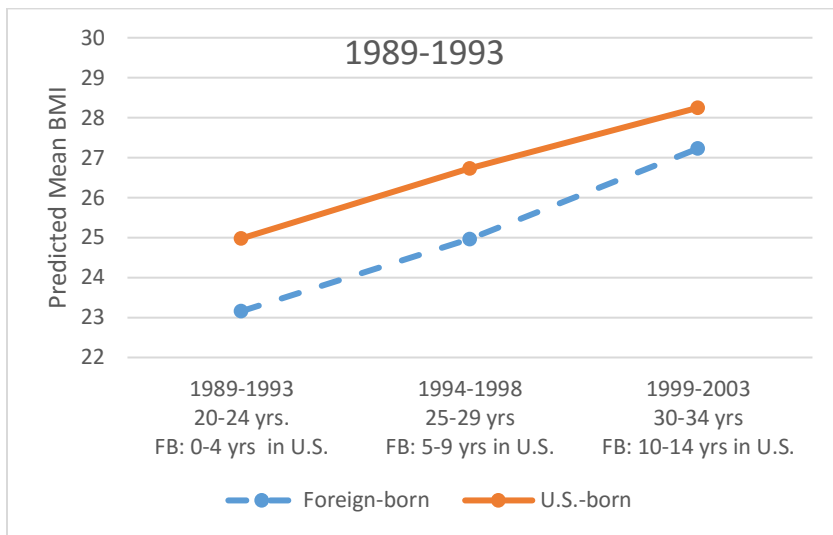
Characteristics	Women		Men	
	BMI	Obesity	BMI	Obesity
<i>Immigrant x Education Interactions</i>				
Immigrant x Less than High School	NA	NA	0.450 (0.283)	0.440 (0.227)
Immigrant x Some College	NA	NA	-0.416 (0.246)	0.067 (0.221)
Immigrant x Bachelors	NA	NA	-0.516* (0.225)	-0.235 (0.226)
<i>Period x Duration Interactions</i>				
1989-1993*0-4 years	0.357 (0.539)	-0.485 (0.406)	1.396*** (0.358)	0.861* (0.382)
1989-1993*5-9 years	1.278** (0.457)	0.154 (0.301)	-0.081 (0.443)	-0.337 (0.408)
1989-1993*10-14 years	-0.096 (0.374)	-0.085 (0.203)	-0.356 (0.387)	-0.322 (0.307)
1994-1998*0-4 years	0.600 (0.686)	-0.006 (0.401)	0.617 (0.470)	0.622 (0.433)
1994-1998*5-9 years	0.461 (0.621)	-0.084 (0.307)	-0.301 (0.475)	-0.467 (0.436)
1994-1998 *10-14 years	-0.346 (0.442)	-0.099 (0.225)	-0.803 (0.431)	-0.638 (0.357)
2004-2008 * 0-4 years	0.007 (0.774)	-0.118 (0.396)	-0.096 (0.624)	0.165 (0.542)
2004-2008 *5-9 years	0.061 (0.572)	-0.056 (0.323)	-0.663 (0.498)	-0.539 (0.416)
2004-2008 *10-14 years	-0.446 (0.620)	-0.084 (0.270)	-0.744 (0.590)	-0.069 (0.370)
2009-2013 * 0-4 years	-0.915 (0.663)	-0.235 (0.365)	-0.473 (0.454)	-0.050 (0.466)
2009-2013 *5-9 years	-0.315 (0.532)	-0.180 (0.269)	-0.829 (0.512)	-0.713 (0.399)
2009-2013 * 10-14 years	-1.335** (0.484)	-0.576* (0.235)	-1.205** (0.432)	-0.182 (0.306)
Constant	26.366*** (0.108)	-1.126*** (0.041)	26.085*** (0.112)	-1.520*** (0.062)
Observations	57,751	57,751	38,560	38,560
R-squared	0.068		0.055	

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05.

**Figure 2 (Chapter 2).** Predicted Mean BMI and probability of Obesity for Black Women and Men, Age 20-24, Foreign-born Arrival Cohorts (0-4 years duration), 1989-2013 (Estimated from Table 4 Models)

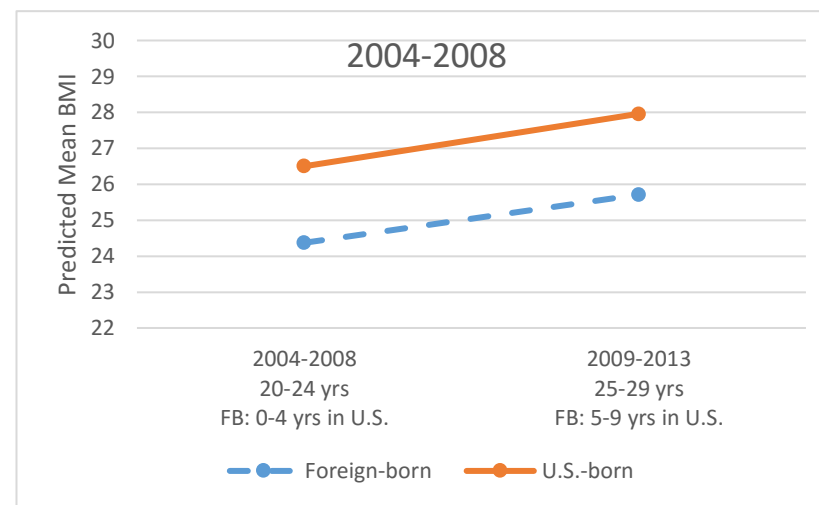
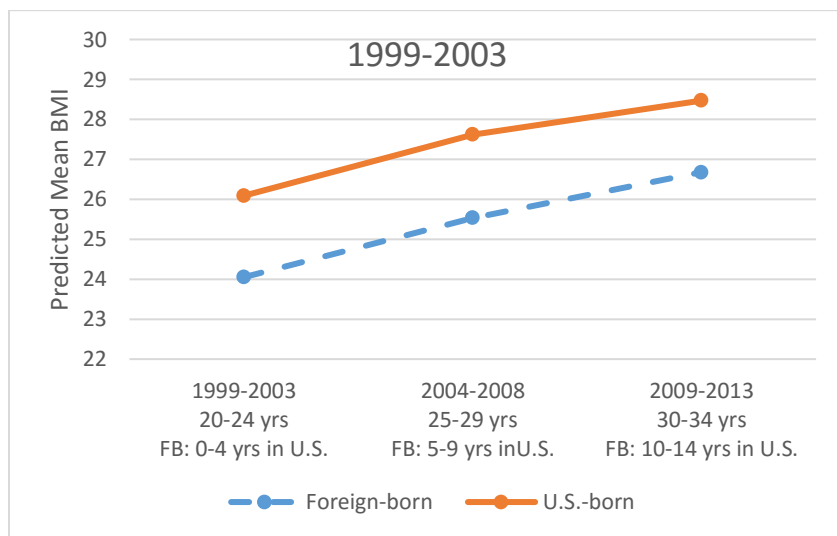
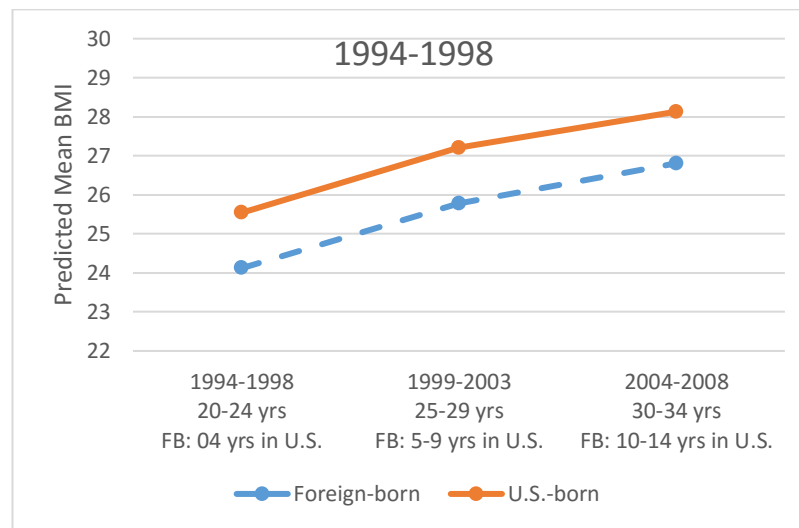
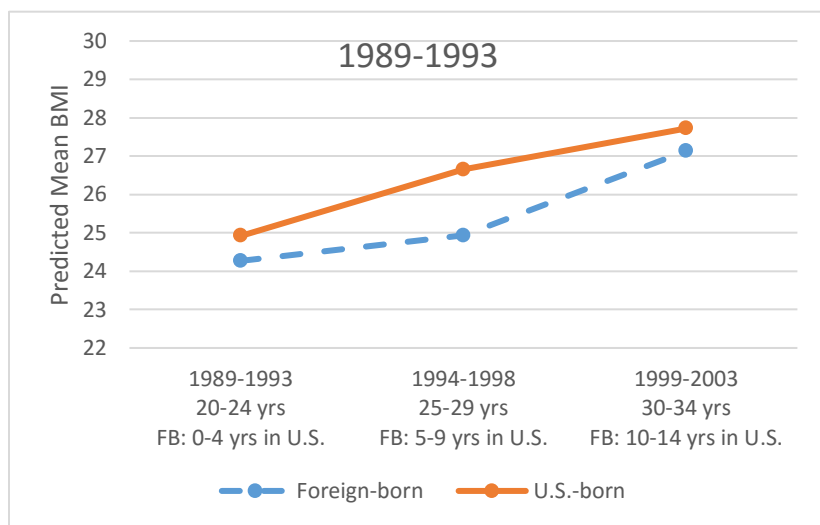


**Figure 3a (Chapter 2).** Predicted Mean BMI Foreign and U.S.-born Black Women, Age 20-34, 1989-2013, by Arrival Cohort (Estimated from Table 4 Models)

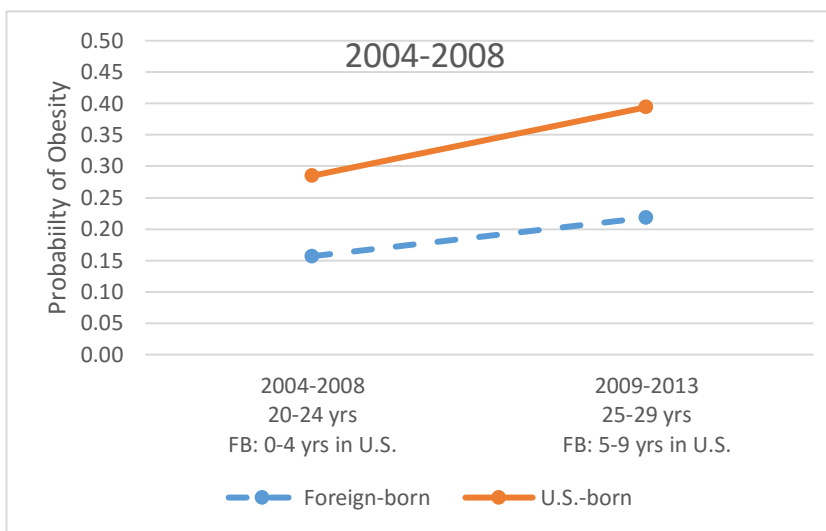
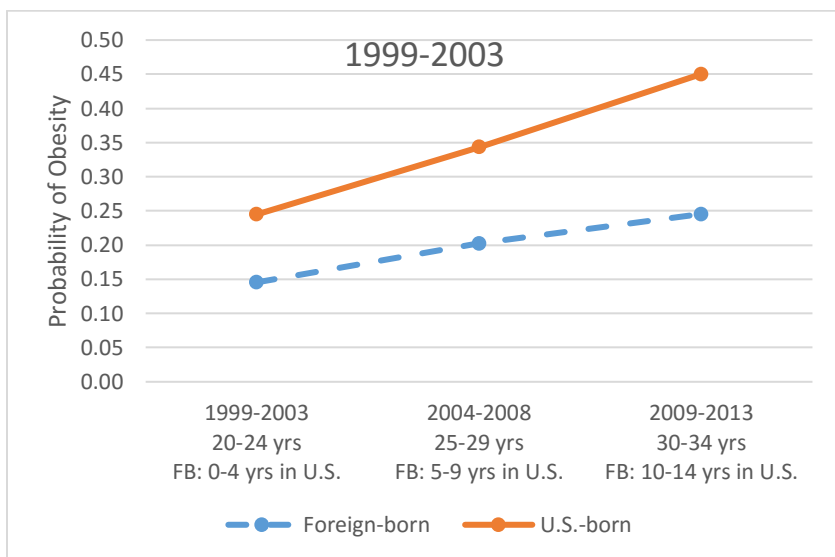
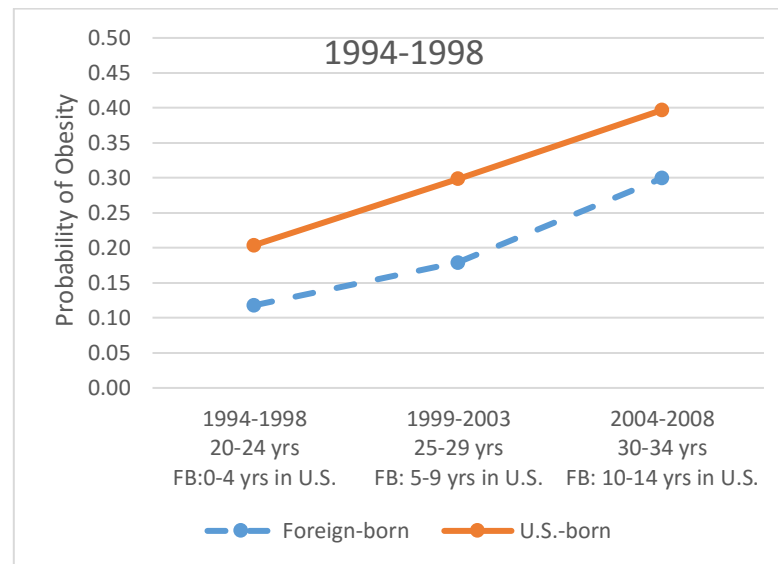
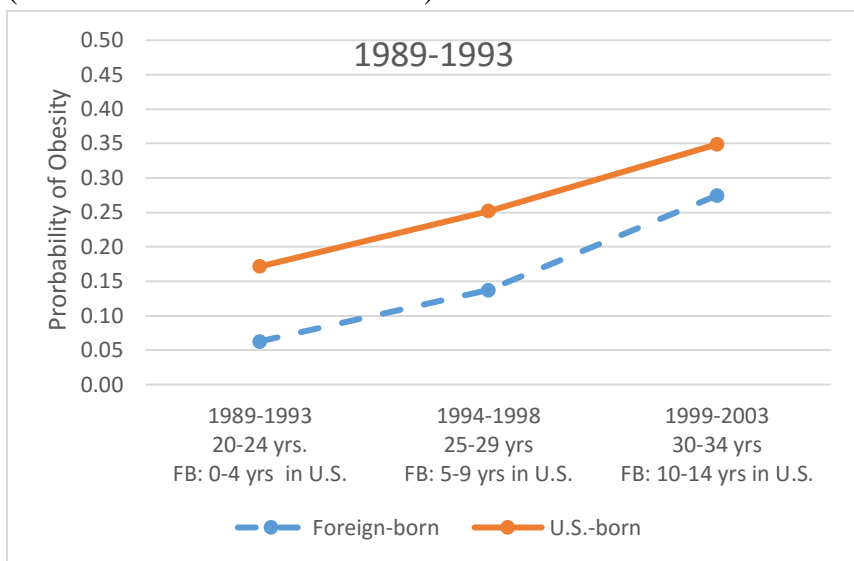




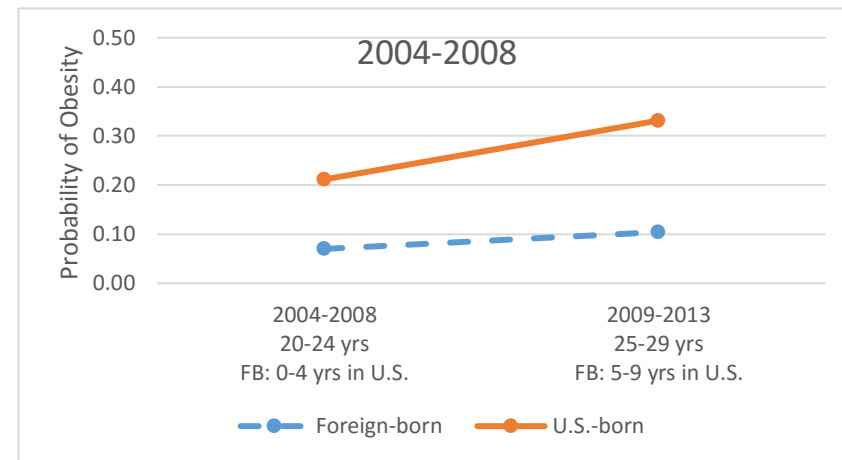
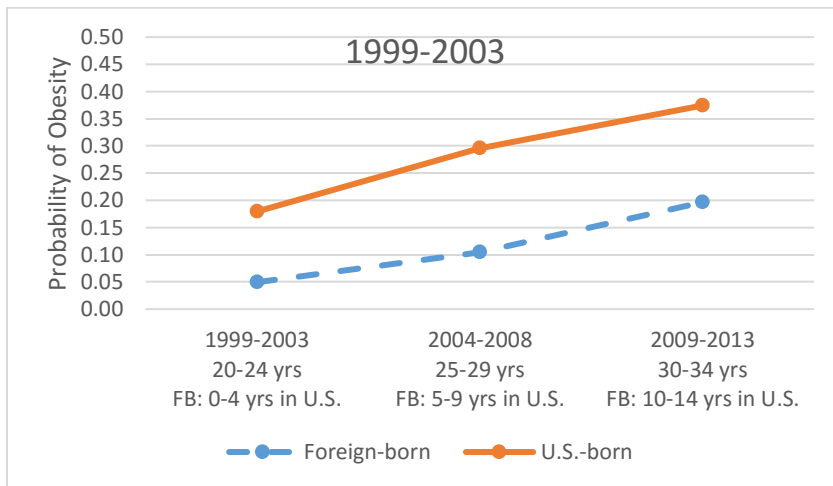
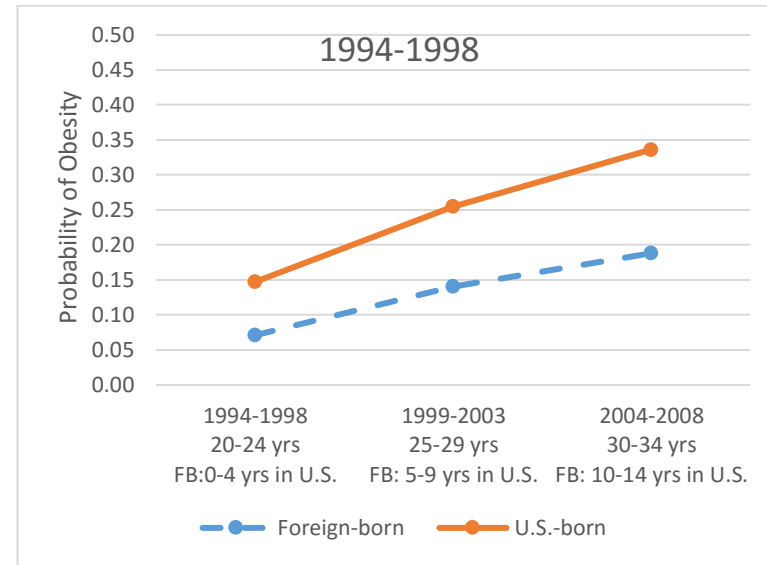
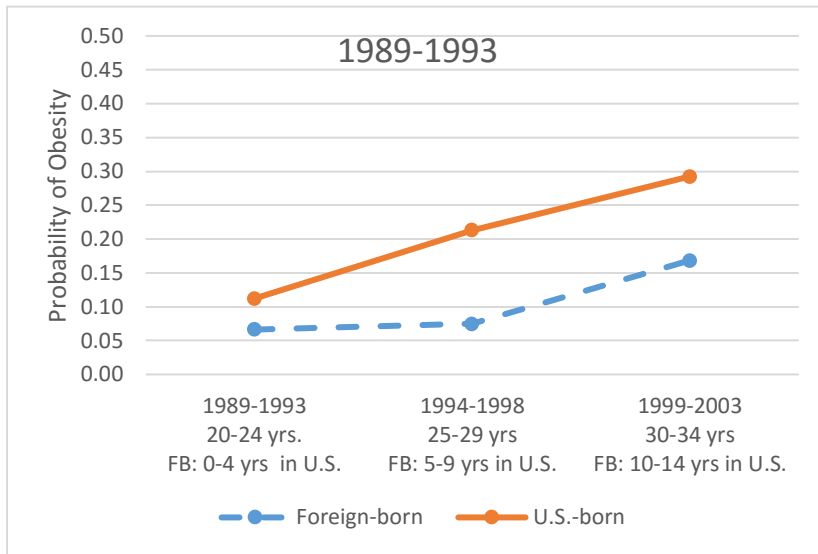
**Figure 3b (Chapter 2).** Predicted Mean BMI Foreign and U.S.-born Black Men, Age 20-34, 1989-2013, by Arrival Cohort (Estimated from Table 4 Models)



**Figure 4a (Chapter 2).** Probability of Obesity Foreign and U.S.-born Black Women, Age 20-34, 1989-2013, by Arrival Cohort (Estimated from Table 4 Models)



**Figure 4b (Chapter 2).** Probability of Obesity Foreign and U.S.-born Black Men, Age 20-34, 1989-2013, by Arrival Cohort (Estimated from Table 4 Models)



## Chapter 3: Paradox Explained: Obesity and the Immigrant Health Paradox (Paper 2)

### **Abstract**

The immigrant health paradox theory states that the foreign-born have better health outcomes than the native born. The immigrant health assimilation theory hypothesizes that this advantage declines over subsequent immigrant generations, resulting in a convergence of outcomes with the U.S.-born. Foreign-born Blacks represent an interesting group to further explore these two theories because their demographic characteristics and social patterns do not resemble the same trajectory as other immigrant groups. Focusing on obesity as the health outcome of interest, this study tests the applicability of these two theories for foreign-born Blacks. This study tests the strength of the immigrant paradox for foreign-born Blacks, as observed elsewhere, by matching the foreign and U.S.-born on both race and ethnicity (as defined by region of origin) and identifying mechanisms that explain existing differences. This study finds that even when matched on ethnicity, foreign-born Blacks have an obesity advantage over U.S.-born Blacks. This finding holds for foreign-born Blacks from English and non-English speaking origins. The foreign-born health advantage is explained by a difference in the rate of return for group characteristics. Foreign-born Blacks receive better health benefits for the same group characteristics. U.S.-born Afro Caribbeans, however, have worse obesity outcomes than African Americans, producing a U.S.-born Afro Caribbean depression penalty, which is different than immigrant health assimilation.

## Literature Review

The immigrant health paradox theory states that the foreign-born have better health outcomes than their native-born counterparts, even when the foreign-born do not have better group characteristics that promote health, hence the paradoxical nature of such observations (Dey and Lucas 2006; Ford, Narayan and Mehta 2015; Griffith et al. 2011; Hummer et al 2007; McDonald and Kennedy 2004). The immigrant health assimilation theory explores the immigrant health trajectory over time. The theory hypothesizes that with increased duration in the receiving country, the immigrant health advantage declines as a function of duration in the host country and across subsequent immigrant generations, resulting in a convergence with U.S.-born non-immigrant health outcomes (Bates et al. 2008). To date most of our knowledge on these theories comes from studies on Hispanic populations (Barcenas et al. 2007; Hummer et al. 2007; Lara et al. 2005; Palloni and Arias 2004).

Foreign-born Blacks represent an interesting case study of these two theories. Foreign-born Blacks reflect a growing percentage of the Black population in the U.S. (approximately 8.7%) (Anderson 2015). Their demographic characteristics and social patterns differ from Hispanics, the primary subject of these two theories. Also, the appropriateness of the immigrant health paradox and the immigrant health assimilation theories to adequately describe the health patterns of foreign-born Blacks relative to U.S.-born Blacks is questionable. Foreign-born Blacks have better socioeconomic status (SES) than U.S.-born Blacks on several key measures (Anderson 2015; Kalmijn 1996; Logan and Dean 2003) and SES is positively correlated with health (Sobal and Stunkard 1989; Wardle, Waller and Jarvis 2002). Thus, at a descriptive level there it is no paradox

that foreign-born Blacks have better outcomes across most health measures (Cunningham, Ruben and Narayan 2008). Their social patterns indicate that they do not socially integrate with U.S.-born Blacks (Logan and Deane 2003; Waters 1999), which places doubt on their health assimilation with U.S.-born Blacks. Also the health literature reflects a similar pattern (Antecol and Bedard 2006; Cunningham, Ruben and Narayan 2008).

A compelling health outcome to explore the applicability of these two theories among Blacks is obesity, because Blacks in the U.S. are disproportionately disadvantaged in their obesity outcomes (Flegal 2012). Foreign-born Blacks do have better obesity outcomes than U.S.-born Blacks (Antecol and Bedard 2006; Bennet et al 2007; Park et al. 2009). Similar to other groups studied, current interrogations of the immigrant paradox theory model nativity as the key explanatory reason for the better health outcomes. While nativity is an important sorting mechanism to disaggregate Blacks, it does not fully explain observed disparities, indicating there is something more at play. Current research shows that while the obesity status of foreign-born Blacks declines with increased duration in the U.S. their obesity outcomes do not converge with U.S.-born Blacks (Antecol and Bedard 2006). These findings may however be related to a lack of appropriate matching of foreign and U.S.-born Black groups on ethnicity as has been done for other immigrant groups (e.g. Bates et al 2008; Flegal et al. 2002; Kaplan et al. 2004; Martorell et al. 1992).

There is a limited body of literature that explores foreign and U.S.-born Black obesity trajectories (Antecol and Bedard 2006; Barrington et al. 2010; Bennett et al. 2007; Goel et al 2004; Kaushal 2009; Mehta 2015; Oza-Frank and Narayan 2009; Park et

al. 2009; Roshania, Narayan and Oza-Frank 2008; Singh et al. 2011). This study adds to this body of literature to confirm the presence of an immigrant paradox and explore health assimilation patterns. This paper is unique in that its exploration of the immigrant paradox moves beyond the reliance on nativity as the key explanatory variable for observed differences in outcomes and investigates nativity as a sorting mechanism for a larger phenomenon at play. Also, explorations of immigrant health assimilation patterns appropriately match foreign and U.S.-born Blacks on ethnicity allowing us to understand intergenerational patterns in obesity between the first generation and its U.S.-born progeny.

### **Foreign-Born Afro-Caribbeans in the U.S.**

A starting point is to understand the representation of foreign-born Blacks in the U.S. and their demographic characteristics. Foreign-born Blacks represent approximately 8.7 percent of the Black population in the U.S. The majority of the current Black immigrant population is represented by immigrants from the Caribbean, with Jamaica (18%) being the largest sending country, followed by Haiti (15%), then Nigeria (5%) (Anderson 2015). Forty-two percent of Afro-Caribbean immigrants migrated to the U.S. prior to 1990 and with more than half of Afro-Caribbean immigrants between 2000 to 2013 migrating for family reunification (Anderson 2015). Of the existing Afro Caribbean population in the U.S. two thirds are foreign born, leaving one third who are either second or third generation immigrants (Logan and Dean 2003). The population dominance of foreign-born Caribbeans and U.S.-born Caribbeans position them as a key population among Blacks to understand and for this reason they formulate the foreign-born Black group of interest for this study.

Several key demographic characteristics are associated with obesity – Age and marital status are positively associated with obesity – getting older or being married increases obesity prevalence. Income and education are negatively associated with obesity – as income increases obesity decreases (Flegal et al. 2002; Ogden et al 2010; Smith et al 2015). The median age of foreign-born Afro Caribbeans is 47 years (Anderson 2015) compared to the median age for U.S.-born Blacks of 29 years. The foreign-born Afro Caribbean proportion married is 45 percent, the U.S.-born Black proportion married for the same period is considerably lower at 28 percent (Anderson 2015). Foreign-born Afro-Caribbeans (20%) have similar college degree attainment rates as U.S.-born Blacks (19%) (Anderson 2015; Logan and Deane 2003). Also, foreign born Afro-Caribbeans (\$43,000) have higher household incomes than U.S.-born Blacks (\$33,500) by almost ten thousand dollars more annually (Anderson 2015; Logan and Deane 2003).

The similar college attainment rates but higher incomes for foreign-born Afro-Caribbeans positions them at a higher socioeconomic status than U.S.-born Blacks. Research suggests that the better socioeconomic status of foreign-born Afro Caribbeans may be linked to the country of origin, where those coming from the English-speaking Caribbean fare better than those from the French and Spanish-speaking Caribbean (Kalmijn 1996). It is challenging to find nationally representative demographic information specific to second and third generation Afro-Caribbeans. However, research suggests that they do better socioeconomically than their parents' generation (Kalmijn 1996; Kasinitz et al 2008).



## **Obesity Patterns among Blacks**

### *Region of Origin Obesity Patterns*

First, understanding the obesity patterns in the country of origin of foreign-born Afro-Caribbeans will add context to their post migration outcomes. Since Afro-Caribbean immigrants represent the largest group among foreign-born Blacks in the U.S., a good starting point is understanding the obesity trends in the Caribbean during the pre-1990 period when most Afro Caribbean immigrants came to the U.S. If we look at the pre-1990 obesity trends for Jamaica, one of the largest sending countries in the Caribbean – the adult female obesity prevalence rate was 12.2 percent in 1975, 13.7% in 1980 and 17.2% in 1989. The adult male rate was 3.2 percent in 1975, 3.8 percent in 1980 and 5.0 percent in 1989 (WHO 2017). There was an increase in obesity rates for both Jamaican men and women from 1975 to 1989, but their highest obesity rates observed in 1989, were still less than the overall U.S. obesity rate that same year at 20.2 percent for females and 16.4 percent for males (WHO 2017).

For Haitians, the adult female obesity rate was 3.9 percent in 1975, 4.8 percent in 1980 and 7.0 percent in 1989. For males the obesity rates were 1.3 percent in 1975, 1.5 percent in 1980 and 2.1 percent in 1989 (WHO 2017). Overall persons residing in English-speaking Jamaica have higher obesity rates than those from French-speaking Haiti, but still maintained lower obesity rates than in the U.S. for the same period. Also, these patterns show that the obesity of arrival cohorts from the Caribbean to the U.S. increased with later cohorts being more obese than earlier cohorts (Singh et al. 2011).

### *Findings on the Immigrant Paradox and Health Assimilation*

There is limited literature specifically on the obesity patterns and outcomes of Afro-Caribbean immigrants in the U.S., thus we must rely on general observations of foreign-born Black obesity to understand the current trends. Research on foreign and U.S.-born Black obesity shows that foreign-born Blacks have lower BMIs and obesity rates than U.S.-born Blacks, even when controlling for the better foreign-born demographic characteristics (Dey and Lucas 2006; Mehta 2015; Park et al 2009; Singh et al. 2011). This pattern holds even when restricting the sample to lower income Blacks (Bennett et al. 2007) and when disaggregating the sample by gender (Antecol and Bedard 2006). Another example of the enduring quality of the foreign-born Black obesity advantage is that despite the increase of the foreign-born Black BMI and obesity rates with more recent arrival cohorts they are able to maintain better outcomes relative to U.S.-born Blacks, even for the foreign-born with longer term residency (15 or more years) in the U.S. (Oza-Frank and Narayan 2008; Singh et al. 2011). Evidence suggests that the greater U.S.-born Black increase in BMI and obesity aids this relationship, by outpacing the rate of change for foreign-born Blacks (Park et al. 2009).

The immigrant health assimilation theory is most commonly modeled by assessing a decline in the health status of the foreign-born with increased duration in the U.S., relative to recently arrived immigrant in their group. The literature is ambiguous on the relationship between BMI and duration in the U.S. for foreign-born Blacks. Most studies using pooled samples of foreign-born Black men and women show that the foreign born with longer duration in the U.S., relative to the recently arrived in their group, have higher BMIs and obesity prevalence rates (Kaushal 2009; Mehta 2015; Oza-

Frank and Narayan 2009; Singh et al 2011). However, one study found no statistically significant difference in mean BMI for foreign-born Blacks residing in the U.S. for 0 to 5 years compared with those with longer duration periods (Goel et al. 2004). This study is telling, because results disaggregated by gender tell a similar story. Foreign-born Black women of longer residency periods in the U.S. show no statistically significant disadvantage in BMI and obesity relative to those of 0 to 4 years residence. Foreign-born Black men actually appear to improve their BMI outcomes with increased duration in the U.S., (Antecol and Bedard 2006). The relationship between duration in the U.S. and obesity outcomes vary by the age of arrival of the foreign-born, with immigrants who arrive at younger ages likely to be more obese with increased duration than immigrants who arrived at older ages (Oza-Frank and Narayan 2009; Roshania, Narayan and Oza-Frank 2008).

There is also the generational story of immigrant health assimilation, comparing the BMI outcomes of first generation immigrants with native born second and third generations. While the first generation has lower obesity rates than the third and higher generations, the first generation does not always have better rates than the second generation as a monotonic relationship would suggest (Bennett et al. 2007; Singh et al. 2009). However, second generation children and adults are less obese than those with no foreign-born parent (Bennett et al 2007; Singh et al 2009). These results provide an overview of generational patterns in obesity for foreign-born Blacks, but ideally intergenerational analysis should either be based on a true longitudinal study or at a minimum by matching the first generation with their true second and third generations based on not only race but also ethnicity.

## **The Value of Matching on Race and Ethnicity**

The selection of the U.S.-born counterpart is particularly important for studies on U.S. and foreign-born minority groups due to the racial social structure in the U.S. Intersectionality theory helps us to understand the complex ways that multiply intersecting social categories combine to impact the experiences of marginalized groups in the U.S. (Choo and Ferree, 2010; Lamont and Molnar 2002). We know that race interacts with health in important ways (Muennig and Murphy 2011; Williams and Collins 1995). We also know that race interacts with ethnicity, producing qualitatively different social experiences among people of racial resemblance (Waters 1999). In order to have a true U.S.-born comparator group for an intergenerational analysis, the foreign and U.S.-born should be matched on both race and ethnicity. Ethnicity can be approximated by matching respondents on country or region of origin. Research on the social (Kasinitz et al. 2008; Waters 1999) and social psychological (Deaux et al. 2007) experiences of first and second generation foreign-born Blacks highlight how race, ethnicity and nativity produce qualitatively different experiences within foreign-born Black groups. Research on foreign and U.S.-born Black health disparities have not benefited from the same level of U.S.-born comparator group specification on both race and ethnicity as studies on Hispanics (i.e. Bates et al 2008; Flegal et al. 2002; Kaplan et al. 2004; Martorell et al. 1992)<sup>4</sup>.

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<sup>4</sup> I acknowledge that the use of analytical frames that don't address ethnic diversity among Blacks in research often is the result of survey data that does not have information about the ethnic backgrounds of Black respondents (Jackson et al 2004). When ethnic data is available on Black samples, researchers often make choices in pursuit of a larger analytical sample size to aggregate groups together (Antecol and Bedard 2006; Park et al. 2009).

## **Other Considerations**

### *Selectivity*

Selection effects suggest that persons of better health status are more likely to migrate, leaving us to compare the healthiest of the foreign-born to the U.S.-born of mixed health status (Jasso et al 2004; Riosmena, Wong and Palloni 2013). One common indicator of the pre-migration health status is SES, where the positive relationship between increased SES and better health outcomes has been observed globally (Kennedy, McDonald, Biddle 2006). Education is one potential measure of SES and has been shown to have a stronger correlation with obesity (Devaux et al. 2011). At the aggregate level foreign-born Blacks (26% have a college degree) have better educational outcomes than U.S.-born Blacks (19% have a college degree), but additional research shows that this is primarily driven by foreign-born Blacks of African origin (35% have a college degree) not Afro-Caribbeans (20% have a college degree) (Anderson 2015)<sup>5</sup>. Indeed, one study estimated that foreign-born Africans were highly likely to be positively selected on health (Akresh and Frank 2008). Second generation Afro-Caribbeans have better educational attainment than the first generation (Kalmijn 1996; Kasinitz et al. 2008). Additionally, foreign-born Afro-Caribbeans are most likely to migrate to the U.S. based on family reunification, which does not have the same socioeconomic or skill based criteria as

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<sup>5</sup> African immigrants have more average years of education (14 years) than African Americans and even Whites (Logan and Deane 2003). The percentage of African immigrants with a Bachelor's degree or higher (35%) exceeds the national average (30%) (Anderson 2015). Thus, the hypothesis of socioeconomically explained selection effects is well supported if focusing on African immigrants in the U.S. African immigrants consequently demonstrate better health outcomes over prolonged duration in the U.S. than U.S.-born Blacks and foreign-born Blacks from other regions (Hamilton and Hummer 2011).

employment of diversity based visas (Anderson 2015; Zong and Batalova 2016). Thus education driven health selectivity is unlikely to be the reason for U.S. and foreign-born obesity differences for the foreign-born of Afro-Caribbean decent. However, there may be other forms of selectivity at play (i.e. biological).

### *Country of Origin*

There are two aspects of the country of origin that has been shown to impact health outcomes – the racial makeup of the country and the national language. Research suggests that the racial makeup of the country of origin matters for the health outcomes of Blacks, where those coming from countries with lower prevalence of Whites in the population and presumably less harsh experiences with racism, faring better than those coming from countries with a White majority (Read and Emerson 2005). More recent research indicates that the health advantages resulting from a country of origin with a White minority may only be negligible (Hamilton and Hummer 2011).

There is less research on the variation in health outcomes for foreign-born Blacks based on the language spoken in their country of origin. There are three national languages that predominate in the Caribbean – English, French and Spanish. Although the majority of foreign-born Blacks come from the English-speaking Caribbean, immigrants from non-English-speaking areas represent a sizeable portion of the foreign-born Black representation in the U.S. (Anderson 2015). Socioeconomic research suggests that Afro Caribbean immigrants from English-speaking countries fare better in the U.S. than those from the non-English speaking areas (Hamilton 2014; Kalmijn 1996) and typically socioeconomic status is associated with better health (Williams and Collins 1995). African immigrants with better English language proficiency report better pre-

migration and post-migration self-reported health (Okafor et al. 2013). However, Afro-Caribbeans from French-speaking Haiti report lower mental health disorder rates than those from English and Spanish-speaking Caribbean (Williams et al 2007a). Thus there are known key differences in social and health patterns for foreign-born Afro Caribbean immigrants from English versus non-English speaking countries, but how these differences might specifically translate to obesity outcomes is unknown.

Research confirms that foreign-born Blacks overall have better obesity outcomes than U.S.-born Blacks (Antecol and Bedard 2006; Bennett et al 2007; Park et al 2009). However, nativity alone does not fully explain the foreign-born obesity advantage, which is an indication of other mechanisms impacting the disparity. Immigrant health assimilation patterns for foreign-born Blacks with respect to obesity are unclear. Some studies show a decline in the obesity status of foreign-born Blacks with increased duration in the U.S. (Kaushal 2009; Mehta 2015; Oza-Frank and Narayan 2009; Singh et al 2011), while other studies do not (Antecol and Bedard 2006; Goel et al. 2004). Intergenerational analysis of obesity patterns shows better first generation foreign-born outcomes relative to the third generation, but not the second generation. However, this may be a result of not appropriately matching the first and subsequent generations for an intergenerational study. This study uses a sample of U.S. and foreign-born Afro Caribbeans and African Americans to explore variances in obesity outcomes. The paper answers the following research questions: 1) Does the immigrant paradox still hold when matching Blacks on both race and ethnicity? 2) Is there an intergenerational decline in obesity outcomes between first and subsequent Afro Caribbean generations? 3) Is it nativity or some other overarching mechanism that explains the observed patterns?

## **Methods**

### **Data**

The National Survey of American Life (NSAL) is a comprehensive study of the mental and physical health of Black Americans (Jackson, et al., 2004). The study, conducted between February 2001 and March 2003, is part of an NIMH Collaborative Psychiatric Epidemiology Surveys (CPES) initiative. The NSAL adult sample is an integrated national household probability sample of 3,570 African Americans, 1,621 Blacks of Caribbean descent (Caribbean Blacks), and 891 non-Hispanic Whites living in areas where at least 10 percent of the population is black, all age 18 and over and residing in the conterminous 48 states (Jackson, et al. 2004). In both the African American and Caribbean Black samples, it was necessary for respondents to self-identify as Black. African Americans consisted of respondents who identified as Black but did not indicate having Caribbean heritage. Those self-identifying as Black were included in the Caribbean Black sample if they answered affirmatively when asked if they were of West Indian or Caribbean descent or if they said they were born in a country included on a list of Caribbean countries provided by the interviewers. The NSAL uses a four stage national probability design and a supplement for Black Caribbean adults. African Americans served as the core sample with 64 primary stage units (PSUs) and 456 secondary stage units (SSUs). Black Caribbeans served as the focus for the supplemental sample, focusing on census block groups with at least 10 percent Black Caribbean residence, resulting in 8 PSUs and 86 SSUs. Institutionalized persons, persons living on a military base and non-English speakers were excluded from the sample.



Most interviews were conducted face-to-face using a computer-assisted instrument and lasted an average of two hours and twenty minutes. The NSAL used race matching between the interviewer and respondent to increase the validity of responses.

The overall response rate was 72.3 percent, but specifically for African American respondents it was 70.7 percent and 77.7 percent for all Caribbean respondents. The NSAL is weighted to correct for disproportionate sampling, non-response, and to provide representation across various demographic characteristics in the coterminous states. For this paper the demographics of the NSAL were compared to the American Community Survey (ACS) for representativeness, using the female sample as the example. Results are presented in the appendix. There were statistically significant differences in the proportion married, mean age and proportion employed for U.S.-born Caribbeans in the NSAL versus the ACS. There was only a statistically significant difference in mean children in the household for foreign-born Afro Caribbeans in the NSAL versus the ACS. The Caribbean Black sample can be disaggregated into U.S.-born and foreign-born Caribbean Blacks. This paper uses the NSAL adult sample of U.S. and foreign-born Afro Caribbeans, producing an analytical sample of 2,176 African Americans, 315 U.S.-born Afro Caribbeans and 979 foreign-born Afro Caribbeans. Respondents who were missing information on any of the key demographics and indicator variables (see measures below) were excluded from the analytical sample. Of the U.S.-born Afro Caribbeans, 254 are second generation immigrants (at least one of their parents is foreign-born) and 61 are third generation or higher (both of their parents are U.S.-born).

## Measures

*Nativity Groups:* The analysis uses three analytical groups – African Americans and U.S. and foreign-born Afro Caribbeans. The analytical groups were formulated using the combination of a pre-coded combined race/ethnicity variable and a country of birth variable found in the dataset. Analysis only focusing on the foreign-born controls for the immigrant's age at immigration. Age at arrival was used in preference to duration in the U.S. for two reasons. The first is that age at arrival had the stronger relationship to obesity of the two variables. Second, there is less known about the impact of age at arrival on the obesity outcomes of foreign-born Blacks. Thus using age at arrival expands our knowledge in this area (Roshania, Narayan, Oza-Frank 2008).

*Country of Origin Language:* Other studies find that Blacks from English-speaking Caribbean fare better than those from French or Spanish-speaking Caribbean in mental health outcomes (Williams 2007). Thus language of the country of origin may also be important for physical health outcomes for Black immigrants. As such, a variable was formulated to denote the national language of the respondent's country of origin as either English Speaking or non-English speaking. For the foreign-born the country of birth was used to determine country of origin. For the second generation U.S.-born, if either the respondent's mother or father was from a non-English speaking country the respondent was counted as having non-English speaking origins. For the third generation U.S.-born, if any of the respondent's maternal or paternal grandparents were from a non-English speaking country, the respondent was counted as having non-English speaking origins. This resulted in 741 English-speaking and 237 non-English speaking foreign

born; 230 English speaking and 85 non-English speaking U.S. born in the analytical sample.

*Demographic Characteristics:* The analyses uses several demographic characteristics known to impact obesity to specify the models. SES can be measured using either income, education or a combination of both variables. This analysis uses both income, measured by a poverty index, and education, coded as a four category variable (less than high school, high school diploma, some college and Bachelor degree or higher), to account for SES effects. The poverty index is a ratio of household income over poverty threshold using the 2001 U.S. Census poverty thresholds determined by family size and composition. The poverty index was pre-calculated within the dataset and is used instead of household income because the poverty index better reflects the estimated expendable income that a respondent may have, taking into consideration both income and family size. Expendable income often impacts important lifestyle decisions like food choices and leisure time activities, both of which impact BMI. Other demographic variables include marital status, age, the number of children in the household and employment status.

*Obesity:* The outcome variable of interest is obesity, coded as a dichotomous variable. Obesity rates were calculated using self-reported weight and height to calculate the respondent's BMI. Respondents with a BMI of 30 or higher were categorized as obese. Although not used in the analysis, descriptive statistics are also reported on for overweight rates, respondents with BMIs between 25.0 to 29.9 were categorized as overweight (Antecol and Bedard 2006; Flegal 2012).

Table 1 provides descriptive statistics for all measures categorized by nativity and further sub-categorized by language of country of origin (English speaking or non-English speaking) for the foreign and U.S.-born Afro Caribbeans. Tests of significance were ran on all descriptive statistics. The foreign-born have statistically significantly lower rates of obesity than both U.S.-born groups. African Americans are statistically significantly more overweight than U.S.-born Afro Caribbeans, but not more obese. English and non-English origin U.S.-born Caribbeans differed only in age, with those of English-speaking origins being older than those of non-English speaking origin and education, with those of English-speaking origin having greater rates of respondents with less than a high school education. English and non-English speaking foreign-born Afro Caribbeans similarly differed in age, with those of English-speaking origin being older. The English-speaking origin foreign-born also had statistically significantly higher rates of those who migrated at older ages, 35 years or older.

**[Table 1. about here]**

### **Analytical Strategy**

Logit models are used to understand the characteristics most important to obesity outcomes for the pooled sample (Table 2) and ran again for each group in the sample (Table 3). The pooled logit also establishes the presence of better foreign-born obesity outcomes relative to African Americans and U.S.-born Afro-Caribbeans. To better understand mechanisms generating it, a multivariate decomposition is used to decompose observed differences by the contribution of each characteristic and coefficient in the model. The decomposition informs us if the observed difference is associated with variations in group characteristics or variations in group characteristics – the rate of

return on the characteristics. The following decomposition equation (1) is used to estimate differences in the contribution of group characteristics or coefficients to observed differences in outcome Y:

$$Y_A - Y_B = \{F[(X_A\beta_A) - F(X_B\beta_A)]\} + \{F[(X_B\beta_A) - F(X_B\beta_B)]\} \quad (1)$$

Which can be further simplified to:

$$Y_A - Y_B = \{F[\beta_A (X_A - X_B)]\} + \{F[X_B (\beta_A - \beta_B)]\} \quad (2)$$

In the above equation,  $Y_A$  is the observed obesity rate for the comparison group, U.S.-born Afro Caribbeans.  $Y_B$  is the observed obesity rate for the reference group, foreign-born Afro Caribbeans.  $\beta_A$  is a vector of coefficients for U.S.-born Afro Caribbeans,  $X_A - X_B$  is the difference in the observed mean levels of characteristics between U.S. and foreign-born Afro Caribbeans.  $X_B$  is a vector of characteristics for the foreign-born and  $\beta_A - \beta_B$  is the difference in the magnitude of the coefficients between U.S. and foreign-born Afro Caribbeans. The function F is the binary logistic function mapping the characteristics X to the binary obese/non-obese outcome Y.

The  $\{F[\beta_A (X_A - X_B)]\}$  component is the characteristics component and it measures the difference in mean characteristics held constant at the coefficients for U.S.-born Afro Caribbeans. The second component of the equation  $\{F[X_B (\beta_A - \beta_B)]\}$  is the coefficient component and it measures the difference in the outcome linked to differences in coefficients between the groups, held constant at the characteristics of foreign-born Afro-Caribbeans. The decomposition output provides a detailed breakdown of the contribution of each characteristic and coefficient in explaining the between group

difference in the outcome. Results are presented using weighted coefficients and percentages (Powers 2016; Powers, Yoshioka and Yun 2011). Multivariate decomposition is carried out using the `mvdcmp` package in Stata for nonlinear outcomes (Powers 2016; Powers, Yoshioka and Yun 2011).

## **Results**

Table 2 (Model 1) shows a lower foreign-born obesity rate in comparison to African Americans and U.S.-born Afro Caribbeans (analysis not shown). The foreign-born obesity advantage holds and even increases when we add in demographic variables (Model 2). The addition of demographic variables unveils a statistically significant difference between African Americans and U.S.-born Afro-Caribbeans that was not present in Model 1. U.S.-born Afro-Caribbeans have higher obesity rates than African Americans. Model 3 disaggregates the foreign and U.S.-born Afro-Caribbeans further by language of country of origin. The analysis shows that both foreign born from English and non-English origins have lower obesity rates than African Americans. Also it is the U.S.-born with roots from English origin countries that have higher obesity rates than African Americans in Model 3. English and non-English origin U.S.-born Afro-Caribbeans have higher obesity rates than both English and non-English-origin foreign-born (analysis not shown).

The indicator variables that are associated with higher obesity rates for the sample are being a female, married, older, employed. Education reduces obesity outcomes for respondents with some college or a Bachelor's degree or higher. It is important to note that the positive relationship between obesity and employment for the sample is

unexpected. Employment is an aspect of socioeconomic status, similar to education, and as observed elsewhere the relationship between obesity and socioeconomic status is typically inverse (Sobal and Stunkard 1989; Wardle, Waller and Jarvis 2002). The poverty index had the expected negative sign, but did not rise to the level of significance for the collective sample.

**[Table 2 about here]**

Table 3 further explores the patterns observed in the pooled logits in Table 2, by running Model 2 in Table 2 individually for each group in the sample. Table 3 also runs a second separate logit for foreign-born Afro Caribbeans and adds in the age at immigration (Roshania, Narayan and Oza-Frank 2008) to understand how the age of migration impacts obesity for this group. The results for African Americans mirrors the results from the pooled sample with being female, married, older and employed causing higher obesity rates and having some college or a Bachelor's degree or higher decreasing obesity rates relative to those with only a high school degree. Looking across models we see that the unexpected positive relationship between employment and obesity only holds for African Americans, not the other groups. For U.S.-born Afro Caribbeans, being a female and married increase obesity rates. Having some college or a Bachelor's degree or higher similarly negatively impacts obesity, but surprisingly having less than a high school degree also is associated with lower obesity relative to those with a high school degree. Typically, we would expect that greater education, not less education has a negative relationship with obesity. For the foreign-born only income, as measured by the poverty index, is statistically significantly associated with obesity and is in the expected negative direction. Education has no effect on obesity for the foreign born. When the age

at immigration variable is added to the model, a pattern emerges that the older the foreign-born were when they migrated the less obese they are. Interestingly being a woman is only detrimental to obesity outcomes for U.S.-born Blacks, not the foreign-born.

**[Table 3 about here]**

Table 4 further explores the variance in obesity between foreign and U.S.-born Afro Caribbeans. While the first two tables allowed us to look at variations in obesity based on ethnicity and nativity, Table 4 focuses specifically on nativity, controlling for ethnicity through the sample and adding a non-English origins variable to understand the role of language of origin and associated socio-cultural differences. Model 1 shows that nativity status is important in the obesity variance between foreign and U.S.-born Afro Caribbeans. Its importance holds in Model 2 when demographic variables are added. The main effects of non-English origins are not significant in Model 2. Similar to the pooled model (Table 2), in Model 2 being female and married increases the obesity rates for Afro Caribbeans, however again we see the unimportance of education in explaining the variance in outcomes for Afro Caribbeans.

Model 3 interacts nativity with the demographic variables and completely explains the nativity advantage seen in the previous models. Foreign-born Afro-Caribbeans are rewarded for marriage relative to the U.S.-born, they also receive an additional benefit from higher incomes than the U.S.-born. However relative to education the foreign-born are penalized for higher education. Thus the overall main effect of having a Bachelor's degree or higher (a coefficient of -1.276) works in the expected direction for the full sample, but the nativity interactions show that this benefit



is erased for foreign-born Afro Caribbeans and they actually receive a penalty for higher education (interaction coefficient of 1.332). Also, the foreign born from non-English origin countries experience higher BMIs than the U.S.-born with origins in non-English speaking countries.

**[Table 4 about here]**

To further understand the contribution of differences in group characteristics versus how those characteristics work (coefficients), Table 5 provides a non-linear decomposition analysis. The decomposition analysis decomposes the contribution of characteristics versus coefficients in explaining observed between group differences (Powers, Yoshioka and Yun 2011). In Table 5a, foreign-born Caribbeans are the reference group and in Table 5b, U.S.-born Caribbeans are the reference group. Table 5a shows that the differences in obesity outcomes is predominantly driven by differences in coefficients – the rate of return on specific characteristics – with coefficients accounting for 130.1 percent of the variation and characteristics accounting for -30.1 percent, where the summed coefficient and characteristics contribution percentage equals 100 percent.

**[Table 5a and 5b about here]**

A positive coefficient indicates a decrease in the obesity difference and a negative coefficient indicates an increase. In Table 5a, where the foreign-born is the reference group, if the U.S.-born had the same levels of marriage as the foreign-born it would increase the obesity disparity by 39.3 percent. Referring to Table 1, we see that foreign-born Afro Caribbeans have higher levels of marriage than U.S.-born Afro Caribbeans and we know from Tables 3, that being married increases obesity rates for U.S.-born Afro Caribbeans. If the marriage coefficient worked similarly for U.S.-born Afro-Caribbeans

as it did for the foreign-born there would be a decrease in the observed disparity by approximately 83 percent. Recall, from Table 4 the foreign-born receive an additional advantage from being married over the U.S.-born. If the U.S.-born had the same proportion of those with only a high school education as the foreign born it would also increase the obesity disparity. The foreign born have higher levels of persons with only a high school diploma than the U.S.-born (Table 1) and recall the U.S.-born with only a high school diploma have higher obesity rates than those with less than a high school diploma (Table 3). If higher incomes, as indicated by the poverty index, provided the same obesity protection for the U.S.-born as it did for the foreign-born there would be an approximately 60 percent reduction in the disparity. Also, while the main effects of the language of the country of origin was not significant in Table 4, we saw that the interaction effects were (Table 4, Model 3). Similarly, the coefficient of this variable (how the variable works) is important in explaining obesity variations between U.S. and foreign-born Afro Caribbeans. If the language of the country of origin worked the same for the U.S.-born as it did for the foreign-born, it would increase the disparity, causing greater disadvantage for the U.S.-born.

Switching the reference group to U.S.-born Afro Caribbeans in Table 5b, again the obesity disparity is predominantly accounted for by differences in coefficients (105.7%) not characteristics (-5.7%). If foreign-born Afro Caribbeans had the same coefficients of marriage (46.5%), high school education (25%) and poverty index (72%) as U.S.-born Afro Caribbeans, the disparity would increase by a combined percentage of approximately 144 percent. However, if the foreign-born had the same coefficient for the language of the country of origin as the U.S.-born, it would decrease the disparity by

approximately 19 percent. Overall the decomposition analysis compliments Model 3 in Table 4 – indicating that it is the rate of return on characteristics that is driving the better foreign-born obesity outcomes. The decomposition gives us a better understanding of the magnitude of the contribution of coefficients collectively to the foreign-born advantage and by each individual coefficient in the model.

## **Discussion**

Previous studies documented the existence of better foreign-born Black obesity outcomes relative to the U.S.-born (Antecol and Bedard 2006; Kaushal 2009; Park et al 2009). This study confirms this pattern and extends the robustness of the finding by matching the foreign and U.S.-born on race and ethnicity and further disaggregating by language of country of origin. Results show that even when matched on ethnicity, foreign born Blacks continue to have lower obesity prevalence rates than U.S.-born Blacks of the same ethnicity (Table 2). Additionally, the foreign-born Black obesity advantage is maintained both for English and non-English speaking origin foreign-born. U.S.-born Afro Caribbeans had higher rates of obesity than African Americans.

Previous studies found that first generation immigrants had better obesity outcomes than third generation or higher, but not always with the second generation. This study matches the first and subsequent generations on both race and ethnicity to produce a more accurate U.S.-born intergenerational comparator. Findings show that the first generation did have better obesity outcomes than subsequent generations. However, to describe the observed obesity patterns of U.S.-born Afro Caribbeans as intergenerational assimilation would be an understatement. Immigrant assimilation theory

states that the health outcomes of immigrants declines and converges with the U.S.-born. We do document an intergenerational decline in obesity outcomes for Afro-Caribbeans, but instead of converging with African Americans they have worse outcomes. This is not quite assimilation; it instead presents an additional health disadvantage for this group that surpasses the existing health disadvantage of African Americans. Also attention should be made in over interpreting results from any cross sectional study as indication of assimilation as assimilation patterns are best if observed longitudinally or using synthetic cohort models (Park et al. 2009). In the case of multiple generations, the ideal comparison would be to the cohorts of children born to the observed foreign-born groups. In this study, based on a single cross section, the U.S.-born group was born to earlier foreign-born cohorts.

Cultural explanations of the immigrant paradox posit that culture is the protective mechanism that produces better foreign-born health outcomes. There are a number of concerns with the use of culture as an explanation of better health for racial and ethnic minority groups (Zambrana and Carter-Pokras 2010), but these results elude to a closer review of such an explanation for foreign-born and U.S.-born Afro Caribbeans. Although ethnicity and culture are not the same constructs, ethnicity suggests some similarities in culture. However, U.S.-born Afro-Caribbeans who share a similar ethnicity as the foreign-born, fared worse in their outcomes than African Americans. Thus ethnicity offered them no protection. Reasons for this may be linked to social identity processes for U.S.-born Caribbeans. They are often caught in between two worlds and face conflict with competing ethnic and racial identities (Waters 1999; Kasinitz et al. 2008; Rumbaut 1994). We know that second generation Afro-Caribbeans experience some of the same

psychological processes linked to race, such as stereotype threat (Deaux et al. 2007), but that they are under increased pressure by parents to disassociate from African Americans (Waters 1999). Such experiences can produce additional stress which encourage habits which are detrimental to obesity outcomes.

One final important contribution of this paper is the inquiry into the mechanisms that explain the better foreign-born Black obesity advantage. Nativity was an important factor in differentiating obesity outcomes between foreign and U.S.-born Afro Caribbeans (Table 4), however it was how nativity interacted with demographic characteristics that explained the better foreign-born obesity advantage. The foreign-born receive a better rate of return for similar characteristics than the U.S.-born. The interactions in Table 3, Model 3, completely suppressed the explanatory power of immigrant status. The decomposition analysis (Table 5) reconfirmed the interaction results, showing concretely that it was a difference in coefficients that drove the better foreign-born obesity outcomes. The immigrant characteristics translate into better health outcomes in more favorable ways than for the U.S.-born. This finding is potentially informative about the overall Black obesity disparity in the U.S. and merits additional investigation. A difference in the rate of return for similar characteristics potentially points to structural disparities in what characteristics “purchase” for each group in the way of health benefits. The findings suggest that Black immigrants are rewarded more favorably for their characteristics than U.S.-born Blacks, which is not inconsistent with the documented variance in social experiences for U.S. and foreign-born Blacks (Kasinitz et al. 2008; Waters 1999).

There are several limitations of this study. One is that the size of the U.S.-born Afro Caribbean sample (n=315) is relatively small in comparison to African Americans (n=2,176) and foreign-born Afro Caribbeans (n=979). This may impact the power of the analysis. Furthermore, the U.S.-born Afro Caribbean sample is composed of a mix of second (81%) and third generation immigrants, which does not make the intergenerational comparisons as concise as they could be if the generations were separated. However, due to already small sample sizes for this group the decision was made to keep the two generations combined. Also, we know that women demonstrate different obesity patterns than men. This analysis pools together men and women into the same logit models, potentially missing some of the nuance of the patterns if the results were disaggregated by gender.

**Table and Figures**

**Table 1 (Chapter 3).** Weighted Descriptive Statistics for African American, U.S-born Caribbean and Foreign-born Caribbean Black Adults

	<u>African Americans</u>	<u>U.S.-born Caribbean Blacks</u>				<u>Foreign-born Caribbean Blacks</u>		
	All	All	English Speaking Origins	Non-English Speaking Origins	All	English Speaking Origins	Non-English Speaking Origins	
Obesity	0.37 <sup>a</sup>	0.41 <sup>a</sup>	0.41 <sup>m</sup>	0.44	0.18	0.17	0.23	
Married	0.45 <sup>a,f</sup>	0.34 <sup>b</sup>	0.30 <sup>n</sup>	0.48	0.57	0.58	0.54	
Age	42.61 <sup>d</sup>	35.10 <sup>a</sup>	37.13 <sup>n</sup>	26.89 <sup>j,q</sup>	42.68	43.40	39.04 <sup>g</sup>	
<i>Education</i>								
< High School	0.23	0.17	0.19	0.07 <sup>k</sup>	0.21	0.21	0.19	
High School	0.39 <sup>e</sup>	0.26	0.27	0.24	0.33	0.33	0.35	
Some College	0.23	0.34	0.31	0.50	0.26	0.26	0.28	
Bachelors or higher	0.15	0.23	0.24	0.19	0.20	0.20	0.18	
F-Statistic for Education African Americans and all U.S.-born Afro Caribbeans	p<.05							
Employed	0.69 <sup>b</sup>	0.78	0.76	0.84	0.79	0.79	0.78	
Poverty Index (0-17)	2.75	3.96	3.76	4.75	3.09	3.21	2.51	
Any children in the home	0.57 <sup>e</sup>	0.32 <sup>c</sup>	0.31	0.37 <sup>s</sup>	0.58	0.57	0.59	
<i>Age at immigration</i>								
12 years or less					0.18	0.18	0.17	
13-17 years					0.15	0.14	0.17	
18-34 years					0.47	0.45	0.56	
35+ years					0.20	0.22	0.09 <sup>g</sup>	
Observations	2,176	315	230	85	979	742	237	

significantly different: a - from FB p<.001; b - from FB p<.01; c - from FB p<.05; d - from USB Carib. p<.001; e - from USB Carib. p<.01;

f - from USB Carib.  $p < .05$ ; g - from Eng. FB  $p < .05$ ; j- from Eng. USB Carib.  $p < .001$ ; k- from Eng. USB Carib.  $p < .01$



**Table 2 (Chapter 3).** Pooled Logit model of obesity, African American, U.S.-born and foreign-born Afro Caribbean Adults

	Model 1	Model 2	Model 3
<i>(Ref: African Americans)</i>			
U.S.-born Afro Caribbeans	0.173 <sup>a</sup> (0.141)	0.408* <sup>a</sup> (0.174)	
Foreign-born Afro Caribbeans	-1.006*** (0.111)	-1.034*** (0.104)	
Non-English Foreign-Born			-0.494* (0.216)
English Foreign-born			1.123*** (0.152)
Non-English U.S.-born			0.487 (0.578)
English U.S.-born			0.389* (0.192)
Female		0.517*** (0.080)	0.516*** (0.080)
Married		0.346** (0.107)	0.346** (0.107)
Age		0.011* (0.004)	0.011* (0.004)
<i>Education (Ref: High School)</i>			
< High School		-0.018 (0.145)	-0.020 (0.145)
Some College		-0.275* (0.135)	-0.279* (0.135)
Bachelors+		-0.525** (0.171)	-0.529** (0.171)
Employed		0.226* (0.091)	0.228* (0.090)
Poverty Index		-0.195 (-.300)	-0.197 (-.300)
Any children in home		0.078 (0.045)	0.077 (0.045)
Constant	-0.516*** (0.053)	-1.427*** (0.252)	1.426*** (0.253)
Observations	3,470	3,470	3,470

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

a: statistically different from foreign-born

**Table 3 (Chapter 3).** Logit of obesity by group - African American, U.S.-born and Foreign-born Afro Caribbean Adults

	African Americans	U.S.-born Afro Caribbeans	Foreign-born Afro Caribbeans	Foreign-born Afro Caribbeans w/ age at immigration
Female	0.510*** (0.085)	0.665* (0.263)	0.543 (0.434)	0.645 (0.428)
Married	0.321** (0.112)	1.759** (0.479)	0.185 (0.319)	0.390 (0.329)
Age	0.011* (0.004)	-0.008 (0.009)	0.001 (0.005)	0.025* (0.011)
<i>Education (Ref: High School)</i>				
< High School	0.003 (0.154)	-1.614*** (0.368)	0.090 (0.394)	0.187 (0.370)
Some College	-0.302* (0.142)	-1.103* (0.453)	0.356 (0.761)	0.121 (0.591)
Bachelors+	-0.546** (0.185)	-1.214** (0.425)	0.075 (0.383)	-0.014 (0.308)
Employed	0.241* (0.097)	0.663 (0.325)	-0.047 (0.288)	0.029 (0.276)
Poverty Index	-.211 (.320)	.829 (.700)	-1.28* (.552)	-1.58* (.626)
Any children in home	0.082 (0.047)	0.066 (0.165)	0.045 (0.073)	-0.033 (0.072)
<i>Age at Immigration (Ref: 12 years or &lt;)</i>				
13-17 years				-0.950* (0.449)
18-34 years				-1.124** (0.332)
35+ years				-2.143** (0.598)
Constant	-1.445*** (0.271)	-1.028 (0.498)	-1.741*** (0.443)	-1.752** (0.491)
Observations	2,176	315	979	979

Standard errors in bold. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Ref: High School; <12 years at immigration

**Table 4 (Chapter 3).** Logit of obesity- U.S. and Foreign-born Afro Caribbean Adults

	Model 1	Model 2	Model 3
Immigrant	-1.179*** (0.170)	-1.395*** (0.175)	-1.106 (0.683)
Female		0.615* (0.292)	0.791** (0.270)
Married		0.725** (0.240)	1.857*** (0.474)
Age		0.003 (0.006)	-0.014 (0.010)
<i>Education (Ref: High School)</i>			
< High School		-0.431 (0.314)	-1.694*** (0.366)
Some College		-0.019 (0.510)	-1.179* (0.450)
Bachelors+		-0.278 (0.351)	-1.276** (0.431)
Employed		0.149 (0.209)	0.712* (0.322)
Poverty Index		-0.001 (0.005)	0.010 (0.007)
Any Children in the Home		0.029 (0.067)	0.060 (0.164)
Non-English Origins		0.222 (0.380)	-0.713 (0.470)

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Ref: High School

**Table 4 (Continued – Chapter 3).** Logit of obesity- U.S. and Foreign-born Afro Caribbean Adults

	Model 1	Model 2	Model 3
<i>Immigrant Interactions</i>			
Immigrant x female			-0.212 (0.457)
Immigrant x Married			-1.664* (0.605)
Immigrant x Age			0.017 (0.009)
Immigrant x < High School			1.787** (0.513)
Immigrant x Some College			1.538 (0.994)
Immigrant x Bachelors+			1.332* (0.534)
Immigrant x Employed			-0.743 (0.430)
Immigrant x Poverty Index			-0.022* (0.008)
Immigrant x Any Children			-0.013 (0.181)
Immigrant x Non-English Origins			1.146* (0.542)
Constant	-0.343* (0.131)	-1.024** (0.309)	-0.823 (0.518)
Observations	1,294	1,294	1,294

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05. Ref: Education: High School

**Table 5a (Chapter 3).** Decompositions of differences in obesity between U.S. and Foreign-born Afro Caribbeans (Foreign-born Caribbean as Reference Group)

Variables	Foreign (R) and U.S.-born Caribbeans			
	Characteristics		Coefficients	
	Coefficient	Percent	Coefficient	Percent
Female	0.0057	2.4	0.0210	8.9
Married	<b>-0.0926</b>	<b>-39.3</b>	<b>0.1955</b>	<b>82.9</b>
Age	0.0230	9.8	-0.1481	-62.8
< High School education	0.0062	2.6	-0.0270	-11.4
High School education	<b>-0.0162</b>	<b>-6.9</b>	<b>0.0798</b>	<b>33.8</b>
Some College	-0.0026	-1.1	-0.0201	-8.5
Bachelors or higher	-0.0017	-0.7	-0.0068	-2.9
Employed	-0.0023	-1.0	0.1210	51.3
Poverty Index	0.0183	7.8	<b>0.1404</b>	<b>59.5</b>
Children in Household	-0.0033	-1.4	0.0015	0.6
Non-English Speaking Origin	-0.0055	-2.3	<b>-0.0383</b>	<b>-16.3</b>
Constant			-0.0121	-5.1
Total	-0.0709	-30.1	0.3068	130.1

**Note:** Bold indicates statistically significant values.

**Table 5b (Chapter 3).** Decomposition of difference in obesity between U.S. and Foreign-born Afro Caribbeans (U.S.-born Caribbean as Reference Group)

Variables	U.S. (R) and Foreign-born Caribbeans			
	Characteristics		Coefficients	
	Coefficient	Percent	Coefficient	Percent
Female	<b>-0.0022</b>	<b>0.9</b>	-0.0212	9.0
Married	0.0050	-2.1	<b>-0.1098</b>	<b>46.5</b>
Age	0.0023	-1.0	0.1150	-48.8
< High School education	-0.0002	0.1	0.0202	-8.6
High School education	-0.0010	0.4	<b>-0.0590</b>	<b>25.0</b>
Some College	-0.0022	0.9	0.0251	-10.6
Bachelors or higher	0.0003	-0.1	0.0075	-3.2
Employed	-0.0001	0.0	-0.1121	47.5
Poverty Index	0.0118	-5.0	<b>-0.1697</b>	<b>72.0</b>
Children in Household	0.0014	-0.6	-0.0008	0.3
Non-English Speaking Origin	-0.0017	0.7	<b>0.0442</b>	<b>-18.8</b>
Constant			0.0114	-4.8
Total	0.0134	-5.7	-0.2492	105.7

**Note:** Bold indicates statistically significant values.

## Chapter 4: Neighborhoods, Discrimination and Depression among U.S. and Foreign-born Blacks (Paper 3)

### **Abstract**

Relatively little is known about the intergenerational mental health assimilation patterns of foreign-born Blacks. To provide an intergenerational analysis of depression outcomes this paper matches first generation foreign-born and subsequent generation U.S.-born Blacks on ethnicity. The study uses a sample of first generation foreign-born Afro Caribbean, subsequent generation U.S.-born Afro Caribbean, and African American men and women and focuses on depressive symptoms (CES-D) and major depressive disorder (DSM-IV) as the mental health outcomes of interest. Informed by the stress process model, this study focuses on perceived neighborhood crime and perceived discrimination as key explanatory variables. Foreign-born Afro Caribbeans have lower depressive symptoms than African Americans, which is partially explained by perceived discrimination. Notably, Black women are more disadvantaged in their depressive symptom outcomes by perceived discrimination than Black men. Foreign-born Afro Caribbeans have lower rates of depressive disorder than both U.S.-born Afro Caribbeans and African Americans. However, U.S.-born Afro Caribbeans have higher rates of depressive disorder than African Americans. Perceived discrimination is also informative in partially explaining this variation.

## **Literature Review**

There is limited research on the intergenerational health assimilation patterns of first (foreign-born) and subsequent generation (U.S.-born) immigrant Blacks. Generally, foreign-born Blacks have better mental health outcomes than U.S.-born Blacks (Miranda et al. 2005; Williams et al. 2007a). When foreign and U.S.-born Blacks are matched on ethnicity, U.S.-born Afro Caribbeans have worse depression outcomes than foreign-born Afro Caribbeans and African Americans (Brewton-Tiayon et al. 2015; Williams et al. 2007b). The mental health status decline between foreign-born Afro-Caribbeans and U.S.-born Afro Caribbeans, the children and grandchildren of first generation Afro Caribbeans (Jackson et al. 2004), is not fully understood. Also, the extent to which this pattern will hold when taking into consideration more diverse indicator variables is unknown.

The immigrant paradox theory (Palloni and Arias 2004; Rumbaut 1997) and immigrant health assimilation (Harker 2001) theories are the predominant theoretical perspectives in the immigrant health disparities literature. Immigrant paradox theory states that the foreign-born will have better health outcomes than the U.S.-born, even if they have worse sociodemographic characteristics (Dey and Lucas 2006; McDonald and Kennedy 2004; Palloni and Arias 2004). The comparison of health outcomes relative to the sociodemographic characteristics formulates the bases of the paradox, because of the known relationship between socioeconomic status (SES) and health (Williams and Collins 1995). It is not anticipated that those with worse SES would fare better in their health outcomes – hence the paradoxical component of the theory. Immigrant health assimilation theory posits that the foreign-born health advantage declines over time,

eventually converging with the U.S.-born (Antecol and Bedard 2006). Immigrant health assimilation can happen both with respect to the first generation relative to the U.S.-born generally (Park et al. 2009) or intergenerationally (Harker 2001), between the first generation and second and third generations.

This paper takes inspiration from the stress process model to provide guidance on important factors that can help explain variations in mental health outcomes for foreign and U.S.-born Blacks. The stress process model, is a prominent social psychological model of mental health that demonstrates the relationship between an individual's social and economic statuses and their resulting mental health outcomes. Social and economic statuses influence the neighborhoods individuals live in, the related stressors they are exposed to and the support available to them to mediate stressors. Collectively these factors combine to influence mental health outcomes (Pearlin 1999).

Taking guidance from the stress process model, this paper assesses neighborhood effects and discrimination as explanatory pathways to understand variances in depression outcomes between foreign and foreign and U.S.-born Blacks and African Americans. In the stress process model, neighborhoods serve as a sorting mechanism for both the types of stressors and individual is exposed to and the resources available to them to buffer those stressors (Brown et al. 2000; Karlsen and Nazroo 2002; Pearlin 1999).

Discrimination functions as a primary stressor in the stress process model, potentially causing adverse mental health outcomes (Brown et al. 2000; Williams, Neighbors and Jackson 2003). Specifically, this study uses perceived discrimination and perceived neighborhood crime.



## **Depression Patterns for U.S. and Foreign Born Blacks**

In line with the interests of this paper, this section will discuss the literature on Black mental health as it relates to patterns by ethnicity, nativity and immigrant generation. Ethnic patterns show that Afro-Caribbeans (10%), irrespective of nativity, have higher prevalence rates of 12-month major depressive episode than African Americans (7%) (Williams et al. 2007a; Williams et al. 2007b). Afro-Caribbean males are more than twice as likely to suffer from 12-month mood disorders than African American males (Williams et al. 2007a). Furthermore, Afro Caribbean men from the French-speaking Caribbean are much less likely (OR=0.13) than Afro Caribbean men from the English-speaking Caribbean to have 12-month mood disorders (Williams et al. 2007a).

Looking at both ethnicity and nativity further elucidates mental health patterns among foreign and U.S.-born Blacks. Overall, foreign-born Blacks have better mental health than U.S.-born Blacks, reporting lower levels of psychological distress (Dey and Lucas 2006). Restricting the sample to respondents from a potentially high stress environment – low income communities (Miranda et al. 2005), researchers found that women U.S.-born Black women had odds of probable depression that were 2.94 times greater than African-born women and 2.49 times greater than Caribbean-born women providing support for a positive immigrant effect irrespective of the country of origin. The literature is consistent with previous research indicating that the foreign-born Black mental health advantage holds across ethnic variations of the U.S.-born, specifically foreign-born Blacks have better mental health outcomes than U.S.-born African Americans and U.S.-born Afro Caribbeans (Brewton-Tiayon et al. 2005; Miranda et al.

2005; Jackson and Antonucci 2005; Williams 2007). Not only do U.S.-born Afro-Caribbeans have higher rates of depressive disorder and depressive symptoms and 12 month mood disorders than foreign-born Afro Caribbeans; they also have higher rates than African Americans (Brewton-Tiayon et al. 2015; Williams 2007b).

The better foreign-born depression relative to both African American and Afro Caribbean U.S.-born Blacks is most stable prior to the late life period of the adult life course (age 65 or older), after which prevalence rates tend to converge (Brewton-Tiayon et al. 2015). Disaggregation of the depressive symptom patterns however suggests that the U.S.-born Caribbean depression burden is carried primarily by U.S.-born Caribbean men, not the women (Brewton-Tiayon et al. 2015)<sup>6</sup>. When looking at depressive symptom profiles, African Americans and U.S.-born Afro-Caribbeans are more likely to have high depressive symptoms than foreign-born Afro Caribbeans (Lincoln et al. 2007).

Generational trends show that second and third generation Afro-Caribbeans report higher mental health disorder rates than first generation Afro Caribbeans (Jackson and Antonucci 2005; Williams et al. 2007a, Williams et al. 2007b). The third generation reports higher mental health disorder rates than the second generation (Jackson and Antonucci 2005). Thus, there is a monotonic relationship in mental health vulnerability with increased immigrant generation for Afro Caribbeans.

It is important to note that Foreign-born Black mental health patterns vary based on the age of immigration and duration to the U.S. Depressive outcomes are likely to increase with increased duration in the U.S. (Lincoln et al. 2007; Miranda et al. 2005;

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<sup>6</sup> Scholars should take care however, not to over interpret this analysis as it only controlled for a limited number of demographic factors (ethnicity, age at arrival and sex).

Williams et al 2007a) and for those who migrated at younger ages (Jackson and Antonnuci 2005). Foreign-born Afro-Caribbeans residing in the U.S. for less than 10 years demonstrate lower depressive symptoms than those residing in the U.S. longer (Lincoln et al. 2007). Foreign-born who migrated at younger ages report higher 12 month major depressive disorder prevalence rates across durational categories (Jackson and Antonnuci 2005). Known demographic factors that impact depressive outcomes for U.S. and foreign-born Blacks include SES, age and emotional support. These variables reflect an inverse relationship with depression, meaning an increase in the level of these factors is characterized by a decrease in depressive outcomes (Jackson and Antonnuci 2005; Lincoln et al. 2007).

### **Neighborhoods and Mental Health**

Neighborhoods can matter for the mental health outcomes of Blacks from both an objective and subjective perspective. Objective assessments can relate to the availability of community resources, crime rates or quality of the homes and buildings in the neighborhood (Evans et al. 2000; Kruger, Reischl and Gee 2007). Subjective assessments are a combination of personal expectations, comparisons to similarly positioned others and objective observations (Milkie 1999). For mental health, subjective measures, which can be thought of as the interpretation of the objective environment, may be more meaningful than objective measures (Adler et al. 2000; Aneshensel and Sucoff 1996).

### **Neighborhoods as a Source of Resources and Stressors**

When considering the role of neighborhoods as a source of resources and stressors for Blacks, racial residential segregation emerges as particularly relevant (Williams and Collins 2001). U.S.-born African Americans experience a high degree of racial residential

segregation, across the SES spectrum (Iceland and Wilkes 2006; Lacy 2007; Massey and Denton 1993). Lower SES African Americans often experience hyper segregation, living in communities not only lacking racial diversity, but also devoid of resources and economic opportunities (Massey and Denton 1993; Tigges, Browne and Green 1998). Such neighborhoods reflect a “geographic accumulation of disadvantage” (Acevedo-Garcia et al. 2008:322). Although Black immigrants’ incomes are higher on average than African Americans, they do not fare better in terms of neighborhoods, experiencing similarly high levels of racial residential segregation from Whites. The neighborhoods where Blacks live are primarily ethnically homogenous with Blacks living in communities with their co-ethnic peers (Logan and Deane 2003).

Racial, residential segregation is important for mental health, because it impacts the resources available in neighborhoods, both from neighbors and within the community (Acevedo-Garcia and Osypuk 2008; Williams and Collins 2001). Neighborhoods provide a key outlet for social support and tangible resources which can positively impact mental health outcomes (Pearlin 1999). Across SES, predominantly White neighborhoods typically have more resources than similarly socioeconomically situated Black neighborhoods (Pattillo 2005; Tigges, Browne and Green 1998). Middle-class Blacks live in neighborhoods that, on average, are poorer than middle-class White neighborhoods, have fewer college-educated persons and less homeownership (Massey and Denton 1993; Pattillo 2005). They also find themselves disadvantaged in the area of community resources relative to Whites. For example, middle-class Blacks living in predominantly Black neighborhoods and in predominantly Black municipalities find that their schools

are underperforming, political influence lacking, and sometimes that their community's relationship with the police is tenuous (Lacy 2007; Pattillo 2005).

The racial and socioeconomic homogeneity of neighborhoods interact to produce different landscapes of neighborhood stressors. Neighborhoods that are both predominantly Black and low SES find themselves in the worst position, living in communities with elevated stressors. For example, such neighborhoods report higher levels of crime (Hipp 2007; Krivo and Peterson 1996). Thus neighborhoods are a source of resources and can function as a form of social support, but they are also a source of stressors, more specifically, and the focus of this paper, impacting residents' exposure and experiences with crime.

#### *Neighborhood Perception of Crime*

Research suggests that the perception of neighborhood crime is a mediator for objective measures of neighborhood quality (such as graffiti on walls, abandoned buildings and witnessing actual crimes) and depression (Kruger, Reischl and Gee 2007). Some studies show that the neighborhood SES and health relationship is completely mediated by perceived neighborhood disorder (Ross 2000; Ross and Mirowsky 2001). Perception of neighborhood crime increases depression prevalence (Stafford, Chandola and Marmot 2007). The effect of the perception of neighborhood crime on depression is sometimes stronger than objective measures of crime (Hadley-Ives et al. 2000).

Persons living in lower SES neighborhoods generally perceive greater crime than those of higher SES neighborhoods, resulting in higher levels of mental health disorders (Aneshensel and Sucoff 1996). Residents in neighborhoods with a higher percentage of Black men perceive higher rates of crime as well (Quillian and Pager 2001). It is well

noted that persons living in lower SES neighborhoods typically report higher rates of depression (Cutrona et al. 2005; Ross 2000; Silver, Mulvey and Swanson 2002).

Perception of crime is inversely related to other coping mechanisms of stress such as exercise or participation in social activities in the neighborhood. Residents who perceive their neighborhood to have a high level of crime are less likely to venture out to exercise or to participate in community events (Stafford et al. 2007; Kruger et al. 2007). The perception of neighborhood crime is influenced by both race and SES and has a demonstrated impact on depression.

Second and third generation Afro-Caribbeans typically grow up in neighborhoods with a higher median house hold income (Logan and Deane 2003) and more favorable neighborhood characteristics such as lower percentage of female headed households and lower rates of high school dropouts (Kasinitz et al. 2008) than African Americans. However, despite the better neighborhood characteristics and the ethnic racial residential segregation among Blacks (Logan and Deane 2003), Afro-Caribbeans still live in neighborhoods in close proximity to other African Americans and must contend with some of the same deleterious effects of living in a less advantaged neighborhood.

### **Discrimination and Mental Health**

Another mechanism that may help explain differences in health across different groups of blacks is perceived discrimination. Perceived discrimination generally and perceived racial discrimination more specifically are significant predictors of psychological distress and depression among Blacks (Brown et al. 2000; Karlsen and Nazroo 2002; Schulz et al. 2006; Williams, Neighbors and Jackson 2003). Among racial groups Blacks are least likely to report that they have never experienced discrimination

and most likely to report that they have experienced discrimination (Kessler, Mickelson and Williams 1999). Perceived discrimination operates as a mental health stressor negatively impacting mental health outcomes (Kessler, Mickelson and Williams 1999; Williams and Mohammed 2009). Perceived racial discrimination is a more harmful stressor than perceived non-racial discrimination (Chae, Lincoln and Jackson 2011), accounting for 15 percent of the total variance of psychiatric symptoms and total lifetime experiences with racial discrimination accounting for 13.8 percent of somatic symptoms (Klonoff, Landrine and Ullman 1999).

According to one important qualitative study, foreign-born Blacks mention racial discrimination as a barrier less often than African-Americans (Waters 1999). Among Black immigrants, there are generational variations in both experiences with and the impact of racial discrimination. Second generation Black immigrants typically report more experiences with discrimination than their first generation parents (Butterfield 2004; Kasinitz et al. 2008; Waters 1999) and are impacted by similar psychological processes associated with racial stereotypes about Blacks (i.e. stereotype threat) as African Americans (Deaux et al. 2007). Research suggests there is no marked ethnic variation in reports of experiences with racial discrimination for African Americans and Caribbean Blacks (Lincoln et al. 2007; Seaton et al. 2008), but these patterns do not take into consideration differences in nativity.

For U.S. and foreign-born Caribbean Blacks and African Americans, there is a relationship between greater racial discrimination and lower psychological well-being and depressive symptoms (Gee et al. 2006; Lincoln et al. 2007). Findings for foreign-born Blacks report that those who recall three or more experiences with racial

discrimination increase depressive symptoms threefold as compared to those with no reported experiences (Krieger et al. 2011). In a study of adolescents, Seaton and colleagues found that perceived discrimination appears to have a comparatively greater impact on depression outcomes for Blacks of Caribbean ethnicity than African-Americans. Reasons suggested for this pattern were the negative relationship between perceived discrimination and self-esteem and perceived discrimination and life satisfaction (Seaton et al. 2008).

### **Other Key Social Statuses: SES Status**

The stress process model posits that our social status characteristics are vital in understanding how stressors may differentially affect outcomes (Pearlin 1999). Two key characteristics examined in this chapter are SES and Gender. First, there is a known link between SES and mental health. Research shows that mental health outcomes are more deleterious for persons of low SES than for persons of high SES (Kessler and Cleary 1980; Kessler and Neighbors 1986; Williams and Collins 1995). SES is important in the stress process model and segmented assimilation theory, serving as a selecting mechanism for the neighborhoods where individuals reside. Race and SES interact in important ways, impacting the health outcomes for Blacks (Williams and Collins 1995). For example, Neighborhood of residence is driven by SES and race for Blacks, resulting in Blacks along the socioeconomic spectrum living in qualitatively less advantageous neighborhoods than Whites of similar socioeconomic backgrounds (Massey and Denton 1993; Lacy 2007). Although foreign-born Blacks have a higher SES than African Americans, they do not always fare better in the neighborhoods they are selected into



(Logan and Deane 2003). Thus a deeper interrogation of SES as it relates to the two variables of interest – perceived discrimination and neighborhood crime is merited.

### **Other Key Social Statuses: Gender**

Gender is another important social status characteristic in the analysis of Black mental health processes. There is a gendered pattern in the U.S.-born Caribbean Black mental health vulnerability, where the more disadvantageous U.S.-born Caribbean Black mental health outcomes are primarily a result of the higher prevalence rates of the men, not the women (Brewton-Tiayon et al. 2015). For African-American women, neighborhood poverty and delinquency are known sources of mental health stressors (Cutrona, Wallace and Wessner 2006). More generally, we know that fear of crime is greater for women than for men (Stafford, Chandola and Marmot 2007). Also, men's experience with discrimination is qualitatively different than women's (Kessler, Mickelson and Williams 1999). Thus understanding how the key indicators of neighborhoods and discrimination differ for women in comparison to men may be an important key to the analysis.

In summary, there are two key patterns in the U.S. and foreign-born Black mental health literature – foreign-born Blacks have better mental health outcomes than U.S.-born Blacks, and U.S.-born Afro Caribbeans have worse mental health outcomes than foreign-born Afro Caribbeans and African Americans. The reasons for both of these observed patterns are not fully understood. The stress process model suggests that neighborhoods and discrimination might be important and also highlights the importance of key social statuses in mental health outcomes. We know a great deal about how perceived discrimination impacts the mental health of Blacks broadly (Brown et al. 2000; Karlsen

and Nazroo 2002; Schulz et al. 2006; Williams et al. 2003), and Asian and Hispanic immigrants specifically (Finch, Kolody and Vega 2000; Mossakowski 2003; Noh et al. 1999; Yip, Gee and Takeuchi 2008), but we know very little about how perceived discrimination impacts the mental health of foreign-born Blacks (Gee et al. 2006; Krieger et al. 2011; Lincoln et al. 2007). This paper expands our knowledge in this area. We know even less about the role of neighborhoods on variances in mental health outcomes for U.S. and foreign-born Blacks. Using a sample of African Americans and foreign and U.S.-born Afro Caribbean men and women this paper answers the following question: 1) What is the role of perceived discrimination and perceived neighborhood crime in explaining observed differences in depression among different groups of blacks? 2) Does discrimination and crime link to depression differently for highly versus less highly educated blacks or for women versus men?

## **Methods**

### *Sample*

The National Survey of American Life (NSAL) is a comprehensive study of the mental health of Black Americans (Jackson et al. 2004). The study, conducted between February 2001 and June 2003, is part of an NIMH Collaborative Psychiatric Epidemiology Surveys (CPES) initiative. The NSAL adult sample is an integrated national household probability sample of 3,570 African Americans, 1,438 blacks of Afro-Caribbean descent (Caribbean Blacks), and 891 non-Hispanic whites living in areas where at least 10 percent of the population is black, all age 18 and over (Jackson et al., 2004). In both the African American and Caribbean Black samples, it was necessary for respondents to self-identify as Black. Those self-identifying as Black were included in the Caribbean Black sample if they answered affirmatively when asked if they were of

West Indian or Caribbean descent or if they said they were from a country included on a list of Caribbean area countries provided by the interviewers. The NSAL is weighted to correct for disproportionate sampling, non-response, and to provide representation across various demographic characteristics in the coterminous states. The analyses of this paper include all NSAL African American and U.S. and foreign-born Caribbean Black respondents who had a response for all key variables. This resulted in an analytical sample of 2,771 African Americans, 305 U.S.-born Caribbean Blacks and 775 foreign-born (first generation) Afro Caribbean. The U.S.-born Afro Caribbean sample are the offspring of foreign-born parents – second-generation immigrants – or the grandchildren of foreign-born grandparents – third generation immigrants. Thus throughout the paper the U.S.-born Afro Caribbeans will also be referred to as the second and third generation. Most interviews were conducted face-to-face using a computer-assisted instrument and lasted an average of two hours and twenty minutes. Interviewers were matched on the race of the respondent.

Table 1 provides the descriptive statistics for African American, U.S.-born Afro-Caribbean and foreign-born Afro Caribbean men and women. U.S.-born Afro-Caribbeans (13%) have depressive disorder rates more than double African Americans (5%) and foreign-born Afro Caribbeans (5%). U.S.-born Afro Caribbeans have a lower marital rate (37%) than African Americans (43%) and foreign-born Afro Caribbeans (59%). However, this may be due to their comparatively younger ages. The mean age for U.S.-born Caribbeans in the sample is 36 years, compared to 41 years for African Americans and 42 years for foreign-born Afro Caribbeans. African Americans have the highest percentage of persons with less than a high school education at 22 percent, statistically

significantly higher than the foreign-born. They also have the lowest percentage of persons with a Bachelor's or higher (14%), again statistically significantly different from the foreign-born. Focusing on the key variables of interest for the study, U.S.-born Afro-Caribbeans have higher levels of perceived discrimination and neighborhood crime than the foreign-born.

**[Table 1 about here]**

### *Measures*

The outcome measures of interest are depressive symptoms and major depressive disorder. Depressive symptoms were assessed using the 12-item version of the Center for Epidemiological Studies-Depression scale (CES-D). This abbreviated CES-D has been found to have acceptable reliability and a similar factor structure compared to the original version. Item responses are coded 1 ("hardly ever") to 3 ("most of the time"). These 12 items measure the extent to which respondents: had trouble keeping their mind on tasks, enjoyed life, had crying spells, could not get going, felt depressed, hopeful, restless, happy, as good as other people, that everything was an effort, that people were unfriendly, and that people dislike them in the past 30 days. Positive valence items were reverse coded and summed resulting in a continuous measure; a high score indicates a greater number of depressive symptoms (Cronbach's alpha = 0.77).

The second outcome measure of interest is 12-month Major Depressive Disorder. Major depressive disorder was assessed using the DSM-IV criterion. The *DSM-IV* criterion for major depressive disorder requires the presence of one or more major depressive episodes (MDE) – the presence of depressive symptoms, including either depressed mood and/or loss of interest or pleasure, lasting two weeks or longer, most of

the day, nearly every day, as well as clinically significant distress or impairment - without a history of manic, mixed or hypo-manic episodes. The depressive episode must not be due to the direct physiological effects of a drug of abuse, a medication, or toxic exposure, nor better accounted for by Schizophrenia or another psychotic disorder.

The key independent variables of interest are neighborhood perception of crime and perceived discrimination. Neighborhood perception of crime is a composite measure based on the following two questions – 1) How often are there problems with muggings, burglaries, assaults or anything else like that in your neighborhood? Would you say these things happen very often in your neighborhood, fairly often, not too often, hardly ever or never? 2) How much of a problem is the selling and use of drugs in your neighborhood? Would you say it is a very serious problem, fairly serious, not too serious or not serious at all? Responses to the two questions were combined in a composite variable adding the responses on both questions, producing a possible response range from zero to six. Higher values indicate higher levels of perceived crime/severity of crime. Possible combined answer responses ranged from 0 to 6, Cronbach's alpha (0.66)

The discrimination variable is a scale variable consisting of responses to nine questions on the respondent's experiences with discrimination. Respondents were asked about the frequency of the following: they were treated with less courtesy than others, they were treated with less respect than others, they received poorer restaurant service than others, people acted like they were not smart, people acted like they were afraid of them, people acted like they were dishonest, people acted better than them, called names and threatened or harassed. Possible response categories were never, less than once a

year, a few times a year, a few times a month, at least once a week and almost every day. The scale ranged from 0 to 45 and had a Cronbach's alpha of 0.90.

The analysis also controlled for social support, a scale variable (Cronbach's alpha =0.68) based on questions asking about the respondent's experience with enacted support. Enacted support asks the respondent to reflect on the frequency of support already received through social contact, help with problems or listening to concerns (Thoits 2011). The questions used to develop the social support scale were: how often do people in your family including children, grandparents, aunts, uncles, in-laws and so on help you out; (other than your (spouse/partner) how often do they listen to you talk about your private problems and concerns; how often do your friends help out; how often do family friends help you out; how often does your family express concern for your wellbeing? Demographic measures such as gender, marital status, age, employment status, income and education were also included in the analysis as independent variables.

### *Analytical Strategy*

The analysis begins with understanding the role of the key social statuses of SES, as measured by education (Figure 1), and gender (Figure 2), on perceptions of neighborhood crime and discrimination for African American, U.S.-born Afro Caribbean and foreign-born Afro Caribbean men and women. The figures depict weighted bivariate analysis of the key indicator variable by education (Figure 1) or gender (Figure 2), separated by group. The figures elucidate potential socioeconomic or gender variations in the key variables which may further influence the impact of perceived neighborhood crime and discrimination on depression outcomes. Additionally, the figures allow us to

see group specific variations along education and gender lines to understand for whom the within group gender and education variance might be greatest.

Next the analysis incorporates the two key explanatory variables and key demographic factors into an OLS model for depressive symptoms (Table 2) and a logit model for depressive disorder (Table 3). African Americans are the reference group for the depressive symptom table (Table 2) because per the descriptive Statistics (Table 1) there was no statistically significant difference in depressive symptoms for U.S.-born Afro-Caribbeans with African Americans or the foreign-born. The U.S.-born is the reference group for Table 3, which allows us to more easily explore intergenerational health assimilation patterns, which posits better first generation immigrant health outcomes relative to subsequent generations and a convergence of the second and third generation outcomes with the non-immigrant U.S.-born counterpart (Harker 2001). Put differently in order to identify intergenerational assimilation there must be a foreign-born Afro-Caribbean health advantage relative to U.S.-born Afro Caribbeans and a convergence (statistically insignificant variation) in the health outcomes of U.S.-born Afro Caribbeans with African Americans. Nested models are used to understand depressive outcomes, adding in additional sets of variables to increase explanatory power. Both Table 2 and 3 use the following models:

$$Y = G_i\beta \quad (1)$$

$$Y = G_i\beta + X_i\beta \quad (2)$$

$$Y = G_i\beta + X_i\beta + K_i\beta \quad (3)$$

$$Y = G_i\beta + X_i\beta + K_i\beta + K \cdot D_i\beta \quad (4)$$

$$Y = Y = G_i\beta + X_i\beta + K_i\beta + K \cdot D_i\beta + K \cdot E_i\beta \quad (5)$$

Where,  $G_i\beta$  are group dummy variables,  $X_i\beta$  is a vector of control variables,  $K_i\beta$  are the key variables of interest – discrimination and neighborhood crime,  $K*Di\beta$  are education interaction dummy variables and  $K*Ei\beta$  are gender interaction variables. Equations 1-5 represent the 5 models for Tables 2 and 3.

## **Results**

### *Perception patterns by Education and Gender*

Figure 1 provides a graph of the weighted mean values of perceived neighborhood crime and perceived discrimination by education for each race/ethnicity/nativity group. Education was used to differentiate SES levels, with those with a High School diploma or less categorized as Low and those with some college or Bachelor's degree or higher categorized as High. Thirty-eight percent of African Americans, 60 percent of U.S.-born Caribbean Blacks and 51 percent of foreign-born Caribbean Blacks were categorized as High. Thus African Americans had the lowest percentage of persons who were in the High education category.

### **[Figure 1 about here]**

The within group results are what is most important to focus on for Figures 1 and 2 as they suggest within group gradients for education or gender for the key variables of perceived discrimination and perceived neighborhood crime. Thus only the statistically significant within group results are reported on in this section. The mean perception of neighborhood crime for African Americans is lower for African Americans with a high level of education (mean of 2.09) than those with lower levels of education (mean=2.47). For mean perceived discrimination only foreign-born Afro Caribbeans demonstrate a statistically significant difference in perception of discrimination by education. Foreign-



born Afro Caribbeans with high levels of education (mean=9.17) perceive less discrimination than those with low levels of education (mean=11.28). Figure 2 reveals the gender patterns for perceived discrimination and neighborhood crime. There are no statistically significant differences within groups by gender for perceived neighborhood crime. African American men (mean=12.79) perceive greater discrimination than African American women (mean=2.71).

**[Figure 2 about here]**

### *Depressive symptom patterns*

Table 2 outlines the depressive symptom patterns for the sample of U.S. and foreign-born Black men and women, using an OLS regression with African Americans as the reference group. No statistically significant differences in depressive symptoms were found between neither U.S.-born Afro Caribbeans and foreign-born Afro Caribbeans nor U.S.-born Afro Caribbeans and African Americans. There is a statistically significant variation in depressive symptoms at the bivariate level between foreign-born Afro Caribbeans and African Americans (Model 1). Foreign-born Caribbean Blacks have lower depressive symptoms than African Americans by slightly more than 1 point on the depressive symptom scale. Some of the foreign-born Caribbean Black depressive symptom advantage compared to African Americans is accounted for by demographic characteristics and social support, decreasing the foreign-born symptom advantage by approximately a third of a point (.27) in Model 2. Education operates in the expected direction, with depressive symptoms lower with higher levels of education. Having a Bachelor's degree or higher provides the greatest reduction in depressive symptoms.

In Table 2 Model 3, neighborhood perception of crime is a statistically significant predictor of depressive symptoms. However, when perceived discrimination is added in Model 4, perceived neighborhood crime is no longer statistically significant. Perceived discrimination mediates the effects of perceived neighborhood crime on depressive symptoms. Higher levels of perceived discrimination are associated with higher levels of depressive symptoms in Models 3 and 4. The education and discrimination interactions are not significant, indicating that perceived discrimination's relationship with depressive symptoms does not vary by education. The gender and discrimination interaction indicates that for Black women the association of perceived discrimination with depression is different than it is for men. Black women experience higher depressive symptoms with increased perceived discrimination than men. Although foreign-born Blacks do have better depressive symptom outcomes than African Americans, due to the better socioeconomic statuses of foreign-born Afro Caribbeans (Table 1) relative to African Americans, this would not be an immigrant paradox, but rather a healthy immigrant effect. The immigrant health paradox theory posits that immigrants have better health outcomes despite lower socioeconomic statuses, but foreign born Afro-Caribbeans do not have lower socioeconomic statuses than African Americans. Perceived discrimination did help to attenuate the health immigrant effect, increasing the explanatory power of the model.

**[Table 2 about here]**

*Depressive disorder patterns*

Table 3 is a logit model of 12-month depressive disorder for U.S. and foreign-born Black adults, with U.S.-born Afro-Caribbeans as the reference group. Recall the use of U.S.-born Afro Caribbeans as the reference group allows for an ease of interpretation with respect to intergenerational health assimilation patterns. U.S.-born Afro-Caribbeans have higher depressive disorder rates than foreign-born Afro Caribbeans, reflecting worse health status for the second generation compared to the first generation. The inclusion of demographic and support variables reduces the foreign born coefficient to non-significance (Model 2), meaning that these variables help to explain the difference between these two groups. The magnitude of the foreign-born coefficient, however, changes relatively little, remaining higher for example than the “married” coefficient. The relatively small sample size of the U.S.-born Afro Caribbean group (see Table 1) means that even a moderately strong a foreign-born advantage may go undetected.

U.S.-born Caribbeans also have higher depressive disorder rates than African Americans. Intergenerational health assimilation posits there should be a convergence with African American health outcomes, not a greater disadvantage. There is no notable difference in depressive disorder rates between African Americans and foreign-born Afro Caribbeans (statistical test results not shown). Interestingly the education variables do not rise to the level of significance to explain variations in depressive disorder for foreign and U.S.-born Blacks, in the same way as for depressive symptoms (Table 2). Again, perceived discrimination is statistically significant and perceived neighborhood crime is not (Model 4). The inclusion of the perception variables (Models 3, 4 and 5) does attenuate the U.S.-born Afro Caribbean disadvantage with African Americans. Differing from patterns observed for depressive symptoms, Black women do not have an additional

disadvantage for higher levels of perceived discrimination (see the gender interaction coefficients of Model 5).

**[Table 3 about here]**

## **Discussion**

The study found lower foreign-born depressive symptoms between foreign-born Afro-Caribbeans and African Americans (Table 2) and better foreign-born depressive disorder outcomes than both African Americans and U.S.-born Afro Caribbeans (Table 3). The better foreign-born depression outcomes relative to African Americans is best framed as a healthy immigrant effect and not as an immigrant paradox that predominates the immigrant health disparities literature. This interpretation better suits the observed patterns due to the better SES of foreign-born Afro Caribbeans. Intergenerational health assimilation posits that first generation immigrants will have better health outcomes than subsequent generations, which is suggestive of a decline in health status from one generation to the next and that the second and third generation will converge with the health outcomes of the non-immigrant U.S.-born counterpart. We do observe a first generation health advantage relative to the second generation. However, the second generation U.S.-born Afro Caribbean's depressive disorder outcomes are worse than African Americans. This is suggestive of a process different than immigrant health assimilation and more like a second generation Black immigrant health penalty. A penalty better describes patterns for U.S.-born Afro Caribbeans because they do not receive any benefit from their ethnic similarity with the first generation or their second generation and higher immigrant status. Instead, they have worse outcomes than African

Americans who are known to be disadvantaged in their health outcomes (Williams and Collins 1995).

The study explored perceived neighborhood crime and perceived discrimination as explanatory variables that could account for observed variances in depression outcomes. Perceived neighborhood crime was important for depressive symptoms, but was mediated by perceived discrimination. Perceived discrimination did account for some of the differences across groups, reducing the foreign-born depressive symptom advantage with African Americans and the African American depressive disorder advantage with U.S.-born Afro Caribbeans. Lastly, the study aimed to assess if relationships between discrimination and health varied for those of higher versus lower SES or for women versus men. The gender interaction for perceived discrimination was the only important interaction and only for depressive symptoms. Black women are more affected by perceived discrimination than Black men, although on average they perceive lower levels of perceived discrimination than men (Figure 2).

The higher U.S.-born Caribbean depressive disorder rates was not surprising in this study as the pattern was previously identified in other studies (Brewton-Tiayon et al. 2015; Williams et al. 2007a). However, the fact that the inclusion of demographic and explanatory variables did very little to explain the persistent U.S.-born Afro Caribbean disadvantage with African Americans was surprising. Reasons for this may rest in unmeasured social psychological processes such as social identity. The second and third generation face various challenges in constructing their social identity due to a conflict of their private and public spheres. In the private sphere second and third generation Afro-Caribbeans may be encouraged to adopt an ethnic identity, while in the public sphere

they may be encouraged to take on or are automatically identified by a racial identity (Kasinitz et al. 2008; Traore 2006; Waters 1999). As a result, many opt for a hyphenated identity (Rumbaut 1994). It may be the management of the role implications of a hyphenated identity that explains the greater U.S.-born Afro Caribbean depressive disorder patterns through the increase of stress (Caldwell et al. 2006). While U.S.-born Afro Caribbeans and African Americans face similar racial challenges, African Americans do not have the same bicultural identity conflicts as the Afro-Caribbeans.

There are several reasons why perceived discrimination might be important. Although the education and perceived discrimination interactions were not significant in the models, the descriptive graphs in Figure 1 are informative. A lower level of perceived discrimination with higher SES was only found to be true for foreign-born Afro Caribbeans, not the U.S. born (Figure 1). Thus higher SES does not appear to improve the discrimination experiences for U.S.-born Blacks. The immigrant literature suggests that the lower perceived discrimination of the foreign born may be largely attributable to their early socialization about race and opportunity. Black immigrants arrive not believing that their race is a hindrance to their mobility and that the opportunity available in the U.S. is not only better than their countries of origin but also attainable (Bryce-LaPorte 1972; Waters, 1999). Such beliefs may thwart or even mask experiences of implicit or overt discrimination and consequently impact variations in perceived discrimination levels between U.S. and foreign-born groups.

Although Black men across groups reported higher levels of perceived discrimination, the analysis found that foreign and U.S.-born Black women received an additional penalty for increased perceived discrimination compared to men.

Intersectionality theory offers that Black women's gender status qualitatively changes the nature of their experiences with discrimination (Crenshaw 1995). As the occupants of two devalued statuses, the impact of discrimination is likely greater for women than men, perhaps because they must also manage their experiences with gender discrimination. The psychological load of managing both gender and race discrimination is likely to evoke higher levels of stress for women. Also, being unable to detangle which social status is being more discriminated against (race or gender) may likewise exacerbate associated stress. Black men may not have to deal with such complexities or perhaps discriminatory experiences for black men become manifest in other negative health outcomes. This may explain the observed gender effects of perceived discrimination among blacks.

There are several limitations of this study. First, there is a specific limitations related to the use of the perception of neighborhood crime in the study and how it is operationalized. The literature on neighborhoods of opportunity inform us that neighborhoods are important for the health promotion resources that they bring. However, it may have been more effective to operationalize the neighborhood effects as it relates to more concrete measures of disadvantage, such as racial residential segregation, poverty levels or percent of female headed households (Acevedo-Garcia et al. 2008; Acevedo-Garcia and Osypuk. 2008; Laventhal and Brooks-Gunn 2003; Osypuk and Acevedo-Garcia 2010). The low Cronbach's alpha (0.66) of the perceived neighborhood crime scale also suggests a better measure could have been used. Thus the observed less significance of neighborhood crime may be a result of how the variable was operationalized in the study. It is also likely that perceived discrimination subsumes the

effects of perceived neighborhood crime as both are strongly linked to SES, and thus may need to be modeled separately. Additionally, the perceived discrimination scale used did not assess the type of perceived discrimination – racial or gender or otherwise– which may ultimately matter in understanding the findings. The low U.S.-born Afro Caribbean sample size (n=305) is also a limitation of the study, potentially impacting the statistical power of the analysis.

In conclusion, foreign-born Afro Caribbeans have better depression outcomes than U.S.-born Afro Caribbeans and African Americans. Perceived discrimination was informative in explaining some of the differences in outcomes, but additional research on the role of perceived discrimination and mental health for foreign and U.S.-born Blacks is needed.



## Tables and Figure

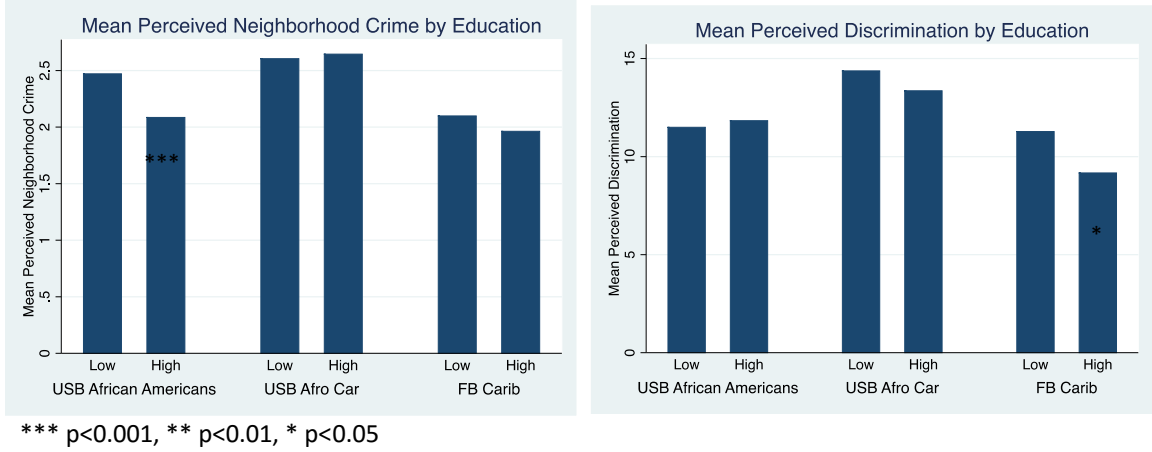
**Table 1 (Chapter 4).** Weighted Descriptive Statistics African American, U.S.-born Afro Caribbean and Foreign-born Afro Caribbean Men and Women, NSAL (2001-2003).

	African Americans	U.S.-born Caribbean Black	Foreign-born Caribbean Black
CES-D	26.49 <sup>a</sup>	26.28	25.39
Depressive Disorder	0.05 <sup>f</sup>	0.13 <sup>c</sup>	0.05
Female	0.56 <sup>b</sup>	0.52	0.44
Age	41.31 <sup>f</sup>	36.39 <sup>c</sup>	42.05
Married	0.43 <sup>a,f</sup>	0.37 <sup>a</sup>	0.59
Income (mean)	37,810.04	56,134.45	44,349.12
Employed	0.69 <sup>c</sup>	0.76	0.80
<i>Education</i>			
< High School	0.22 <sup>c</sup>	0.20	0.17
High School Diploma	0.38 <sup>d</sup>	0.23 <sup>c</sup>	0.35
Some College	0.25	0.32	0.28
College Diploma +	0.14 <sup>f</sup>	0.25	0.20
Chi squared between African Americans and U.S.-born Afro-Caribbeans	p<.05		
Support Scale (0-15)	9.07 <sup>f</sup>	9.94	9.01
Perceived Neighborhood Crime scale (0-6)	2.32	2.63 <sup>a</sup>	2.03
Perceived Discrimination scale (0-45)	11.63	13.79 <sup>b</sup>	10.26
<i>Years in U.S.</i>			
< 5 Years			0.15
5-10 Years			0.14
11-20 Years			0.32
20+ Years			0.39
Observations	2,771	305	775

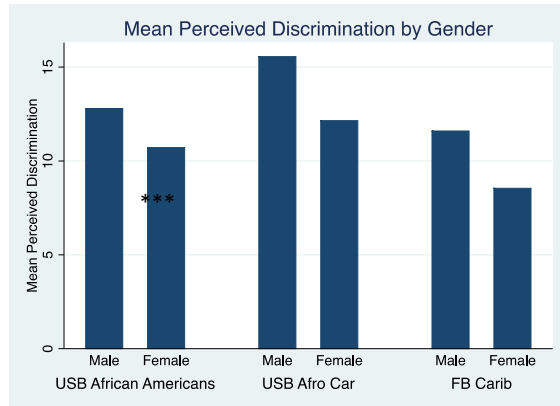
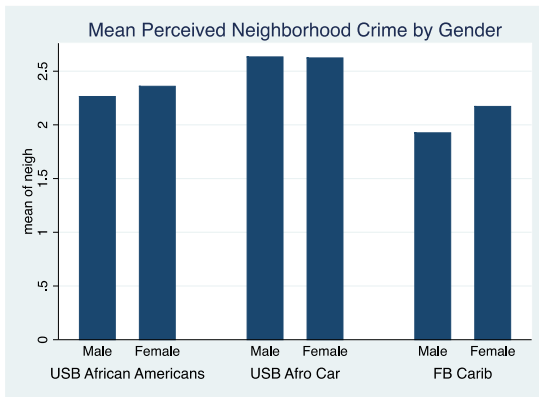
Significantly different from: a-Foreign-born p<.001; b-Foreign-born p<.01; c- Foreign-born p<.05

d-U.S.-born Car p<.001; e-U.S.-born Car p<.01; f- U.S.-born Car p<.05

**Figure 1 (Chapter 4).** Weighted Mean Perceived Neighborhood Crime and Discrimination by Education



**Figure 2 (Chapter 4).** Weighted Mean Perceived Neighborhood Crime and Discrimination by Gender



\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 2 (Chapter 4).** OLS Regression Model, Depressive Symptoms (CES-D), U.S. and foreign-born Black, adults

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>(Ref: African Americans)</i>					
U.S.-born Afro Caribbeans	-0.202 (0.919)	-0.204 (0.929)	-0.254 (0.903)	-0.364 (0.825)	-0.341 (0.856)
Foreign-born Afro Caribbean	1.100*** (0.249)	0.826*** (0.205)	0.801*** (0.208)	-0.686** (0.208)	-0.696** (0.214)
Female		0.785*** (0.205)	0.781*** (0.206)	0.978*** (0.196)	0.070 (0.321)
Married		0.061 (0.217)	0.106 (0.217)	0.150 (0.223)	0.133 (0.225)
Age		0.039*** (0.005)	0.038*** (0.005)	0.028*** (0.005)	0.027*** (0.005)
Employed		-0.675** (0.210)	-0.631** (0.213)	-0.613** (0.200)	-0.622** (0.196)
<i>Education (Ref: &lt; High School)</i>					
High School		-1.080** (0.364)	-1.019** (0.363)	-0.948** (0.351)	-1.268* (0.550)
Some College		1.187*** (0.320)	-1.112** (0.325)	-1.106** (0.319)	-1.020 (0.654)
Bachelors +		1.554*** (0.296)	1.454*** (0.297)	1.460*** (0.289)	-1.762** (0.569)
Social Support		-0.031 (0.025)	-0.032 (0.024)	-0.021 (0.023)	-0.019 (0.024)
Perceived Neighborhood Crime			0.156* (0.060)	0.099 (0.059)	-0.004 (0.118)
Perceived Discrimination				0.088*** (0.013)	0.057 (0.029)

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 2 (Continued – Chapter 4).** OLS Regression Model, Depressive Symptoms (CES-D), U.S. and foreign-born Black, adults

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Education Interactions</i>					
High School x Neighborhood Crime					0.042 (0.156)
Some College x Neighborhood Crime					-0.019 (0.153)
Bachelors+ x Neighborhood Crime					0.144 (0.182)
High School x Discrimination					0.020 (0.030)
Some College x Discrimination					-0.003 (0.030)
Bachelors+ x Discrimination					0.000 (0.036)
<i>Gender Interactions</i>					
Female x Neighborhood Crime					0.128 (0.096)
Female x Discrimination					0.052* (0.021)
Constant	26.487*** (0.097)	29.320*** (0.372)	27.222*** (0.480)	27.360*** (0.605)	27.812*** (0.595)
Observations	3,851	3,851	3,851	3,851	3,851
R-squared	0.003	0.050	0.081	0.081	0.085

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 3 (Chapter 4).** Logit Model, 12- Month Depressive Disorder (DSM-IV) U.S. and foreign-born Black, adults

	Model 1	Model 2	Model 3	Model 4	Model 5
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<i>(Ref: U.S.-born Afro Caribbeans)</i>					
African Americans	-1.040*	-1.027*	-1.007*	-0.956*	-0.962*
	(0.417)	(0.447)	(0.436)	(0.418)	(0.419)
Foreign-born Afro Caribbeans	-1.093*	-0.864	-0.837	-0.738	-0.825
	(0.530)	(0.561)	(0.559)	(0.562)	(0.545)
Female		0.679***	0.673***	0.814***	1.515**
		(0.186)	(0.186)	(0.195)	(0.514)
Married		-0.657**	-0.639**	-0.612*	-0.594*
		(0.231)	(0.233)	(0.240)	(0.243)
Age		-0.021**	-0.021**	-0.016*	-0.017*
		(0.007)	(0.007)	(0.007)	(0.007)
Employed		-0.370*	-0.350	-0.343	-0.347
		(0.181)	(0.179)	(0.184)	(0.181)
<i>Education (Ref: &lt; High School)</i>					
High School		-0.280	-0.244	-0.173	-1.187*
		(0.296)	(0.307)	(0.321)	(0.589)
Some College		-0.445	-0.403	-0.350	-0.422
		(0.325)	(0.335)	(0.357)	(0.574)
Bachelors+		0.095	0.151	0.212	-0.604
		(0.309)	(0.323)	(0.345)	(0.656)
Social Support		-0.040	-0.039	-0.031	-0.032
		(0.027)	(0.027)	(0.028)	(0.028)
Perceived Neighborhood Crime			0.074	0.039	0.075
			(0.058)	(0.059)	(0.152)
Perceived Discrimination				0.049***	0.043
				(0.012)	(0.022)

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 3 (Continued – Chapter 4).** Logit Model, Depressive Disorder (DSM-IV U.S. and foreign-born Black, adults

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Education Interactions</i>					

High School x Neighborhood Crime					0.139 (0.142)	
Some College x Neighborhood Crime					-0.102 (0.176)	
Bachelors+ x Neighborhood Crime					0.300 (0.182)	
High School x Discrimination					0.040 (0.026)	
Some College x Discrimination					0.015 (0.034)	
Bachelors+ x Discrimination					0.001 (0.031)	
<i>Gender Interactions</i>						
Female x Neighborhood Crime					-0.151 (0.120)	
Female x Discrimination					-0.017 (0.024)	
Constant	-	1.899*** (0.405)	-0.491 (0.718)	-1.806* (0.843)	-1.254 (0.954)	-1.747 (1.074)
Observations		3,851	3,851	3,851	3,851	3,851

Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

## Chapter 5: Conclusion

In this dissertation, I set out to answer the following overarching research questions: 1) Does the immigrant health paradox or the healthy immigrant effect best explain the BMI, obesity and depression comparisons between U.S. and foreign-born Blacks? 2) Does immigrant health assimilation theory explain the health trajectories of foreign-born Blacks for first generation Blacks with increased duration in the U.S. and intergenerationally between first generation Blacks and subsequent generations? 3) What mechanisms can help to explain observed variation in outcomes between U.S. and foreign-born Blacks? In this chapter I will briefly recap the answers to these questions derived from the dissertation results, highlight how this dissertation moves the current foreign-born Black health literature forward, and suggest additional explanations for the results and suggest areas of future research.

**[Tables 1, 2 and 3 about here]**

### *Immigrant Health Paradox or Healthy Immigrant Effect?*

The dissertation finds that when comparing foreign-born Blacks to U.S.-born Blacks generally or African Americans specifically, a healthy immigrant effect is most appropriate in describing the patterns. This is due to the better SES of the foreign-born. However, when making intergenerational comparisons between first generation Afro Caribbeans and subsequent generations, the immigrant health paradox best explains patterns because subsequent generations have better SES than the first generation.

Paper one, focusing on the outcomes of BMI and obesity and comparing foreign and U.S.-born Blacks generally, confirms both the presence and endurance of a healthy immigrant effect. Foreign-born Black men and women maintained lower rates of BMI



and obesity throughout the 25-year period of observation. The foreign-born Black men and women maintained a gap in outcomes with the U.S.-born when explored across a birth cohort, following them as they aged from 20 to 24 in 1989 to 1993 to 40 to 44 in 2009 to 2013. The foreign-born gap was also maintained across five, five-year immigrant arrival cohorts, relative to their age and education matched U.S.-born counterparts. A healthy immigrant effect also described obesity patterns when specifying the ethnicity of the foreign-born in paper two. Foreign-born Afro Caribbeans had lower rates of obesity than African Americans and better SES. Also, in paper three, foreign-born Afro Caribbeans were found to have lower rates of depressive symptoms and depressive disorder than African Americans.

Intergenerational comparisons between first generation foreign-born and subsequent generation U.S.-born Afro Caribbeans were best explained by the immigrant health paradox theory, because the second and third generation had better SES than the first generation. In paper two, foreign-born Afro-Caribbeans had lower obesity rates than second and third generation U.S.-born Afro Caribbeans. A similar intergenerational pattern was observed in paper three for depressive disorder.

*Does Immigrant Health Assimilation Explain the Trajectory of Foreign-born Blacks?*

This dissertation provides evidence against the adoption of immigrant health assimilation as the predominant theory explaining foreign-born Black health trajectories, both with increased duration in the U.S. and intergenerationally.

Paper one explored the BMI and obesity trajectories of foreign-born Black men and women, compared to U.S.-born Blacks as the groups aged, across arrival cohorts and following arrival cohorts with increased duration in the U.S. Overall, across observations

the paper found most support for no convergence or divergence of outcomes. Results in this direction were most compelling for foreign-born Black men, as was similarly found in a previous study (Antecol and Bedard 2006). This pattern provides evidence against immigrant health assimilation. Also this pattern appears to be enduring as the predominant trend for BMI and obesity of immigrant arrival cohorts compared to the U.S.-born was one of divergence, thus the difference in outcomes is increasing with more recent immigrant arrival cohorts.

Papers two and three of the dissertation looked at intergenerational immigrant health assimilation patterns. For intergenerational health assimilation there should be both better first generation health outcomes compared to subsequent generations and a convergence of subsequent generation's health outcomes with the non-immigrant comparator group; in this case African Americans (Harker 2001). Both papers confirmed better obesity and depression outcomes for first generation Afro-Caribbeans relative to second and third generation U.S.-born Afro-Caribbeans, however second and third generation U.S.-born Afro Caribbeans had worse obesity (paper two) and depressive disorder (paper three) outcomes than African Americans. Intergenerational assimilation predicts that the second and third generation U.S.-born Afro Caribbeans would assimilate to the outcome levels of African Americans (Harker 2001), effectively resulting in no statistically significant difference in outcomes. The dissertation uncovered more of a U.S.-born Afro Caribbean penalty than assimilation, because their outcomes were worse than African-Americans. Thus for both obesity and depression, assimilation does not adequately describe the observed patterns for Black immigrants.

### *Mechanisms Explaining Variations*

Two important mechanisms that explained foreign and U.S.-born variations in outcomes was uncovered in the dissertation. The first mechanism was a differential rate of return, or different coefficients, for the foreign-born than the U.S.-born, resulting in better health outcomes for the foreign-born. The second mechanism was perceived discrimination.

In paper two, the mechanism that explained the intergenerational decline in obesity for U.S.-born Afro Caribbeans relative to the foreign-born, was a differential rate of return on characteristics. The characteristics of foreign-born Afro-Caribbeans afforded them more obesity protection than equivalent characteristics for U.S.-born Afro Caribbeans. That is, the foreign-born Afro-Caribbeans fared better because the characteristics translated into more favorable outcomes than for U.S.-born Afro Caribbeans. Thus it was not a difference in characteristics per se, but instead how the characteristics influenced outcomes differently for each group. For depression, perceived discrimination functioned as a mechanism to explain some of the variation in depression outcome between groups. Specifically, the lower depressive symptoms of foreign-born Afro Caribbeans compared to African-Americans is partially explained by fewer experiences of discrimination. Perceived discrimination was important for both depressive symptoms and depressive disorder. For depressive symptoms Black women were more disadvantaged by perceived discrimination than men.

### *Contributions to the Literature*

This dissertation moves the literature on foreign-born Black health disparities in several ways. First, this dissertation confirms the results of a higher rate of increase of

obesity over time for U.S.-born Blacks relative to foreign-born Blacks observed in Park et al. (2009). However, Park et al. (2009) did not demonstrate this finding in a conclusive manner, illustrating that the general pattern held across cohorts for foreign-born Blacks. This dissertation picks up where they left off and extends and reinforces their findings for foreign-born Blacks. The dissertation effectively shows that when looking at foreign-born Black birth cohorts or arrival cohorts and their age and education matched U.S.-born peers, the slope of the U.S.-born BMI and obesity trajectory is steeper for U.S.-born men and women than the foreign-born. The dissertation also shows how this trajectory plays out over time as cohorts age and across periods for arrival cohorts, showing a widening of the foreign and U.S.-born gap as they age and with more recent arrival cohorts.

A second important contribution of the paper is a firm argument against immigrant health assimilation being an appropriate theory to explain foreign-born Black health outcomes. Most current work on foreign-born Blacks BMI and obesity trajectories use health assimilation as a starting point (Antecol and Bedard 2006; Kaushal 2009; Mehta et al. 2015; Oza-Frank and Narayan 2009), even with evidence contrary to what assimilation theory would suggest for Blacks (Antecol and Bedard 2006). This dissertation provides evidence against using immigrant health assimilation as an analytical starting point to explain foreign-born Black health outcomes and argues that no convergence, divergence or Black second generation penalty may be more appropriate theories to explore. Future work focusing on Black immigrants would be better advised to explore ways Black immigrants continue to differ from U.S.-born Blacks, despite increased duration in the U.S., and the processes that facilitate this. It is perhaps through understanding the divergent pathways that will bring greater knowledge about foreign

and U.S.-born Black health trajectories, than frameworks that seek to identify commonalities between the groups.

A third contribution of the dissertation is a move away from focusing only on differences in group characteristics to explain foreign and U.S.-born Black health disparities. Previous research on foreign-born Black health focused on differences in demographic factors as an explanation for variations, by essentially controlling for key demographics, (Kaushal 2009; Oza-Frank and Narayan 2009; Singh et al 2011). This dissertation shows that it is not the difference in demographic factors that matter the most, but instead how those characteristics translate differentially into obesity outcomes for foreign versus U.S.-born Blacks. Foreign-born Blacks receive more favorable returns on equivalent characteristics. This finding shifts the focus away from characteristics themselves and more towards the social structure or social psychological processes. What is it about the U.S. that favors foreign-born Blacks over U.S.-born Blacks? What are the systems and processes that support this phenomenon? What are the social psychological processes that occur that may impact how characteristics are translated to outcomes for foreign versus U.S.-born Blacks? Structurally we've seen this play out in the labor market for Blacks, where foreign-born Blacks are favored over U.S.-born Blacks (Kalmijn 1996; Waters 1999) and thus it is cogent to find similar patterns in health. Social psychologically we have also seen a variance in the social psychological processes of first generation Afro Caribbeans, compared to second generation Afro-Caribbeans, with the second generation being more impacted by stereotype threat than the first generation (Deaux et al. 2007).

Lastly, this dissertation increases our understanding on how discrimination relates to mental health disparities between foreign and U.S.-born Blacks. We know a lot about the effects of discrimination on health for Blacks in general (Brown et al. 2000; Karlsen and Nazroo 2002; Schulz et al. 2006; Williams, Neighbors and Jackson 2003). We also have knowledge on how discrimination impacts the health outcomes of other immigrant groups (Finch, Kolody and Vega 2000; Mossakowski 2003; Noh et al. 1999; Yip, Gee and Takeuchi 2008), but we know comparatively less about the role of discrimination on health for foreign-born Blacks (i.e. Lincoln et al. 2007; Seaton et al. 2008). Using a nationally representative sample, this dissertation shows that discrimination is an important variable that helps to elucidate differences in foreign and U.S.-born mental health among Blacks. Also, despite popular belief that Black men deal with more discrimination than Black women, this dissertation shows that perceived discrimination has a stronger relationship to the mental health of Black women when it is experienced.

#### *Additional Explanations*

I offer now some additional explanations for the findings in the dissertation. These explanations were briefly discussed in the individual papers, but not elaborated upon. First, beginning with the worse health outcomes of U.S.-born Afro Caribbeans relative to foreign-born Afro Caribbeans and African Americans. One reason explaining the worse U.S.-born Afro Caribbean obesity and depressive disorder outcomes relative to foreign-born Afro Caribbeans is differential impacts of the racial social structure of the U.S. The racial social structure is a racialized social system, inclusive of interpersonal and institutional mechanisms and norms, that systemically privilege Whites over non-White groups in the U.S. (Bonilla-Silva 2006). Foreign-born Blacks perceive lower

levels of discrimination than second and third generation Blacks (Butterfield 2004; Kasinitz et al. 2008; Traore 2006; Waters 1999). Also where second generation Afro Caribbean Blacks are impacted by racial stereotypes in the U.S., first generation Afro Caribbeans are not (Deaux et al. 2007). The relationship between perceived discrimination and health is clear in the literature (see previous citations on this in Paper three). Thus one reason to explain the worse second generation and higher health outcomes relative to the first generation is differential rates and impact of perceived discrimination. This dissertation also finds support for this.

The worse U.S.-born Afro-Caribbean outcomes relative to African Americans may be related to conflicting social identity processes. A social identity is an individual's recognition and acceptance of their membership in a group based on shared group characteristics. Social identities are acknowledged and validated by both the individual and others. As an integral component of the self, an individual internalizes social identities -- they are not merely ascribed. This puts the agency of group membership into the hands of the individual (Owens 2003). Equipped with the knowledge of the racialized social hierarchy in the U.S. and its link to opportunity structures, first generation Black immigrants often prefer an ethnic social identity over a racial one, rooting their group membership in their country of origin, or a pan-ethnic membership such as African or West Indian (Kasinitz et al. 2008; Waters 1999).

Second-generation Black immigrants on the other hand more frequently take on a racial identity -- a racial identity that may not always be validated by others in the private and public sphere. In the home, second and third generation children may find conflict with their parents in an effort to take on a racial identity. Foreign-born Black parents are

likely to encourage their children to take on an ethnic identity to protect them from the racism and discrimination in the U.S. (Waters 1999). In fact, first-generation Afro Caribbeans report feeling closer to other first-generation Caribbeans than U.S.-born Afro Caribbeans (Thornton, Taylor and Chatters 2013). Consequently, as second and third generation Afro Caribbeans attempt to construct their identity in a racialized society, they strain their closeness with their parents and grandparents. In the public sphere their attempts to take on a racialized identity may be thwarted by lack of acceptance by the non-immigrant U.S.-born peer group, specifically African Americans (Imoagene 2015; Traore and Lukens 2006). For example, second-generation Nigerian immigrants report experiences of discrimination from African Americans and the use of racial slurs by African Americans to refer to them (Imoagene 2015). The use of slurs can be thought of as a social boundary making process that delineates the in-group from the out-group (Lamont and Molnar 2002). Thus the identity making processes of second generation Blacks is riddled with internal and external conflict which may create additional stress. Stress impacts health directly and through the decline of health behaviors (Pearlin 1999).

These patterns may vary by socioeconomic status. Poor and working class second generation Black immigrants are more likely to take on a racial identity than an ethnic one as compared to Black immigrants from middle class families. Middle-class second generation Black immigrants are more likely to take on an ethnic identity. Those who take on a racialized identity are less likely to believe the racialized stereotypes about Blacks or as a member of the group accept those stereotypes as self-relevant. Consequently, Black immigrant children who identify as African American recount more instances of racialized experiences of discrimination, poor schools and poor



neighborhoods, which additionally contribute to health outcomes. Those who take on an ethnic identity are more likely to believe the stereotypes about Blacks and they recount greater opportunities, less discrimination, attendance at good quality schools and residence in good quality neighborhoods (Kasinitz et al 2008; Waters 1999).

Socio-structural explanations may also explain the worse U.S.-born Black health outcomes as well. The social structure is all of the processes, systems, relationships and institutions that reinforce the existing social hierarchies in a society (Tilly 1998). The question that emerges from this finding is why would foreign-born Blacks receive a better rate of return on characteristics that promote better health outcomes than U.S.-born Blacks? When asking this question, the model minority construct comes to mind. The model minority framework was largely developed as a way to discredit the struggles and challenge of African Americans by using other immigrant groups as a success example (Johnson 2008; Tillery and Chresfield 2012). As such, the narrative of immigrants as being superior to Blacks was developed to support this construct. The labor market provides one example of how this construct and narrative impact opportunities and outcomes for Blacks. As a result of the model minority narrative, the foreign-born are a preferred labor source than African Americans in the labor market (Shih 2002; Waters 1999), effectively limiting the labor market participation opportunities for African Americans relative to foreign-born Blacks. Thus there is the construct of the model minority that says that immigrants are better than Blacks, the accompanying narrative that supports this and the institutional processes that reinforce it. It is likely that a similar process is at play for foreign-born Blacks and health – the interconnection of social representations, processes and institutional rewards that promote the health of foreign-

born Blacks for equivalent characteristics in ways that are less accessible to U.S.-born Blacks.

The model minority narrative may also be linked to the social identity conflict of U.S.-born Afro Caribbean discussed above as well. The dissertation found that U.S.-born Afro-Caribbeans reported the highest levels of perceived discrimination (Paper 3) and foreign-born Afro Caribbeans reported the least. Thus, while foreign-born Afro Caribbeans may feel the effects of the model minority narrative, it appears that U.S.-born Afro Caribbeans do not. Thus, the conflict between the experiences of their parents and grandparents and their own experiences may be linked to higher stress (Deaux et al. 2007) and worse mental and physical health outcomes.

#### *Additional Research*

There are several areas of additional research needed to further advance the findings in this dissertation. Continuing with the previous suggestion that social structure may explain the better foreign-born Black rate of return on characteristics compared to the U.S.-born, additional research is needed to test this hypothesis. This dissertation did not provide data that can conclusively implicate social structure as the key explanatory factor. Answers to the question if structural explanations explain the different rate of return between foreign and U.S.-born Blacks is likely to come from a study that attempts to understand the varying opportunity structures afforded foreign-born Blacks than U.S.-born Blacks that may impact health. Also interviewing of institutional actors to see how this may play out at the institutional level could be beneficial. Taking the lead from labor market studies to develop an adequate study on the subject of health may be informative.

Another area of additional research is further testing the role of neighborhood effects on the mental health of foreign and U.S.-born Blacks. The relative lack of importance of perceived neighborhood crime relative to perceived discrimination in Paper 3 may have been more related to the operationalization of the neighborhood effects. There is substantial literature that links neighborhoods to mental health (Evans et al. 2000; Ross 2000; Ross and Mirowsky 2001; Stafford, Chandola and Marmot 2007). There is also a body of literature that discusses how “neighborhoods of opportunity” promote health while neighborhoods of disadvantage have accumulated negative health consequences (Acevedo-Garcia et al. 2008). Neighborhoods of opportunity are largely linked to the socioeconomic makeup of the neighborhood and best captured through objective measures of neighborhood poverty, percent female headed households or percent home owners (Acevedo-Garcia et al. 2008; Acevedo-Garcia and Osypuk. 2008; Lavanthal and Brooks-Gunn 2003; Osypuk and Acevedo-Garcia 2010). While subjective measures of neighborhood quality matter for mental health outcomes, they are most likely a mediator for adequately measured objective neighborhood factors. Additional research focusing on foreign and U.S.-born Blacks, matched on ethnicity, should be conducted using more objective measures of neighborhood quality and perhaps neighborhood social connections.

Blacks continue to be disadvantaged in their health outcomes in the U.S., but there is a subgroup of the Black population that is thriving in their health status – foreign-born Blacks. They fare better than second generation immigrants and non-immigrant African Americans in both obesity and depression outcomes. Unlocking the policies, systems and other mechanisms that facilitate this pattern may be an important piece to the

Black health disparity puzzle in the U.S. This is especially important as the foreign-born Black health advantage is increasing not decreasing over time as indicated by a widening obesity gap with more recent immigrant arrival cohorts and the large physical and mental health disadvantage of U.S.-born Afro Caribbeans. This is an indication that the mechanisms that facilitate better foreign-born Black health continue to persist and are strengthening over time. Turning to structural and social psychological processes may be a fruitful area of exploration. Current research on foreign and U.S.-born Black health disparities is still small compared to other immigrant groups. If Blacks are the most disadvantaged in their health outcomes, then research and public interest to understand these patterns should increase. I end this dissertation with a question posed in the introduction who has the right to a better quality life and why aren't we doing more to make sure everyone has equal access to this right? This dissertation has expanded our knowledge in this area for Blacks and it is my hope that there will be a continued and increased interest from other scholars as well.

## Tables and Figures

**Table 1 (Conclusion). Paper 1 Summary of major findings**

<b>Paper</b>	<b>Dataset/Sample</b>	<b>Outcome</b>	<b>Major Findings</b>	<b>Theoretical Implications</b>
1	National Health Interview Survey, 1989-2013  Foreign-born (“Immigrant”) and U.S.-born Blacks ages 20-54	Obesity and BMI disparities between foreign-born and U.S.-born women, matched by age, education, and year, and by immigrants’ duration in U.S.	<p>1. Foreign-born Black men and women show patterns of divergence in obesity outcomes with U.S.-born Black men and women as they age.</p> <p>2. The differences in BMI and obesity outcomes between immigrant arrival cohorts and age- and education-matched U.S.-born Blacks are increasing with more recent arrival cohorts.</p> <p>3. When following the BMI and obesity trajectories of immigrant arrival cohorts with increased duration in the U.S., patterns primarily show no convergence or divergence of outcomes with the U.S.-born.</p>	<p>There is a strong <i>healthy immigrant effect</i> for obesity and BMI for foreign-born Black men and women, both on arrival and across adult ages. This is not an <i>immigrant health paradox</i> as the SES of foreign-born Blacks is above that of U.S.-born Blacks.</p> <p><i>Unhealthy assimilation</i> of immigrants is not seen in the BMI and obesity trajectories of foreign-born Blacks with increased duration in the U.S. Instead, results predominantly support either no convergence or divergence in comparison to U.S.-born BMI and obesity outcomes.</p>

**Table 2 (Conclusion). Paper 2 Summary of major findings**

<b>Paper</b>	<b>Data/Sample</b>	<b>Outcome</b>	<b>Major Findings</b>	<b>Theoretical Implications</b>
2	<p>National Survey of American Life (NSAL), 2001-2003</p> <p>Foreign-born Afro Caribbeans, U.S.-born Afro Caribbeans and African Americans, ages 18+</p>	Obesity regressions and regression decompositions	<ol style="list-style-type: none"> <li>1. Foreign-born Afro Caribbeans have lower obesity rates than U.S.-born Afro-Caribbeans and African Americans.</li> <li>2. U.S.-born Afro-Caribbeans have higher rates of obesity than African Americans.</li> <li>3. The foreign-born advantage over U.S.-born Afro-Caribbeans in obesity outcomes is explained by differential rates of return on characteristics: the same characteristics of the foreign-born provide more obesity protection than for the U.S.-born.</li> </ol>	<p>There is a <i>healthy immigrant effect</i> between the foreign-born and African Americans for obesity, because the SES of the foreign-born is above that of African Americans.</p> <p>There is an <i>immigrant health paradox</i> between foreign-born and U.S.-born Afro-Caribbeans. The foreign-born have lower obesity rates than the U.S.-born, despite less favorable SES.</p> <p><i>Unhealthy assimilation</i> of immigrants does not adequately explain the intergenerational health patterns between the first generation foreign-born and subsequent generation U.S.-born Afro Caribbeans, because the U.S.-born have worse obesity outcomes than non-immigrant origin African Americans. Immigrant health assimilation theory suggests that the outcomes between these two groups should converge.</p>

**Table 3 (Conclusion). Paper 3 Summary of major findings**

<b>Paper</b>	<b>Data/Sample</b>	<b>Outcome</b>	<b>Major Findings</b>	<b>Theoretical Implications</b>
3	NSAL, 2001-2003  Foreign-born Afro Caribbeans, U.S.-born Afro Caribbeans and African Americans, ages 18+	Depressive Symptoms (CES-D) and 12-month depressive disorder, regressions	<ol style="list-style-type: none"> <li>1. Foreign-born Afro Caribbeans had lower rates of depressive symptoms than African Americans and lower rates of depressive disorder than U.S.-born Afro Caribbeans and African Americans.</li> <li>2. The foreign and U.S.-born Afro Caribbean depressive disorder variance was reduced to insignificance once demographic variables were added to the model</li> <li>3. U.S.-born Afro Caribbeans have worse depressive disorder outcomes than African Americans.</li> <li>4. Perceived discrimination partially explains the better foreign-born depression outcomes.</li> </ol>	<p>There is a <i>healthy immigrant effect</i> between the foreign-born and African Americans for depressive symptoms, because the SES of the foreign-born is above that of African Americans.</p> <p>There is an <i>immigrant health paradox</i> for depressive disorder between foreign-born and U.S.-born Afro Caribbeans. The foreign-born have lower depressive disorder rates than the U.S.-born, despite less favorable SES.</p> <p><i>Immigrant health assimilation</i> does not adequately explain the intergenerational health patterns between the first generation foreign-born and subsequent generation U.S.-born Afro Caribbeans, because the U.S.-born have worse depressive disorder outcomes than non-immigrant origin African Americans. Immigrant health assimilation theory suggests that the outcomes between these two groups should converge.</p>

## Appendix I: Validation of the National Survey of American Life (NSAL)

In order to check that the NSAL accurately reflects the U.S. and foreign-born Afro Caribbean female population present in the U.S. I validated the dataset against the American Community Survey (ACS). Using pooled ACS data from 2001-2003, which reflects the same time period the NSAL sample was collected, I ran statistical analysis to test if there were significant differences in key demographics between the U.S. born or foreign born samples of the NSAL versus the ACS.

**[Table A1 about here]**

The NSAL reports statistically significantly higher rates of marriage and employment and mean age than the ACS for U.S.-born Afro Caribbean women. Thus, it is likely that the NSAL overestimates marital rates, mean age and employment rates for U.S.-born Afro Caribbeans. Also, the difference in the number of children in the household for foreign-born Afro Caribbeans is statistically significantly higher in the ACS than the NSAL. In this case it is likely that the NSAL underestimates the number of children in the household. However, it is important to note that there is a slight variation in the definition of the children in the household variable for each dataset. In the NSAL the variable reflects the number of the respondent's own children living in the household, in the ACS it reflects the total number of all children living in the household. This may also account for the higher value in the ACS.

I conducted additional investigations into the differences in descriptives for the U.S.-born Caribbean Blacks to understand if the difference in age between the NSAL and



ACS U.S.-born Caribbean women may be related to the lower marital and employment rates of the ACS. To explore this, I created a categorical age variable representative of life stages 18 to 22 years – college age, 23 to 29 years – young adult/early employment, 30 to 45 years - middle age adult/mid-career, 46 to 65 years – older adults/pre-retirement and 66 years and older – senior citizens/retired. I used a chi-square test to see if there was a significant difference in these age categories between the NSAL and ACS. The results showed a statistically significantly greater proportion of female respondents in the 18 to 22-year age category for the ACS, which is notably the age range most individuals attend college. Thus the ACS has significantly more college aged respondents in the sample than the NSAL. College-aged individuals typically do have lower marital rates and employment.

## Tables and Figures

**Table A1.** NSAL validation of descriptive statistics for foreign and U.S.-born Caribbean Black women using ACS (2001-2003)

	NSAL	ACS		NSAL	ACS	
	U.S.-born Caribbean	U.S.-born Caribbean		Foreign born Caribbean	Foreign born Caribbean	
	Women	Women		Women	Women	
Married	0.352	0.199	**	0.452	0.413	
Age	37.19	32.80	*	42.86	43.53	
<i>Education</i>						
< High School	0.137	0.095		0.223	0.170	
High School	0.266	0.316		0.312	0.426	
Some College	0.382	0.317		0.266	0.225	
Bachelors or higher	0.215	0.272		0.198	0.179	
Employed	0.728	0.587	*	0.735	0.668	
Poverty Index	3.245	2.936		2.730	2.803	
Children in the household	0.521	0.534		0.610	1.064	***
<i>Age at immigration</i>						
1.5 generation				0.178	0.162	
1st generation				0.822	0.838	
<i>Duration in the U.S.</i>						
<=10 years				0.248	0.269	
>10 years				0.752	0.731	
Observations	226	760		641	5,927	

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

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