Race, Class, and Space: An Intersectional Approach to Environmental Justice in New York City

2018. Rachel G. McKane, Lacee Satcher, Stacey L. Houston II, and David J. Hess. Race, Class, and Space: An Intersectional Approach to Environmental Justice in New York City. *Environmental Sociology* 4(1): 71-92.

ABSTRACT

The present study contributes to the environmental justice literature by quantitatively examining spatial location within a city through an intersectional lens. Specifically, we develop the literature on longstanding conflicts over the location of bus depots and urban environmental inequality to study how patterns of racial, ethnic, and class inequality are related to distance to bus depots in four boroughs in New York City. We use a continuous measure of distance and examine the moderating effects of race, ethnicity, and class. Using census tracts as our unit of analysis, we find a general trend suggesting that census tracts with above-average percentages of racial and/or ethnic minority groups are located closer to bus depots, and we find that in three of the boroughs class moderates the relationship between racial composition and census tracts' distance to bus depots. However, we also show how these relationships vary across the boroughs. Thus, this article develops the study of environmental justice, transportation justice, and spatial location to examine how social disparities created by political and spatial divisions within cities are varied in their impact across intersecting social identities.

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) defines environmental justice (EJ) as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (Environmental Protection Agency 2016). The year 2014 marked the twentieth anniversary of President Bill Clinton's signing of Executive Order 12898 on Environmental Justice. Yet, despite the injection of EJ concerns into the policy arena, environmental inequity persists, as evidenced by incidences such as the aftermath of Hurricane Katrina, the Flint water crisis, and the South Dakota pipeline protests. Similarly, academic studies continue to demonstrate that racial minority groups and those with low socioeconomic status are disproportionately exposed to environmental hazards (e.g., Brulle and Pellow 2006; Chakraborty, Maantay, and Brender 2011; Grineski, Collins, and Chakraborty 2012; Mohai, Lantz, et al. 2009).

As Bullard (1996) and Schlosberg (2007) argue, the field of EJ is more than just the study of the siting of waste facilities and other hazards. A holistic understanding of EJ issues requires an analytic synthesis of not only racial and socioeconomic data with respect to environmental hazards but also space-specific historical contexts and theoretical insights from stratification studies, including critical race studies and intersectionality. Intersectionality, which draws attention to the cumulative effects of multiple disparities, provides the theoretical toolkit for understanding how intersecting identities are central to understanding struggles for social justice. This same concept can be applied to issues at the forefront of EJ, where race, ethnicity, and class produce cumulative effects. Furthermore, it is important to recognize space as equally important when assessing how racial and ethnic minority status, along with class, can shape and maintain

environmental inequity (Calmore 1999, Julius-Wilson 2009). The way people are distributed across space by race and class interacts with political, social, and environmental systems to create and sustain disparities of health and risk.

In order to examine the theoretical importance of spatial dimensions of intersectionality quantitatively, we analyze the relationship among distance to bus depots, racial and ethnic composition, and socioeconomic composition. The environmental risk posed by bus depots is imperative for understanding transportation justice in major metropolitan areas, as transportation justice is not only about providing access to public transit but also about ensuring that racial minorities and the poor have access to *healthy* forms of transportation. Bus depots are sites where buses are stored and served, and they often double as bus stations. Bus depots often have a large number of buses present at the same time, and these vehicles can idle for longer than a bus would at a standard bus stop. Bus depots can produce toxic emissions that endanger the wellbeing of those who live around them. Thus, EJ mobilizations have emerged in several cities, most notably in New York City (NYC), because of associated air-quality and health risks in an attempt to pressure governing bodies into providing cleaner sources of public transportation (Brown 2007, Hess 2007). The combination of NYC's unique history with EJ struggles and its racial, ethnic, and class diversity makes the city an excellent site for examining the relationship between intersecting identities and environmental inequity. In this context, the research questions that this study seeks to answer are:

1) What is the relationship between the racial, ethnic, and socioeconomic composition of census tracts and their proximity to bus depots in New York City?
2) How do intersections of race, class, and proximity to bus depots vary across the city's boroughs?

The present study contributes to the EJ literature that quantitatively examines inequality and intersectionality by examining one component of transportation justice: the demographic characteristics of areas surrounding bus depots. We take a spatial approach to intersectionality to demonstrate how the social study of space and the intersections of race, class, and other social categories within various spaces is valuable for understanding the spatial distribution of environmental inequity. Although there is some work that takes spatial location into account when examining the interactions of race, class, ethnicity, and other forms of inequality (e.g., Crowder and Downey 2010, Liévanos 2015), our study shows how location in a district within a city is associated with variations in the pattern of intersections of racial, ethnic, and class inequality with respect to EJ.

We pursue this project cognizant of Bullard (1996)'s distinction between environmental racism and EJ. Environmental racism refers to policies and practices that place a disproportionate burden of environmental hazards specifically on racial minority groups, whereas EJ refers to an unequal burden being placed on marginalized identities including but not limited to race, class, gender, etc. In this context, we define class as a diverse set of demographic characteristics including but not limited to income, poverty status, educational attainment, and employment. Although we argue in favor of the addition of intersectionality theory to EJ studies, we also recognize the importance of structural racism as an independent category (King 1988).

The first section of this article will summarize the history of transportation justice and the major mobilizations involving bus depots in New York City (NYC). The second section examines intersectionality theory and its linkages to the EJ literature. After this background discussion, we will present the data, methods, and results of the empirical analysis.

REVIEW OF THE LITERATURE

Transportation Justice in New York City

Although transportation justice is important for all residents in large cities, it is particularly imperative for racial minorities, the poor, the disabled, and women who disproportionately bear the burden of child rearing and the transportation of children to childcare facilities. Transportation barriers can hinder class mobility and create obstacles to job opportunities. In their comparative research on transportation justice in major U.S. cities, including NYC, Bullard and Johnson (1997) found that transportation benefits disproportionately favor the wealthy and educated over racial minorities and the poor. Cleaner modes of transportation, such as commuter rail, are often more accessible to wealthier white residents, while poorer communities of color can only access dirtier modes of transportation, such as buses.

In their subsequent work on transportation racism, Bullard, Johnson, and Torres (2004) explore how transportation justice is not just about increasing mobility, but also about equal access to healthy forms of transportation. Both EJ and public-health scholars have examined the health effects of urban air pollution and have noted the health implications for increased exposure to industrial and traffic-related pollutants (e.g., Brugge, Durant, and Rioux 2007; Maantay 2007; Zora et al. 2013). Thus, while access to transportation is imperative for minority communities, access to healthy transportation, including cleaner buses, is equally important in order to decrease racial health disparities.

Environmental justice groups in NYC have been mobilizing to fight for access to cleaner transportation since the late 1980s. West Harlem Environmental ACTion, Inc., or WE ACT for environmental justice, the first EJ organization in the New York run by people of color, was founded in 1988 to address community struggles with environmental hazards and accompanying

health disparities in NYC. Brown (2007) explores how WE ACT cultivated a community identity with respect to the experience of lung diseases, particularly asthma. In 1988, WE ACT sued NYC's Metropolitan Transportation Authority (MTA) over the construction of more bus depots, a source of inner-city air pollution. The organization also claimed that bus depots were disproportionately located in low-income communities of people of color (Shepard, Mark, and Foster 2006). In the late 1990s, WE ACT launched a campaign against dirty diesel buses called "If You Live Uptown, Breathe at Your Own Risk." This campaign was launched to bring attention to the health risks of dirty diesel buses and to push the city to invest in cleaner fuels for buses, such as natural gas and non-fossil fuel alternatives (WE ACT 2017). WE ACT expanded its political reach by partnering with academic researchers who were willing to participate in community-led research on air pollution from the NYC transit system and the accompanying health risks.

Asthma and other lung diseases continue to be a major health epidemic across the U.S. as evidenced by the growing number of asthma cases each year. Studies continue to show that there are significant racial differences among asthma sufferers, with African Americans having the highest asthma rates in the country. For example, Bhan et al. (2015) found that differences between African Americans and whites in asthma rates dramatically grew from 1999 to 2011: African Americans saw a 3.5% increase in asthma rates, whereas there was only a 1.5% increase in asthma diagnoses for whites. In NYC, these divisions are even more pronounced when examining hospitalization rates for asthma. For example, Claudio et al. (1999) found that hospitalization rates were twenty-one times higher for impoverished and minority neighborhoods. NYC continues to be one of the worst cities in the U.S. for air pollution, and it

ranks in the top fifteen cities for short-term and year-round particulate pollution (American Lung Association 2015).

The connection between particulate pollution and lung disease has been well documented in the health literature since the late 1980s (McClellan 1987; Kinney et al. 2002). One of the major sources of pollution in the inner city arises from transportation, with "dirty diesel" being particularly dangerous. Diesel engines, which have historically been used to fuel buses across the U.S., produce nitrogen oxides (NOx) and fine particulate matter (PM 2.5), both of which have been linked to asthma and other respiratory illnesses. "Clean Diesel," or emissions-controlled diesel (ECD), and compressed natural gas (CNG) were proposed as alternative technologies for city buses because both produce less air pollution (Hess 2007). However, neither of these options is truly "clean," especially in comparison to buses that use electricity or hydrogen. For example, the California Air Resources Board (2004, 2005) released studies that found that "clean diesel" buses had double the NOx emissions of CNG buses, but CNG buses emitted more aldehydes and ultrafine particles, both of which are harmful for human health.

Bus depots pose particular health risks for residents because they house numerous buses that can idle for long periods of time. In 1971 NYC passed an anti-idling law, but there is a major issue with enforcement. In 2009, NYC politicians proposed legislation to further restrict laws on idling, claiming that people let their vehicles idle because of poor enforcement. In 2015, legislation was introduced that would offer citizens monetary rewards for reporting idling vehicles. Idling buses pose a larger threat to human health, as opposed to cars, because diesel engines emit more pollution into surrounding areas. In their study on diesel exhaust particles in Harlem, Kinney et al. (2000) found that higher levels of elemental carbon on sidewalks were associated with the presence of a bus depot.

Research on the health impacts of dirty diesel and the toxicity of bus depots was spearheaded by citizen-science alliances that were catalyzed by WE ACT activists. Minkler et al. (2006) examine how community-based participatory research was pivotal in shaping a research agenda on environmental health in NYC. WE ACT partnered with Columbia University's Center for Children's Environmental Health to produce research on diesel bus pollution and lung-related illnesses in East Harlem. Their research shows that WE ACT and their academic partners played a pivotal role in the MTA's plan to switch its entire bus fleet to "clean diesel." Although this was a victory for the organization at the time, it fell short of their original goals to obtain 300 new CNG buses between 2000 and 2004 and to convert all the bus depots to CNG.

Because access to public transportation is an important amenity, especially for impoverished communities, it should be clear that the goal is not to eliminate bus depots; rather, the objective is to transition urban bus fleets so that their hazardous emissions are significantly reduced or even eliminated. There have been some victories in introducing CNG bus depots and buses into the current bus fleet, but there are only two bus depots that run completely on CNG: the West Farms Bus Depot in the Bronx and the Jackie Gleason Bus Depot in Brooklyn. According to a report generated by Columbia University at the request of New York City Transit, the bus fleet in 2016 contained 747 CNG, 1503 diesel, and 1672 hybrid-electric diesel buses (Aber 2016). The report was generated in order to evaluate the economic and environmental considerations of switching NYC's entire bus fleet to electric buses. The estimated health savings, calculated as a reduction in hospitalization, emergency room costs, and the cost of missing work, was estimated to be roughly $150,000 per bus. Although this translates to a $100 savings per year for every resident in NYC, when considering the racial disparities

associated with lung related illnesses, this change would lead to significant health improvements and a decrease in financial burdens for African Americans.

However, a swift change to electric buses is unlikely to be economical for large metropolitan areas. In April, 2017, the MTA announced a pilot program to test how electric buses will perform in NYC. The electric charging stations for the first five buses were planned for the Grand Avenue Bus Depot in Queens, an area that has the lowest percentages of African Americans and individuals living in poverty across the five boroughs (see Table 1). The second set of five buses was planned to be used on the M42 bus route in Manhattan, which only travels across midtown and does not service transportation to East Harlem or to other minority areas in upper Manhattan. Thus, the temporal issue of greening transportation in NYC involves intersections of space, race, ethnicity, and class. A just transition to healthier forms of transportation must take into account race and class disparities in the process of implementing cleaner buses and updating bus depots.

The linkage between pollution generated from buses and health disparities is well documented in the literature, which highlights the consequences of structural forms of racism and classism. However, an examination of the historical and cultural side of these phenomena highlights the process that led minority communities to a situation in which they are limited to dirty transportation and living in spaces associated with dirty transportation. Mills (2001) crafted the term “black trash” to represent the process by which racism has created a social schema that links people of color, and by extension low-income areas, to filth and waste. The systematic location of racial minorities in areas that are considered polluted, or vice-versa, suggests the need for ongoing attention to race, inequality, and spatial location in studies of EJ and health risks. These studies are valuable regardless of the documentation of actual health risks.

EJ, Intersectionality, and Space

Benjamin Chavis, head of the Commission for Racial Justice, defined environmental racism as "racial discrimination in environmental policy making, the enforcement of regulation and laws, and the deliberate targeting of communities of color for toxic waste facilities, the official sanctioning of the life-threatening presence of poisons and pollutants in our communities, and the history of excluding people of color from the ecology movements" (Bullard 1990). A research question that emerged from this definition is whether environmental inequity is a function of direct racial discrimination via the siting of these facilities or within the housing market, or whether class-based market dynamics create these unequal patterns.

Been (1994) argued that the race-versus-class argument is largely dependent on the spatiotemporal process of demographic change surrounding environmental hazards. Uncovering patterns of inequity requires more analysis than just determining whether the original siting of hazards was the product of racism and classism. For example, in an examination of locally unwanted land uses (LULUs) in metropolitan Texas, Yandle and Burton (1996) found that LULUs were initially sited in poorer white neighborhoods, but white flight could gradually change the racial and ethnic composition of these neighborhoods. Moreover, African-Americans and Latinos also tend to move into neighborhoods with higher hazard levels (Crowder and Downey 2010). In a study on Superfund sites in Florida, Streteskey and Hogan (1998) argued that even if indirect processes, such as changing prices in the housing market, create racial disparities surrounding hazards, then inequity still exists. Thus, instances of structural racism and classism are not limited to intentional government policies because the capitalist system can create and maintain racism and classism, regardless of intent. The notion of indirect processes creating disparities is parallel with the literature in feminism and intersectionality on the complex

relationship between multiple marginalized identities and capitalism (Davis 1978, Gimenez 2001).

Thus, the structural inequalities of race, class, ethnicity, and spatial location have been central to EJ research. Although early quantitative research in EJ often examined race and class separately, subsequent research addressed interactions of race, class, ethnicity, and immigration status (e.g., Crowder and Downey 2010, Liévanos 2015), and the study of interactions became a way to link quantitative EJ research to the study of intersectionality (Liévanos 2015). An intersectionality framework proposes that multiple categories of difference such as race, gender, age, (dis)ability, socioeconomic status, and sexuality interact at the level of individual and group experiences to reflect multiple interconnected social inequalities based on the outcomes of these interactions as it relates to power (Collins 2000, Crenshaw 1989). Within the EJ scholarship, an intersectionality perspective draws attention to the divergence of environmental risk both across and within these social categories. In turn, the spatial aspects of social inequality have observable impacts on the production and experience of disproportionate environmental risks, and thus an intersectional perspective should include the analysis of spatial differences in additional to the interactions of variables that are more commonly associated with structural inequality (Holifield, Porter, and Gordon 2009).

The value of utilizing an intersectional framework in examining and illustrating the complexity of the juncture between environmental risk, race, ethnicity, and class and of the creation and experience of environmental injustice is further demonstrated by several recent studies, including the following: Simpson (2002) on the devastating impacts of the environmental hazards faced by low-income black women in Memphis, Tennessee; Sicotte (2013) on the environmental burdens faced by racially diverse but socioeconomically

homogenous neighborhoods in the industrialized areas of Philadelphia; and Grineski, Collins, and Chakraborty (2013) on traffic-related air pollution faced by the disaggregated racial and ethnic groups within the traditionally (and problematically) aggregated Hispanic/Latinx category. These studies demonstrate how examining demographic characteristics surrounding environmental risks through an intersectional lens offers a more nuanced understanding of inequity.

When exploring the way in which race, ethnicity, and class shape the experience of environmental injustice, examining spatial differences within these contexts is necessary. Intersectionality, as well as critical race theory, contributes to an understanding of how space itself is a means to maintaining and creating power. Although the intersectional study of EJ from a spatial perspective is still in development, it demonstrates how the dominant groups develop and enforce both social and spatial boundaries for multiple types of inequality (Pellow 2016, Taylor 1997). These dynamics are long recognized in the broader context of urban studies of spatial disparities across race and class divisions, but in the context of quantitative EJ studies the intersectional perspective draws attention to the need to better understand the complex patterns of interaction among race, class, and spatial location within an urban area.

The most efficient and comprehensive methodological means by which to quantitatively assess intersectionality is heavily debated (e.g., Bowleg 2008, Bauer 2014). These debates carry over into the analysis of the interactions of race, ethnicity, class, and space. Because race, ethnicity, and class cannot always be treated as independent phenomena, the use of aggregate racial categories can be problematic because it can disguise within-group differences. For example, there is significant diversity within the black and Hispanic/Latinx racial and ethnic

communities in terms of nativity and citizenship status. Furthermore, data limitations prevent the examination of exposure to toxins using the individual as the unit of analysis.

Although not perfect, the use of aggregated data, such as the data presented in this article, can be used as a proxy for individual-level effects provided that the limitations are understood and future research extends to individual level analysis. EJ research has demonstrated interactions of race, class, ethnicity, and nativity status in studies at a national scale (e.g., Crowder and Downey 2010, Liévanos 2015), and researchers have also demonstrated that neighborhood effects are evident in spatially aggregated data sets (e.g., Downey and Hawkins 2008). This article adds to the conversation on the quantitative use of intersectionality in EJ studies by focusing on the interaction of multiple social categories with the spatial aspects of social inequality *within* a city by examining patterns within the boroughs of NYC. We recognize that our data are not simply numbers and figures, but representations of real people whose lived experiences in urban spaces like these and others are impacted by multiple social, political, and environmental forces in unique ways *because* of their social identities. Thus, this application of an intersectional lens to quantitative data does not seek to dilute the more nuanced, meaningful allocation of intersectionality hidden within the experiences of each person living and working in these communities; rather, such experiences could be used to engage our data in a way that offers richer analysis than previous EJ research.

Intersectionality theory is of particular importance for transportation justice, a topic long explored within the EJ literature. As shown in the previous section, transportation justice itself is a multifaceted, intersectional issue. Those with multiple marginalized identities are more likely to rely on buses as their primary mode of transportation and to live closer to particular types of public transportation. Although increasing mobility for marginalized populations is imperative,

the cost of increased mobility should not be poor health outcomes for communities that already face significant challenges. While the present study does not analyze health disparities surrounding bus depots, it does explore how the distribution of bus depots in various boroughs is an intersectional issue. Thus, by exploring how communities with multiple levels of marginalization assume a disproportional risk (i.e. living near bus depots), this research can both contribute to the theoretical and methodological development of EJ studies and provide useful information to citizen groups and policy makers.

DATA AND METHODS

Data

The data for this study come from two sources: bus depot data from the MTA of NYC and demographic data from the 2015 American Community Survey (ACS). The addresses provided by the MTA are geocoded into latitude and longitude coordinates using Google Maps. There are a total of 28 bus depots as well as two bus-maintenance facilities. Although there are bus depots close to NYC that are located in other states, we only use the bus depots in NYC because we are primarily interested in policy outcomes which are determined on a city and state level. We use demographic data on race, ethnicity, and class from the U.S. Census Bureau, using American Factfinder. The primary unit of analysis for this project is the census tract. The ACS—a national survey conducted by the U.S. Census Bureau every year or every three years, depending on the population size—provides census-tract data. Although the ACS samples a much smaller percentage of the population in comparison to the decennial census, it is widely considered to be an acceptable sample of the U.S. population in general. It also provides the margin of error for

every calculation made, which provides information on the precision of the estimate. The demographic data include all five boroughs of NYC: Manhattan, Brooklyn, Bronx, Queens, and Staten Island. All analyses presented in this study are based on complete cases. The resulting sample size is 748 for Brooklyn, 300 for the Bronx, 277 for Manhattan, 640 for Queens, and 107 for Staten Island. However, in Staten Island, there were no significant findings for the variables explored in this study. Therefore, in order to preserve space and present the findings concisely, estimates for Staten Island have been removed from the study.

Measures

Dependent Variable: Distance to the Nearest Bus Depot (miles). The dependent variable for this study is the distance from the geographic mean center of every census tract to the nearest bus depot (see Banzhaf 2012). The dependent variable is constructed by combining U.S. Census Shapefiles with longitude and latitude coordinates provided by NYC's MTA using ArcGIS. U.S. Census Shapefiles contain not only geographic information but also Federal Information Processing Standard (FIPS) codes for each census tract. The census-tract level of demographic data from the ACS was merged with the distance data using each tract's unique FIPS code. Figure 1 (generated using the rgdal and ggplot2 packages in R) depicts the distribution of the bus depots and maintenance facilities in NYC.

[Insert Figure 1 about here.]

Table 1 provides descriptive statistics for the means, percentages, and standard deviations for all study variables for each of the five boroughs. The average distance from the mean center of census tracts to the nearest bus depot is 1.65 miles in Brooklyn, 1.24 miles in the Bronx, 1.41 miles in Manhattan, and 1.58 miles in Queens. In other words, within each borough, on average,

all census tracts are located within two miles of a bus depot. The average distance to a bus depot is greatest in Brooklyn. However, the most variation in distance to bus depots is in Manhattan.

[Insert Table 1 about here.]

Independent Variables: (1) Race, Ethnicity, and Nativity, and (2) Socioeconomic Status. The independent variables are split into two primary categories: race, ethnicity, and nativity and socioeconomic status. The variables for race, ethnicity, and nativity include percent white, percent black, percent Hispanic, and percent foreign born. Percent white does not include those who identify as Hispanic and represents the percentage of white alone, not in combination with other races/ethnicities. Likewise, percent Hispanic and percent black are not in combination with other races/ethnicities. ACS provides continuous estimates for each of these variables, but we dichotomized the race/ethnicity variables such that census tracts with percentages above the average for the borough were coded as "1" and those at or below the average were coded as "0." We made this decision because the skewed distribution of the original variables led to potentially biased results with the continuous measures. However, the results using the continuous measure were similar to the results using the dichotomous measure aside from the Bronx. We also think that these variables better reflect the way in which decisions are made regarding EJ issues. More specifically, rather than examining the continuous percentages of minorities in a geographical area, policy makers and others are likely to gauge the extent to which areas are, for example, "blacker," than other areas. Dichotomizing the demographic composition variables in this way still yields considerable variation both within and across census tracts. In their dichotomous forms, these variables indicate the percentage of census tracts in each borough that have an

above average proportion of each racial/ethnic group. In Brooklyn, 47.19%, 42.25%, and 31.82% of census tracts have an above-average percentage of whites, blacks, and Hispanics, respectively. Additionally, on average, 3% percent of the population within these census tracts is foreign born. In the Bronx, there are considerably more census tracts with an above-average percentage of Hispanics (60%). Nearly a third of the census tracts in the Bronx have an above-average percentage of whites, compared to over forty percent of census tracts having an above-average percentage of blacks. The average percentage of the population that is foreign born is 34.02%. Manhattan has a relatively large percentage of census tracts with an above-average percentage of whites (57.40%). Additionally, 28.88% and 34.30% of census tracts have an above-average percentages of blacks and Hispanics, respectively. The average percentage of the population that is foreign born is 28.43%. Lastly, 49.22%, 26.09%, and 37.19% of census tracts in Queens have an above-average percentages of whites, blacks, and Hispanics, respectively. Queens also has the highest percentage of foreign-born individuals averaged across all tracts.

The variables for socioeconomic status include the following: percent unemployed, percent of individuals below poverty, and percent of the population 18-24 years old with less than a high school degree. Although average income (dollars) was also available in the ACS, we used a poverty indicator due to high rates of income inequality in NYC. In Brooklyn, across all census tracts, the average number of unemployed is 6.15%, the average of individuals below the poverty level is 21%, and the average of the population with less than a high school degree is 21.55%. The Bronx has highest average percent below poverty, at 29.58%. Additionally, on average, 8.31% of the population is unemployed and 22.49% of the population has a high school degree. In Manhattan, the average unemployed across all census tracts is 4.91%, the average percent below poverty is 17.42%, and the average percent of census tracts with a high school

education or less is 10.59%. Queens has similar socioeconomic status indicators. Specifically, the average percentages for unemployed, below poverty, and with a high school education or less are 5.65%, 14.07%, and 12.12%, respectively. In the analysis, we examine how these race, nativity, and ethnicity and socioeconomic indicators are associated with census tracts' distance to bus depots.

Analytic Strategy

In order to test an empirical model of the relationship between proximity to bus depots and race, ethnicity, and socioeconomic status, first we produced correlation matrices for each variable used in the study for each borough separately and with all the boroughs together (not included in results). These matrices demonstrated a moderate correlation between some independent variables but did not raise concerns regarding multicollinearity. We then estimated a series of multiple linear-regression models using distance to bus depots (miles) as the outcome. We estimated the same series of regressions for all census tracts in each of the four NYC boroughs separately and with all the boroughs together. We present only the results for each of the four NYC boroughs. We contend that aggregating the boroughs masks differing intersectional characteristics of the boroughs themselves and therefore misrepresents the patterning of distance to bus depots by racial/ethnic and class composition. Significant Breush-Pagan tests and Non-Constant Variance Score (NCV) tests (using the lmtest package in R) indicated the presence of heteroscedasticity across all statistical models. Therefore, we use heteroscedasticity-consistent standard errors to account for the unequal variability in the residuals (using the sandwich package in R).

The first model for each borough is an ordinary least squares regression (OLS) analysis that tests whether race, ethnicity, and socioeconomic status exhibit any main effects on census

tracts' proximity to a bus depot. In the second model, we added a series of variables representing interactions between the percentage of individuals in the census tract that fall below the national poverty line and whether or not the census tract has an above-average percentage of whites, blacks, and Hispanics. In this study we look at interactions among these four variables and not others due to potential issues with multicollinearity and multiple comparisons. For each analysis, multicollinearity was assessed with variance inflation factors (VIFs) using the car package in R. In the baseline models, the maximum VIF is below 10 in all of the models, indicating that multicollinearity is not substantially affecting estimates produced in these models. VIFs on interaction effects and their main effect components in the interactions models are over 10, as expected with the use of interaction terms. These models allow us to determine the extent to which race and ethnicity and one indicator of socioeconomic status (poverty) interact to pattern census tracts' proximity to bus depots. The results of these analyses are presented in the next section and discussed thereafter.

RESULTS

[Insert Table 2 about here.]

Table 2 presents the OLS results for distance to bus depots. Each borough examined in this study has a model depicting the main effects of the variables of interest (Model 1) and a model including interaction effects between percentage of the census tract in poverty and racial composition (Model 2). We begin by discussing the results of Model 1 for each of the four boroughs. With regard to race and ethnicity, the results diverge across boroughs. The general trend is that having an above-average percentage of minority groups (i.e., blacks or Hispanics) is negatively associated with a census tract's distance to a bus depot, but there are a few cases that diverge from this pattern. In Brooklyn, having an above-average percentage of blacks and having an above-average percentage of whites are both positively associated with distance to bus depots.

In three of the four boroughs, having an above average percentage of Hispanics within the borough is negatively associated with census tracts' distance to bus depots. This is the case in Brooklyn (b=-.267, p<.001), the Bronx (b=-.274, p<.001), and Queens (b=-.253, p<.001). In Manhattan, where having an above-average percentage of Hispanics is not significant, having an above-average percentage of blacks is negatively associated with distance to bus depots (b=-.880, p<.001). In Model 1, nativity is not associated with distance to bus depots except in Queens.

In three of the four boroughs at least one variable representing socioeconomic status of the census tract exhibits main effects on distance to bus depots. In each case, the relationship is negative, which indicates that poorer populations live closer to bus depots. In Brooklyn, the percentage of the census tract with a high school education or less is negatively associated with its distance to a bus depot (b=-.007, p<.01). In Manhattan, the percentage of the people in the census tract who are unemployed is negatively associated with distance to bus depots (b=-.042, p<.01). In Queens, the percentage of the census tract in poverty is negatively associated distance to bus depots (b=-.013, p<.001). The combination of these socioeconomic status indicators and the race and ethnicity indicators explain between 9% and 23% of the variance in distance to bus depots, with the most variance being explained in Manhattan.

[Inserts Figures 2-4 about here.]

Next, we turn to interaction effects in Model 2 to show how the interactions among race, ethnicity, and poverty in census tracts alter the main affects observed in Model 1. Interactions between percentage of the population in poverty and percent foreign born were tested, but yielded no significant results and are excluded in this analysis. In each borough, with the exception of Manhattan, there are significant interaction effects. The relationships indicated by

the interaction terms are presented in Table 1. Figure 2 (generated using the effects package in R) depicts the significant interaction between having an above-average percentage of Hispanics and the percentage of the population in poverty in Brooklyn ($b=-.011$, $p<.001$). For ease of interpretation, low poverty represents census tracts where poverty is one standard deviation below the mean, high poverty represents census tracts where poverty is one standard deviation above the mean, and medium poverty represents those tracts at mean poverty levels. For census tracts with a below average percentage of Hispanics, those with high levels of poverty are also located farthest from bus depots. However, the percentage of individuals in poverty moderates the association: for census tracts with an above-average percentage of Hispanics, those with high levels of poverty are closest to bus depots. This indicates that in Brooklyn census tracts with a high composition of Hispanics and individuals in poverty are closest to bus depots.

Figure 3 depicts the significant interaction between having an above-average percentage of blacks and the percentage of the population in poverty in the Bronx ($b=.012$, $p<.05$). Census tracts with a below-average percentage of blacks are farther from bus depots than those with an above-average percentage of blacks, but in census tracts with a below-average percentage of blacks, those with low poverty are located farther from bus depots. However, in census tracts with above-average percentage of blacks, there is no difference in distance to bus depots across poverty levels.

Figures 4 and 5 show the significant interactions between having an above-average percentage of blacks and percentage of the population in poverty ($b=.024$, $p<.01$) and having an above-average percentage of Hispanics and percentage of the population in poverty ($b=.042$, $p<.001$) in Queens. Figure 4 shows that census tracts with a below-average percentage of blacks are farther from bus depots than those with an above-average percentage of blacks. However,

poverty modifies the relationship between percentage black and distance to bus depots such that for census tracts with an above-average percentage of blacks the difference between poverty levels decreases. Lastly, Figure 5 depicts a similar relationship for Hispanics. Specifically, for census tracts with a below-average percentage of Hispanics, those with low and medium levels of poverty are farther from bus depots than those with high levels of poverty. However, poverty modifies the relationship such that for census tracts with an above-average percentage of Hispanics, there is no difference in distance to bus depots across poverty levels. In other words, the protection of having an economically well-off census tract is erased in census tracts with a high presence of Hispanics. The implications of these results for EJ are discussed in the following section.

DISCUSSION AND CONCLUSION

These findings support previous quantitative studies that find evidence of environmental inequity involving the interactions of race, class, and ethnicity (e.g., Crowder and Downey 2010, Liévanos 2015). Thus, this research contributes to growing appreciation of the role of intersectionality in EJ, suggesting that having a combination of marginalized statuses can lead to an increased exposure to pollution. However, we also take a within-city approach to show that the nature of these inequities is not uniform across political and spatial divisions within a city. For example, in Brooklyn, census tracts with a high Hispanic populations and high levels of poverty are located closer to bus depots. Therefore, the results for Brooklyn highlight a double disadvantage wherein the risk of exposure is increased by spaces being occupied by individuals with multiple, intersecting marginalized identities, thereby providing support for theories of intersectionality (e.g., Collins 2000; Crenshaw 1989). Interestingly, in Brooklyn, when below average levels of Hispanics are present, census tracts with low levels of poverty are farthest from

bus depots on average. Brooklyn is the only borough that demonstrates this pattern. The pattern may be indicative of moving patterns wherein economically privileged individuals move into areas traditionally occupied by those who are economically disadvantaged. Additional analyses that examine change over time in the relationship presented in this article may help shed light on this finding.

In the Bronx, Queens, and Manhattan, the story is more complicated. In the Bronx, census tracts that have a higher than average percentage of blacks are closer to bus depots, but the interaction between percent black and percent in poverty does not suggest a double disadvantage of being poor and African American. Nevertheless, the interaction does suggest that differences across poverty levels are diminished with the presence of high proportions of blacks. This is also evident in Queens with census tracts that contain a higher than average percent of blacks and census tracts that contain a higher than average percent of Hispanics. Comparing the Bronx and Queens, regarding blacks, it is clear that levels of poverty are predictors of distance to bus depots, whether there are high concentrations of blacks in the census tracts or not. However, these interactions for the Bronx, Queens, and Manhattan suggest that when racial or ethnic minority groups are a relatively high percent of the population, poverty does not really play a factor.

These complex interactions should not overshadow the fact that, overwhelmingly, census tracts with above average percentages of minorities are located closer to bus depots. Brooklyn is the only borough where a high concentration of racial/ethnic minorities is associated with *greater* variation in distance to bus depots among poverty levels, although the relationship still points to environmental injustice. In the Bronx, census tracts that contain a higher than average percent of Hispanics are closer to bus depots. In Queens, census tracts that contain a higher than

average percent of both Hispanics and blacks are closer to bus depots. In Manhattan, census tracts that contain a higher than average percent of blacks are closer to bus depots. Thus, in the Bronx, Queens, and Manhattan, the data suggest the presence of environmental racism that is not necessarily compounded with environmental classism (Bullard 1990). This finding may support Mills (2001)'s "black trash" thesis, and the systematic placement of racial minorities in polluted areas. However, the future analysis should consider the complex political and social structures within the city that can lead to this phenomenon over time.

Ultimately, these findings suggest that even within a city inequity varies by place, which has both methodological and theoretical implications in the field of EJ studies. First, spatial inequity implies that overly aggregated data (i.e., studies that aggregate entire cities, regions, or states), despite the unit of analysis, can obscure spatially specific patterns of injustice. Although Anderton, Oaks, and Eaga (1997) and Cutter, Holm, and Clark (1996) highlighted the risk of using overly aggregated data from larger geographic units, like counties or zip-codes, there can also be methodological issues with combining smaller units of analysis, such as census tracts, for statistical analysis. Aggregating census tract level data from a larger geographic unit, such as the entire U.S., can hide regional, state, and county differences. For instance, during the analytical process, the aggregation of all the boroughs in NYC obscured the nature of environmental inequity for particular boroughs. Future quantitative research in the field of EJ studies must take into account the significance of the social and political construction of space and consider using multiple statistical models, or multilevel modeling when applicable, to examine regional-level differences within a larger geographical unit.

Second, these findings support the calls from Liévanos (2015); Mohai, Pellow, and Roberts (2009); and Pellow (2016) on emphasizing the role of intersectionality theory in

understanding patterns of environmental inequity. We agree with the need to include intersectionality issues in the study of EJ, and we add that the way in which social categorizations overlap and intersect to create disadvantage and oppression is place dependent even within a city. This is particularly true when considering transportation justice, as transportation systems are usually created and maintained by city officials. While significant interaction terms denote the importance of evaluating the disadvantage of these marginalized identities, this research also suggests that environmental racism, and the permeation of white supremacy into political, social, and economic structures, continue to be important factors in quantitatively evaluating environmental injustice. Essentially, the data in this study suggest that environmental racism is a phenomenon of equal importance, and that places occupied by individuals of higher socioeconomic position are not always buffered from the role that racism plays in perpetuating unequal exposure to pollutants.

REFERENCES

Aber, Judah. 2016. *Electric Bus Analysis for New York City Transit*. New York City Transit. http://www.columbia.edu/~ja3041/Electric%20Bus%20Analysis%20for%20NYC%20Transit%20by%20J%20Aber%20Columbia%20University%20-%20May%202016.pdf.

American Lung Association. 2015. "Most Polluted Cities." http://www.stateoftheair.org/2015/city-rankings/most-polluted-cities.html.

Anderton, Douglas, John Oaks, and Karla Eaga. 1997. "Environmental Equity in Superfund Demographics of the Discovery and Prioritization of Abandoned Toxic Sites." *Evaluation Review* 21(1): 3-26.

Banzhaf, Spencer. 2012. *The Political Economy of Environmental Justice*. Stanford, CA: Stanford University Press.

Bauer, Greta. 2014. "Incorporating Intersectionality Theory into Population Health Research Methodology: Challenges and the Potential to Advance Health Equity." *Social Science & Medicine* 110: 10-17.

Been, Vicki. 1994. "Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?" *Yale Law Journal* 103: 1383-1411.

Bhan, Nandita, Ichiro Kawachi, Maria M. Glymour, and S.V. Subramanian. 2015. "Time Trends in Racial and Ethnic Disparities in Asthma Prevalence in the United States from the Behavioral Risk Factor Surveillance System (BRFSS) Study (1999-2011)." *American Journal of Public Health* 105(6): 1269-1275.

Bowleg, Lisa. 2008. "When Black + Lesbian + Woman ≠ Black Lesbian Woman: The Methodological Challenges of Qualitative and Quantitative Intersectionality Research." *Sex Roles* 59(5): 312-325.

Brown, Phil. 2007. *Toxic Exposures: Contested Illnesses and the Environmental Health Movement*. New York: Columbia University Press.

Brugge, Doug, John Durant, and Christine Rioux. 2007. "Near-Highway Pollutants in Motor Vehicle Exhaust: A Review of Epidemiologic Evidence of Cardiac and Pulmonary Health Risks." *Environmental Health* 6(23): 1-12.

Brulle, Robert and David Pellow. 2006. "Environmental Justice: Human Health and Environmental Inequalities." *Annual Review of Public Health* 27:103-124.

Bullard, Robert. 1990. *Dumping in Dixie: Race, Class, and Environmental Equity*. Boulder, CO: Westview Press.

Bullard, Robert. 1996. "Environmental Justice: It's More Than Waste Facility Siting." *Social Science Quarterly* 77(3): 493-499.

Bullard, Robert, and Glenn Johnson. 1997. Just Transportation: Dismantling Race and Class Barriers to Mobility. Gabriola Island, British Columbia: New Society.

Bullard, Robert, Glenn Johnson, and Angel Torres. 2004. Highway Robbery: Transportation, Racism, and New Routes to Equity. Atlanta, GA: South End Press.

California Air Resources Board. 2005. "Proposed Amendments to the Exhaust Emissions Standards for 2007- 2009: Model Heavy Duty Urban Transit Bus Engines and the Fleet Rule for Transit Agencies." http://www.arb.ca.gov /regact/sctransit/isor.pdf.

California Air Resources Board. 2004. "Study of CNG and Diesel Transit Bus Emissions." ftp://ftp.arb.ca.gov/carbis/.

Calmore, John. 1999. "A Call to Context: The Professional Challenges of Cause Lawyering at the Intersection of Race, Space, and Poverty." *Fordham Law Review* 67(5): 1927-1957.

Chakraborty, Jayajiy, Juliana Maantay and Jean Brender. 2011. "Disproportionate Proximity to environmental health hazards: Methods, models, and measurement." *American Journal of Public Health* 101(S1): S27-S36.

Claudio, Luz, Leon Tulton, John Doucette, and Phillip Landrigan. 1999. "Socioeconomic Factors and Asthma Hospitalization Rates in New York City." *Journal of Asthma* (36): 343-50.

Collins, Patricia Hill. 2000. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment.* New York: Routledge.

Crenshaw, Kimberle. 1989. "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory, and Antiracist Politics." *University of Chicago Legal Forum* 1(8): 139-167.

Crowder, Kyle, and Liam Downey. 2010. "Inter-neighborhood Migration, Race, and Environmental Hazards: Modeling Micro-Level Processes of Environmental Inequality." *American Journal of Sociology* 115(4): 1110-1149.

Cutter, Susan, Danika Holm, and Lloyd Clark. 1996. “The Role of Geographic Scale in Monitoring Environmental Justice.” *Risk Analysis* 16(4): 517-526.

Davis, Angela. 1978. “Race, Racism, and the Capitalist Setting.” *Black Scholar* 9(7): 24-30.

Downey, Liam, and Brian Hawkins. 2008. “Race, Income, and Environmental Inequality in the United States.” *Sociological Perspectives* 59(4): 759-781.

Environmental Protection Agency. 2016. “Environmental Justice.” https://www.epa.gov/environmentaljustice.

Gimenez, Martha. 2001. “Marxism, and Class, Gender, and Race: Rethinking the Trilogy.” *Race, Gender and Class* 8(2): 23-33.

Grineski, Sara Elizabeth, Timothy Collins, and Jayajiy Chakraborty. 2013. “Hispanic Heterogeneity and Environmental Injustice: Intra-ethnic Patterns of Exposure to Cancer Risks from Traffic-related Air Pollution in Miami.” *Population and Environment* 35(1): 26-44.

Hess, David J. 2007. “What is a Clean Bus? Object Conflicts in the Greening of Urban Transit.” *Sustainability: Science, Practice, and Policy* 3(1): 1-14.

Holifield, Ryan, Michael Porter, and Gordon Walker. 2009. "Introduction. Spaces of Environmental Justice: Frameworks for Critical Engagement." *Antipode* 41(4): 591-612.

Julius-Wilson, William. 2009. “Framing Race and Poverty.” *Contexts* 8(4): 84.

King, Deborah. 1988. “Multiple Jeopardy, Multiple Consciousness: The Context of a Black Feminist Ideology.” Signs: Journal of Women in Culture and Society 4(1): 42-72.

Kinney, Patrick, Mary Northridge, Ginger Chew, Wrik Gronning, Evelyn Joseph, Juan Correa, Swati Prakash, and Inge Goldstein. 2002. “On the Front Lines: An Environmental

Asthma Intervention in New York City." *American Journal of Public Health* 92(1): 24-26.

Kinney Patrick, Manessha Aggarwal, Mary Northridge, Nicole Janssen, and Peggy Shepard. 2000. "Airborne Concentrations of $PM_{2.5}$ and Diesel Exhaust Particles on Harlem Sidewalks: a Community-Based Pilot Study." *Environmental Health Perspectives* 108(3): 213–218.

Liévanos, Raoul. 2015. "Race, Deprivation, and Immigrant Isolation: The Spatial Demography of Air-Toxic Clusters in the Continental United States." *Social Science Research* 54: 50-67.

Maantay, Juliana. 2007. "Asthma and Air Pollution in the Bronx: Methodological and Data Considerations in Using GIS for Environmental Justice and Health Research." *Health and Place* 13: 32-56.

McClellan, Roger. 1987. "Health Effects of Toxic Exposure to Diesel Exhaust Particles." *Annual Review of Pharmacology and Toxicology* 27: 279-300.

Mills, Charles. 2001. "Black Trash." In *Faces of Environmental Racism: Confronting Issues of Global Justice*, edited by Laura Westra and Bill Lawson, 73-89. Lanham, MD: Rowman & Littlefield.

Minkler, Meredith, Victoria Vásquez, and Peggy Shepard. 2006. "Promoting Environmental Health Policy through Community-Based Participatory Research: A Case Study from Harlem, New York." *Journal of Urban Health* 83(1): 101-110.

Mohai, Paul, Paula Lantz, Jeffrey Morenoff, James S. House, and Richard Mero. 2009. "Racial and Socioeconomic Disparities in Residential Proximity to Polluting Industrial Facilities:

Evidence from the Americans' Changing Lives Study." *American Journal of Public Health* 99(S3): S649-S656.

Mohai, Paul, David Pellow, and J. Timmons Roberts. 2009. "Environmental justice." *Annual Review of Environment and Resources* 34: 405-430.

Pellow, David N. 2016. "Toward a Critical Environmental Justice Studies: Black Lives Matter as an Environmental Justice Challenge." *Du Bois Review* 13(2): 321-336.

Schlosberg, David. 2007. *Defining Environmental Justice: Theories, Movements, and Nature*. Oxford, U.K.: Oxford University Press.

Shepard, Peggy, Cecil Mark, and Sheila Foster. 2006. "Testimony to the Council of the City of New York, Committee of Transportation." http://old.weact.org/transportation/downloads/weact_testimony_2006-10-18.pdf.

Sicotte, Dianne. 2013. "Diversity and Intersectionality among Environmentally Burdened Communities in the Philadelphia Metropolitan Area, USA." *Urban Studies* 51(9): 1850-1870.

Simpson, Andrea. 2002. "Who Hears Their Cry? African American Women and the Fight for Environmental Justice in Memphis, Tennessee." In *The Environmental Justice Reader: Polictics, Poetics, and Pedagogy*, edited by Joni Adamson, Mei Mei Ecans, and Rachel Stein, 82-104. Tucson, AZ: University of Arizona Press.

Streteskey, Paul, and Michael Hogan. 1998. "Environmental Justice: An Analysis of Superfund Sites in Florida." *Social Problems* 45(2): 268-287.

Taylor, Dorceta. 1997. "Women of Color, Environmental Justice, and Ecofeminism." In *Ecofeminism: Women, Culture, Nature*, edited by Karen Warren, 38-81. Bloomington, IN: Indiana University Press.

United Church of Christ. 1987. *Toxic Waste and Race in the United States*. New York: United Church of Christ.

U.S. General Accounting Office. 1983. *Siting Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities*. Washington, D.C.: General Accounting Office.

WE ACT. 2017. "Dirty Diesel Campaign." https://www.weact.org/campaigns/dirty-diesel-campaign/.

Yandle, Tracy, and Dudley Burton. 1996. "Re-examining Environmental Justice: Race, Poverty, and Hazardous Waste Landfill Siting in Metropolitan Texas." *Social Science Quarterly* 77(3): 477-492.

Zora, Jennifer E., Stefanie Sarnat, Amit Raysoni, et al. 2013. "Associations between Urban Air Pollution and Pediatric Asthma Control in El Paso, Texas." *Science of the Total Environment* 448: 56-65.

Table 1. Weighted Means, Percents and Standard Deviations (SD) For All Study Variables

	Brooklyn (N=748)		Bronx (N=330)		Manhattan (N=277)		Queens (N=640)	
Variables	Mean/ Percent	SD	Mean/ Percent	SD	Mean/ Percent	SD	Mean/ Percent	SD
Distance to Nearest Bus Depot (miles)	1.65	0.68	1.24	0.48	1.41	0.89	1.58	0.74
Race and Nativity								
% Above-average White	47.19	-	23.72	-	57.40	-	41.81	-
% Above-average Black	42.25	-	40.54	-	28.88	-	26.09	-
% Above-average Hispanic	31.82	-	60.00	-	34.30	-	37.19	-
% Foreign Born	3.14	2.52	34.02	10.38	28.43	11.03	46.74	14.14
Socioeconomic Status								
% Unemployed	6.15	2.94	8.32	3.17	4.91	2.97	5.65	2.79
% Below Poverty	21.55	12.59	29.35	14.73	17.42	12.51	14.07	7.98
% High School Education or Less	13.94	10.82	22.49	12.76	10.59	12.06	12.12	9.74

Table 2. Ordinary Least Squares Regression Models for Distance Between Dyads Regressed on Select Race and Ethnicity and Socioeconomic Status indicators.

Borough	Manhattan (N=277)				Brooklyn (N=748)				Queens (N=640)				Bronx (N=330)			
	Model 1				Model 2				Model 1				Model 2			
Variables	*b*	*b*	se	se	*b*	*b*	se	se	*b*	*b*	*se*	*se*	*b*	*b*	*se*	*se*
Race and Nativity																
Above-average White	-.162	.390***	.232	.075	.343	.377	.446	.201	.071	.232**	.086	.087	.021	.025	.196	.224
Above-average Black	-.880***	.383***	.178	.074	-.512	.500*	.368	.204	-.503***	.091	.096	.091	-.822***	-.312	.181	.212
Above-average Hispanic	-.169	.267***	.143	.064	-.209	.021	.379	.138	-.253***	.274***	.065	.063	-.879***	-.337*	.143	.149
% Foreign Born	.004	.015	.006	.010	.004	.016	.006	.010	-.006*	.004	.002	.003	-.001	.005	.003	.003
Socioeconomic Status																
% Unemployed	-.042*	.018	.017	.061	-.042*	.021*	.021	.010	-.010	.009	.009	.008	-.008	.007	.009	.003
% Below Poverty	.014	.001	.007	.002	.031	.005	.017	.008	-.013**	.004	.004	.002	-.044***	.004	.009	.006
% High School Education or Less	-.008	.007**	.005	.003	-.009	.007**	.005	.003	-.004	.001	.003	.003	-.005	.001	.003	.003
Interactions																
White X % Below Poverty					-.029	.001	.024	.008					.002	.004	.011	.006
Black X % Below Poverty					-.015	.003	.016	.007					.024**	.012*	.009	.005
Hispanic X % Below Poverty					.002	.011**	.015	.005					.042***	.001	.008	.005
Adjusted R^2				.102				.111				.092				.101

*p<.05; **p<.01;***p<.001 (two-tailed tests).

Adjusted R^2	.200	.199	.195	.234

*p<.05; **p<.01;***p<.001 (two-tailed tests).

Figure 1: Distribution of Bus Depots and Maintenance Facilities in NYC

Figure 2: Interaction between Hispanic and Poverty in Brooklyn

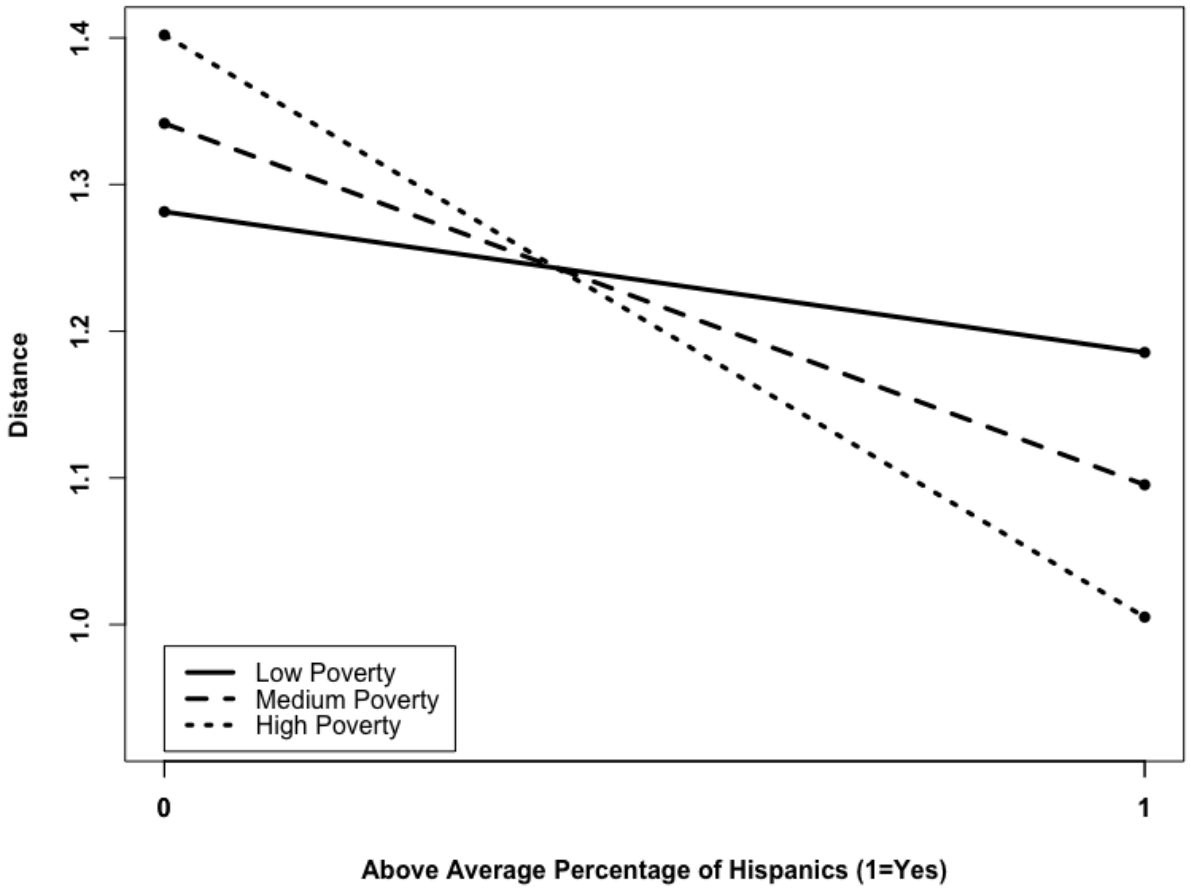

Figure 3: Interaction between Black and Poverty in the Bronx

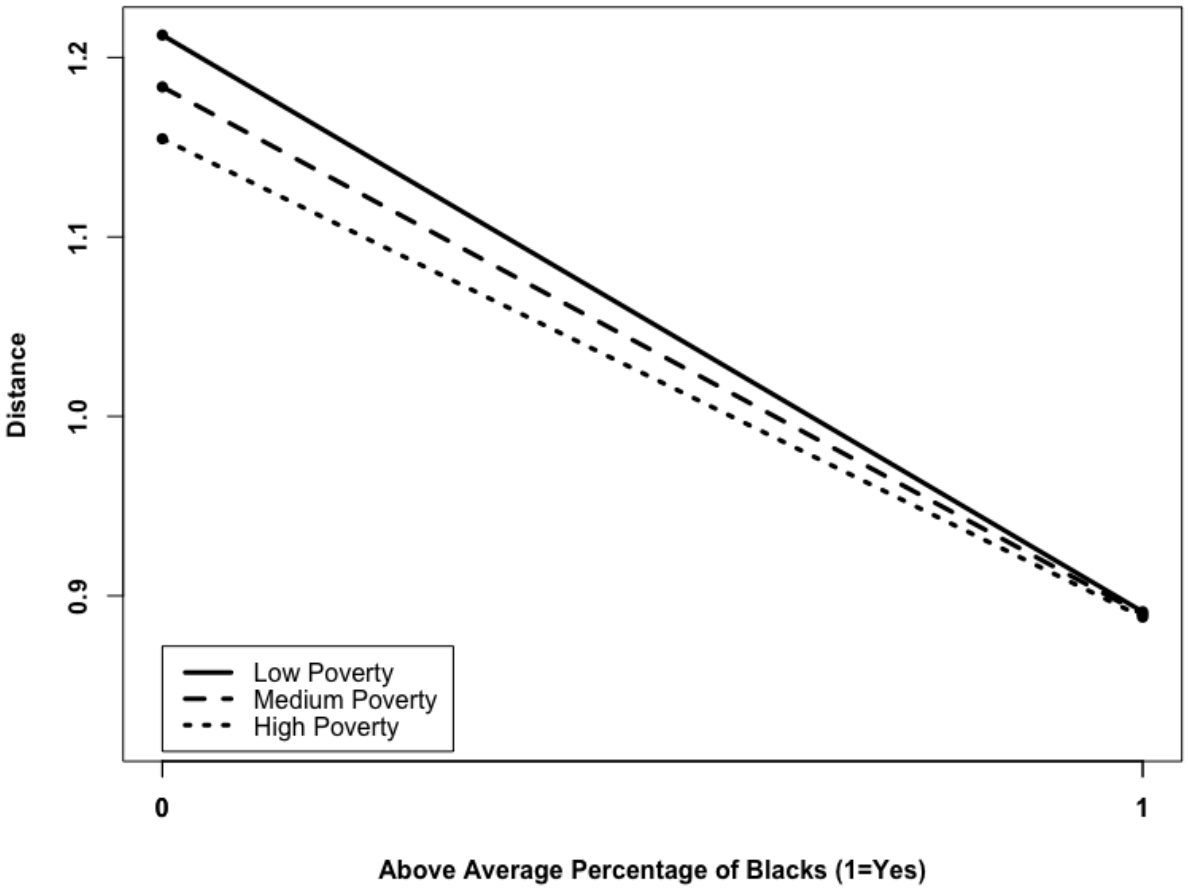

Figure 4: Interaction between Black and Poverty in Queens

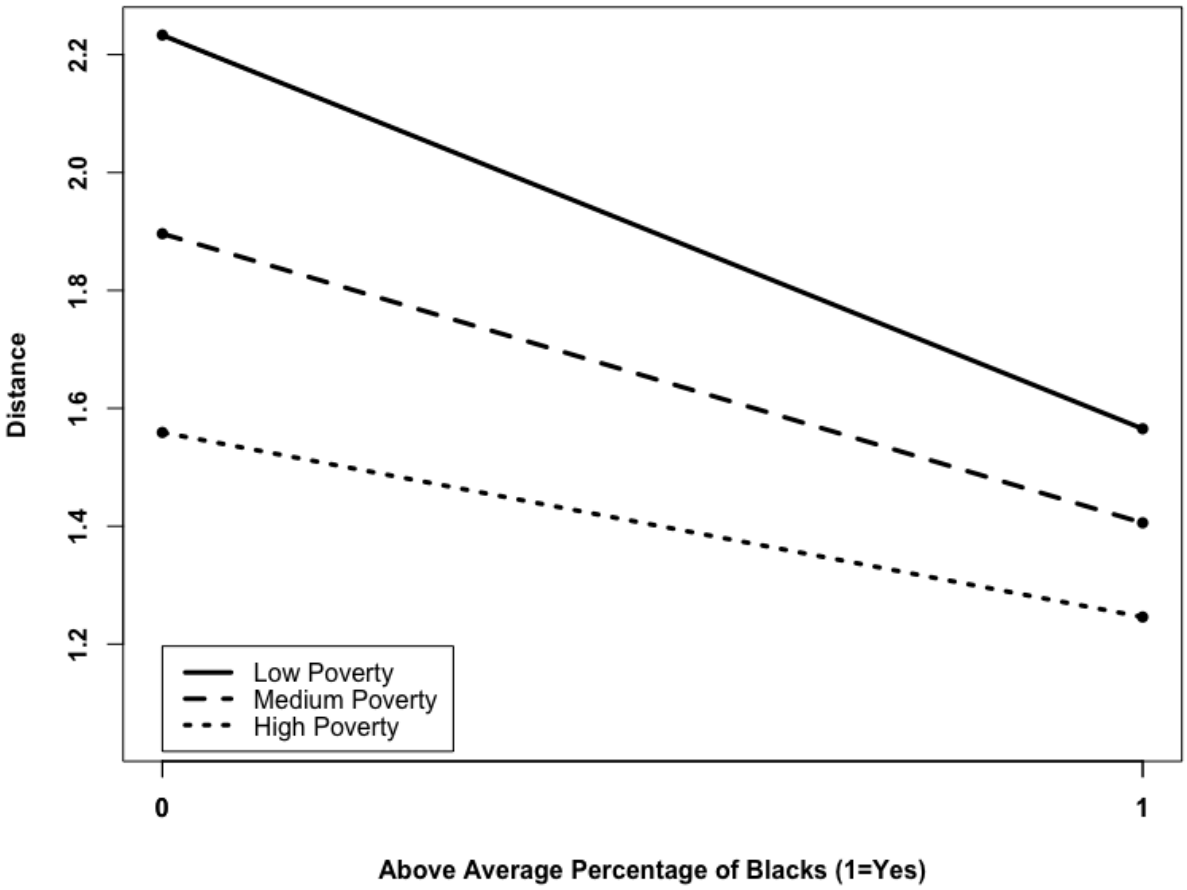

Figure 5: Interaction between Hispanic and Poverty in Queens