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Residential Segregation, Socio-economic Status, and Disability: A Multi-Level Study of Puerto Ricans in the United States

GIOVANI BURGOS AND FERNANDO I. RIVERA

ABSTRACT

Although socioeconomic status (SES) is hypothesized to be one of the key mechanisms that links segregation to health, there are no multilevel studies that examine if SES mediates the relationship between segregation and disability among Puerto Ricans across the U.S. This paper introduces the Racialized Place Inequality Framework and addresses three questions: Does segregation affect the likelihood that Puerto Ricans have a disability? Are higher levels of segregation associated with lower SES? Does SES mediate the relationship between segregation and disability? Multilevel results from the 2008-2010 American Community Survey (ACS) and 2000 U.S. Census show that segregation (1) increases individuals’ probability of having a disability, (2) is associated with lower levels of SES, and (3) affects disability directly and indirectly through SES. These findings indicate that segregation is a powerful upstream-macro level social structure that continues to limit the life chances of people of color in the U.S. through SES. [Keywords: Residential Segregation, Latinos, Puerto Ricans, Health Disparities, Disability, Racialized Place Inequality Framework]
Even after the passage of several housing acts (e.g., 1968 Fair Housing, Home Mortgage Disclosure), court rulings, and laws banning housing discrimination on the basis of race, ethnicity, and national origin (see Schwemm 2008), the United States remains a racially and ethnically segregated society (Stainback and Tomaskovic-Devey 2012). Latinos, who experienced overall increases in segregation from 1980 to 2000, are not only the second most segregated minority group after African Americans, but they also find themselves living in hyper-segregated areas (Iceland 2002; Reardon et al. 2009). Among Latinos, stateside Puerto Ricans have been, and continue to be, the most highly segregated ethnic group in the United States (Massey & Denton 1993; Vargas-Ramos 2006; Vélez and Burgos 2010). These residential patterns, where Whites are more likely to live in affluent suburban neighborhoods, while Blacks and Puerto Ricans live in economically disadvantaged urban areas, are considered to be synonymous with racism in that they reflect institutional acts of discrimination (Ellen 2008; South, Jeremy and Crowder 2011). As Williams and Collins (2001: 404) note, segregation is a direct result of systemic acts of housing discrimination that “protect Whites from interaction with Blacks” and other minorities and it also cements racial/ethnic inequalities across geographical space (Massey and Fischer 2000; Carr and Kutty 2008a). As such, segregation is deeply intertwined with the racialization of place.

The central academic and policy concern is that segregation may concentrate economic disadvantage in the communities where African Americans and Puerto Ricans live (Martin 2006). Although some of the pathways (e.g., SES) that may link residential segregation to the health of individuals have been hypothesized (see Acevedo-Garcia and Osypuk 2008; Williams, Sternthal and Wright, 2009), there is a need for multilevel research on the factors that link segregation, as a characteristic of place (e.g., county), to the health of Puerto Rican individuals. This dearth of research is surprising given persistently high levels of residential racial segregation between Puerto Ricans from non-Hispanic Whites (Vélez and Burgos 2010), the documented association between segregation and economic disadvantage (Charles 2003; Wilson 2009), the links between segregation and poor health (Landrine and Corral, 2009), the well established relationship between low socioeconomic status (SES) and poor health (Muntaner, Borrell and Chung 2007), and that Puerto Ricans are one of the most
economically disadvantaged groups in the U.S. (Santiago and Galster 1995; Bergad 2010) who also suffer from some of the worst health conditions of any group (Rivera and Burgos 2010). This limited amount of research on how segregation may harm the health of Puerto Ricans, and, more specifically, how segregation is related to disability is particularly striking in light of the recent surge in interest among social scientists on the relationship between structural characteristics of places and the life chances of individuals (Logan 2012).

This paper seeks the answers to three questions with the goal of informing broader sociological issues on how segregation affects the life chances of individuals, and the health of Puerto Ricans in particular.

The shortage of research on how segregation affects disability is unfortunate on several fronts. First, residential segregation is a powerful institutional barrier that systematically limits the life prospects of racialized minorities, including health. Second, the disability rate for Puerto Ricans has been found to be twice as high as the national average in highly segregated U.S. counties (Rivera and Burgos 2010). Third, as Jenkins (1991) argued, studying disability provides crucial insights into the study of social stratification and mobility because individuals with disabilities are more likely to be unemployed, have higher debt, lower incomes, live in substandard housing, and many suffer the indignities of discrimination and rejection. Long-term experiences with disability can also lead to the downward social mobility of families, which can hamper the life chances of children and youth. Fourth, the Centers for Disease Control (CDC) have acknowledged that there is limited research on minorities with disabilities, and maintain that more research is needed since such limited information hampers the development of targeted public health efforts designed to help at risk minority populations who suffer from disabilities (Centers for Disease Control and Prevention 2006). Thus, if Puerto Ricans have high rates of disability, and are residually segregated from non-Hispanic whites, their future may be limited. In short, research that examines how segregation is related to disability among Latinos (e.g., Puerto Ricans) is important and long overdue.

This paper seeks the answers to three questions with the goal of informing broader sociological issues on how segregation affects the life chances of individuals, and the health of Puerto Ricans in particular. First, using data from the 2008–2010 American Community Survey and the 2000 U.S. Census Summary Files (SF) 1 and 3, we rely on
a hierarchical/multilevel statistical framework (see Raudenbush and Bryk 2002) to examine if county-level segregation increases the likelihood that Puerto Ricans have a disability. Relative to aggregate population-level studies on segregation and health, there are only a few multilevel investigations on this topic, despite a strong plea for multilevel research (Williams and Collins 2001; Acevedo-Garcia and Lochner 2003). Even less is known about the effects that segregation has on Puerto Rican health, given that the available multilevel evidence is restricted to Puerto Ricans in Chicago (Lee and Ferraro 2007; Lee 2009)—a city with one of the highest rates of Puerto Rican segregation from non-Hispanic Whites in the U.S. (Vélez and Burgos 2010). By using recent data from 72 counties with large Puerto Rican populations and with hugely different structural conditions, this study provides both a more recent and geographically broader view of the longitudinal effects that segregation may have on the health of this marginalized population.

Second, we assess whether socioeconomic status (SES), which is considered one of the most important factors that may link segregation to health (Williams et al. 2009), operates as an intervening variable between segregation and disability. Specifically, we examine if Puerto Ricans living in counties with high levels of segregation tend to have lower SES levels (income, education, occupational prestige, and poverty) than Puerto Ricans living in counties where they are less isolated from non-Hispanic Whites. Our third and final question explores if SES mediates the relationship, if any, between segregation and disability. Mediation can be observed if segregation directly affects SES, and then, if the relationship between segregation and disability is no longer statistically significant once SES is taken into account in multivariate models.

Given that most research examines the question of whether segregation directly affects the health of African Americans, there is a particularly strong need for theoretically driven scholarship (see Palloni and Morenoff 2001) that explores how meso and micro-level structural conditions (e.g., human capital/SES) mediate the relationship between segregation and the health of Latinos, and especially, the health of Puerto Ricans. In this article, we introduce the Racialized Place Inequality Framework (RPIF) and argue that segregation limits Puerto Rican life chances, such as poor health, by concentrating Puerto Rican economic disadvantages (see also Ellen 2008; Santiago and Galster 1995; Massey and Bitterman 1985). According to this framework, the mediating effect of SES is theoretically expected and does not minimize the importance of segregation as a powerful upstream structural factor (see also McKinlay 1996). This study is, to the best of our knowledge, the first and largest multilevel study to examine if SES mediates the relationship between segregation and Puerto Rican disability.
The next section of this paper (Review of the Literature) frames the literature review on segregation within the culture of poverty debate, since much of the literature on segregation developed as a structural critique of cultural arguments that blamed Black and Puerto Rican poverty on their cultural pathology. We highlight some of the major reasons why the U.S. remains a segregated society, before briefly introducing our Racialized Place Inequality Framework, which describes some of the key mechanisms through which segregation may be related to health. The section that follows (Segregation and Health: Multi-Level Studies) provides a succinct review of multilevel studies on segregation and health and shows that the mechanisms that link segregation to health are largely untested. The last sections of this paper include Data and Methods, Results, and Discussion.

REVIEW OF THE LITERATURE

Explanations of Puerto Rican Life Chances: Culture vs. Structure

If we look more broadly at accounts of Puerto Rican and Latino health they tend to parallel the culture of poverty debate that has influenced much of the work on segregation and the life chances of African Americans and Puerto Rican individuals. Before the year 1980, little was known about the health of Latinos from different ethnic backgrounds (e.g., Cubans, Puerto Ricans, Mexican) in the United States. But during the past 30 years, a large body of literature has revealed significant health disparities between Puerto Ricans and other groups across a wide spectrum of health outcomes, including disability (for a review, see Rivera and Burgos 2010). However, at this point in our knowledge base, there are few explanations for such health disparities between Puerto Ricans and other groups (Tucker et al. 2010) because the focus has largely been on documenting such differences rather than on explaining them. Still, prevailing explanations of poor health, not just in the case of Puerto Ricans, but for other Latino groups as well, tend to focus on individual risk factors like culture (i.e., narrowly defined as values and beliefs), health behaviors (e.g., diet and exercise), lifestyle choices (e.g., doctor’s visit) and basic demographic factors such as age, gender, and race (see Hunt, Schneider and Comer 2004).

Recently, Acevedo-Garcia (2008: 200) argued that because health disparities are not randomly distributed across different geographies, there is an imperative to “look for solutions to health disparities beyond individual risk factors.” More specifically, Acevedo-Garcia et al. (2008) suggested that segregation is a structural characteristic of place that sets into motion a series of disadvantages (e.g., economic disadvantage) that are, in turn, related to poor health. In order to understand the
links between segregation and health, however, we first have to understand the broader research on segregation.

**Segregation and Structural Explanations of Puerto Rican Life Chances.**

Much of the work on segregation has been a response to arguments that blame Black and Puerto Rican poverty—and other social disadvantages—on cultural deficiencies that allegedly characterize these two groups (see Tienda 1989). For instance, the relative lack of Puerto Rican upward mobility has been attributed to individual characteristics such as lack of ambition, poor work ethic, hopelessness and helplessness, lack of job skills, limited English proficiency, and lack of discipline, among other so-called “cultural deficiencies” (see Cameron, Cabaniss and Teixeira-Poit 2012; Small, Harding and Lamont 2010). As Fineman (2012) argues, cultural arguments have been used to demonize and characterize economically marginalized populations with words such as “dependent”, lacking “moral responsibility”, “undeserving dependent welfare recipients”, among other derogatory terms that attribute group disadvantages to over-individualistic personal failings (see also Piven 2012; Mayhew 1980; Schram, Soss, Fording and Houser 2009).

The response by sociologists was to emphasize structural conditions as the source of Black and Puerto Rican limited life chances, rather than individual or cultural failings. Scholars such as Massey and Denton (1993), William Julius Wilson (2009), Jargowsky, (1996), and Martin (2006) stressed that the plight of Blacks and Puerto Ricans living in Barrios and Ghettos was not exclusively rooted in cultural deficiency, but rather, founded on structural conditions such as segregation, de-industrialization, lack of suitable jobs, and discrimination in the job and housing markets. These conditions cemented disadvantages in poor neighborhoods that were predominantly Black and Puerto Rican—with few White individuals. In essence, the life chances of Blacks and Puerto Ricans were tightly intertwined with the racialization of place, as predominantly Black and Puerto Ricans neighborhoods were characterized by problems such as poverty, unemployment, crime, and failing schools that limited upward social mobility. As Carr and Kutty (2008b: 1) succinctly argued, “Denial of access to housing is arguably the single most powerful tool to undermine and marginalize the upward mobility of people.” With respect to the current housing crisis, Rugh and Massey (2010) maintain that segregation “concentrates the effects of any economic downturn spatially . . . and hit Black and Hispanic neighborhoods with particular force”. As such, place stratification scholars have referred to residential segregation as the “lynchpin of American race relations” (Bobo and Zubrinsky 1996).
In particular, place stratification theorists maintain that high levels of segregation cannot be fully explained by the housing choices of individuals, to the extent that Blacks and Puerto Ricans choose to live exclusively with people of similar backgrounds (Charles 2003; Bobo and Zubrinsky 1996). Instead, segregation is largely a result of widespread housing discrimination instituted by individuals, businesses, and the government that prevents many people of color from finding housing in resource-rich White communities (U.S. Housing Scholars & Research and Advocacy Organizations 2008; Massey 2008; Roscigno, Karafin and Tester 2009). For example, the U.S. Federal Government has been complicit in creating segregation by building housing projects in urban-minority communities; local governments have passed building codes limiting the number of people living in an apartment, and they have also placed restrictions on the building of multi-unit dwellings; banks have *redlined* predominantly minority areas on a map for the sole purpose of denying mortgages to minorities in those communities, and, they are also more likely to offer subprime mortgages to minorities in minority areas; insurance companies are more likely to deny mortgage insurance to minorities which makes owning a home in more expensive/exclusive neighborhoods unlikely; real estate agencies have *steered* minorities away from White neighborhoods; landlords refuse to rent to minorities in White neighborhoods and to individuals with section 8 vouchers; and, Whites have shown strong preferences to live in all White communities, including leaving neighborhoods that are “turning” and becoming more racially and ethnically diverse—a process known as “White flight” (Miller, Vandome and McBrewster 2009).

The main drawback of the place stratification literature on how segregation limits the life chances of African Americans and Puerto Ricans is that most studies are conducted at a macro-structural level, such as metropolitan areas, states, or counties.

And while African Americans have been the primary targets of these practices, there is also some recent evidence indicating that Latinos can experience even higher levels of housing discrimination than African Americans (Turner 2008; Ross and Turner 2005), and that segregation has been increasing between Latinos and non-Hispanic Whites (Wilkes and Iceland 2004). Among Latinos, Puerto Ricans are the most segregated group (Vargas-Ramos 2006). Massey and Denton suggest that Puerto Ricans—many who are dark skin and/or of black phenotype—also experience high levels of segregation in the housing market due to racial discrimination (Massey and Denton 1993; Massey...
and Denton 1989). Vélez and Burgos’ (2010) recent study further reveals that in the year 2000 there were nine metropolitan areas (mostly in the Northeast) with high levels of segregation between Puerto Ricans and non-Hispanic whites.

The main drawback of the place stratification literature on how segregation limits the life chances of African Americans and Puerto Ricans is that most studies are conducted at a macro-structural level, such as metropolitan areas, states, or counties. Although the place stratification literature is replete with insights on how segregation affects the life chances of individuals (as described above), such aggregate level studies do not test the mechanisms that may link segregation to the life chances of individuals. The Racialized Place Inequality Framework that we briefly introduce in the next section suggests that the health effects of segregation are best captured if we think of individuals as being part of an interlocking system that ranges from the microsystem of the family, to the macrosystem of governmental, social, and economic policies. All these social systems pose significant risk and opportunities for the development of both good and poor health among individuals of all backgrounds.

**The Racialized Place Inequality Framework (RPIF).**

The RPIF that appears in Figure 1 captures some of the key mechanisms that link residential segregation to the life chances of Puerto Ricans. Although RPIF draws on many of the untested insights of place stratification scholars, it extends our knowledge on how segregation affects individuals by arguing that the effects of segregation on health are better understood if we place individuals within a multilevel context, as suggested by Social Structure and Personality (SSP) scholars (McLeod and Lively 2003). Briefly, McLeod and Lively (2003) conceive of the SSP paradigm as a set of embedded circles with the individual at the inner-core. Individuals are influenced by an ever larger and more complex system of social relationships. The most proximal social structures, those closest to the individual are in the form of dyads and small groups. More distal social structures at the meso-level, ones that can impact the individual, although not to the same extent as the more proximal structures, include communities, neighborhoods, and meso-level contexts such as the school and the workplace environments. The larger layers of the social structure nexus include organizations and institutions, such as the criminal justice system or the health care system. The most outer layer includes the macro social system, which encompasses all the inner and more proximal social structures, and includes elements such as the composition of the labor market and system of social stratification (e.g. income inequality, ideologies).

The RPIF that appears in Figure 1 combines largely untested insights from the place stratification framework and the SSP paradigm and suggests that residential
Figure 1. Racialized Place Inequality Framework of the Multilevel Pathways That Link Residential Racial/Ethnic Segregation to Health

- **Macro-Level** (e.g., Metro-Area, State, County)
  - **Residential Segregation**
    - **Concentrated Neighborhood Disadvantage**: unemployment, poverty, crime, male incarceration, school dropout rates
    - **Health Care Access & Quality**: uninsured population, few advanced medical technologies, few specialists, and few certified doctors
    - **Toxic Environment**: air pollution, toxic waste dump sites, contaminated housing, noise pollution
    - **Poor Built Environment**: few parks & recreation, many fast food restaurants, few supermarkets
  - **Micro-Level** (e.g., human, social, cultural, and social capital, stress)
    - **Human Capital**: income, education, occupational prestige, wealth, poverty status
    - **Social Capital**: network ties, social support, trust, collective efficacy
    - **Cultural Capital**: values, beliefs, health promoting behaviors, self-efficacy, locus of control, repertoires, frames, narratives
    - **Stress**: life events, chronic stress, daily hassles, discrimination
  - **Mental Health**
  - **Physical Health**
Residential segregation is a macro-level social structure that affects the health of individuals through more proximal social structures at the meso and micro-levels. For instance, segregation directly affects meso-level conditions in that it restricts access to good paying jobs, limits enrollment in good quality schools, concentrates neighborhood poverty, restricts access to quality health care, and forces African Americans and Puerto Ricans to live in toxic environments (e.g., highway pollution) that are poorly built (e.g., dilapidated housing). These meso-level social structures, in turn, are related to micro-level social factors that are related to health, such as SES, network ties, cultural orientations, and discrimination stress (Rugh and Massey 2010; Massey 2008; Landrine and Corral 2009). Although the effects of segregation on health operate indirectly through meso and/or micro-level social structures, Figure 1 also shows that segregation can affect health directly. Still, the mechanisms that link segregation to the health of Puerto Ricans remain largely untested.

The RPIF that we briefly introduce, partially develop, and test in this article (Figure 1) draws on insights from the Place Stratification framework and the Social Structure and Personality paradigm to identify some of the key mechanisms that link residential segregation, as a macro-level characteristic of place, to the well being of Puerto Ricans. We focus on one particular pathway and examine if segregation is related to Puerto Rican disability through socioeconomic status (income, education, occupational prestige, and poverty). We are particularly interested in testing if SES mediates the relationship between segregation and disability. Taken as a whole, the major contribution of the RPIF is that it draws on the SSP paradigm and provides a theoretically informed way to evaluate many of the untested insights of place stratification scholars on how residential segregation is related to health.

**Segregation and Health: Multi-Level Studies.**

The overwhelming majority of studies on segregation and health are aggregate population-level studies. Given that these studies tend to find that segregation is harmful to the health of African Americans (Nuru-Jeter and LaVeist 2011; Collins and Williams 1999; LaVeist et al. 2008), place stratification health scholars consider segregation to be the “cornerstone on which black-white disparities in health status have been built in the US” (Williams and Collins 2001: 405). Recently, researchers have turned their attention to the multilevel effects that segregation may have on health. While the empirical evidence of these hierarchical investigations supports the central tenet of the place stratification framework, there are fewer than 40 such studies, and less than a handful multilevel investigations that focus on Latinos. Only two of these multilevel studies included samples of Puerto Ricans (Lee 2009; Lee and Ferraro 2007).
In both absolute numbers and compared to aggregate studies on segregation and population health (for a review, see Kramer and Hogue 2009), multilevel studies have focused on only a few health conditions. The most commonly studied conditions are childhood related and include low birth-weight (Bell et al. 2006; Ellen, Cutler and Dickens 2000; Grady and McLafferty 2007; Grady 2006), fetal growth restrictions (Bell et al. 2006), and preterm disparities between Blacks and Whites (Osypuk and Acevedo-Garcia 2008). The other two most commonly examined outcomes are weight-related, including overweight/body mass index and lack of exercise (Chang 2006; Mellerson et al. 2010; Mobley et al. 2006), followed by studies on self-rated health (Robert and Ruel 2006). The remaining studies focus on physical health, including risk of coronary heart disease (Mobley et al. 2006), acute physical symptoms and disability (Lee and Ferraro 2007), early diagnosis of cancer (Haas et al. 2008), risk of violent injury (Fabio, Sauber-Schatz, Barbour and Li 2009), and odds of HIV testing (Ford et al. 2009). Only one study looked at mental health as measured by depressive symptoms (Lee 2009). Almost every one of these studies found a significant and direct relationship between segregation and poor health.

Unfortunately, little is known about many of the theorized mechanisms found in Figure 1 (e.g., SES) that link segregation and Latino health in general. More specifically, few studies, if any, trace the mechanisms that link segregation to Puerto Rican disability. Lee found (2009) that although segregation affected the mental health of Puerto Ricans in Chicago, such a relationship was not significant once controls for neighborhood level income and other individual level risk factors (e.g., acculturation, high school graduation, acute physical symptoms) of mental health were statistically controlled. In another Chicago based study, Lee and Ferraro (2007) found that segregation was more harmful to the health of Puerto Ricans than to the physical health (i.e., acute physical symptoms and a 3-item index of disability) of Mexican Americans. Aside from these two studies, we know little about the multilevel effects that segregation has on Puerto Rican health across the U.S. Moreover, there is a dearth of empirical work that examines the relationship between segregation and the many conditions that disproportionality afflict Puerto Ricans, such as high rates of disability.

DATA AND METHODS
This paper merges individual-level data from the 2008-2010 American Community Survey’s (ACS) Public Use Micro-Data Samples (PUMS) with county-level data from the 2000 U.S. Census Summary Files 1 and 3. This allows us to examine the effects that county level variables have on individual level characteristics, including disability (see Table 1 for descriptive statistics of county and person level variables). The combined data are used for the multilevel analyses where individuals are nested within counties.
The ACS is a monthly rolling sample of households and individuals within those households and was designed to approximate and ultimately replace estimates from the U.S. Decennial Census long form. The primary goal of the ACS is to provide both policy makers and researchers with data on the social and economic well being of the population, such as occupational prestige, income, education, poverty, disability status, family composition, migration, and race/ethnic background on a timely basis. All person level variables (i.e., level-1 variables a multilevel statistical context) in this study came from the ACS PUMS data. Complete descriptions of the complex cluster-sample design of ACS PUMS data have been widely disseminated elsewhere (Ruggles et al. 2010; U.S. Census Bureau 2006).

Structural or level-2 variables at the county level come from two other data sets: 2000 Census Summary File 1 (SF 1) and Summary File 3 (SF 3). Whereas SF 1 is based on the Census 2000 Short-Form and contains 100-percent data on population characteristics such as age, sex, ethnicity, race, household relationships, family composition, and other basic demographic factors (U.S. Census Bureau, 2001a), SF 3 contains a more extensive list of variables and is based on sample (i.e., not a complete count) data (U.S. Census Bureau, 2001b). Estimates from these summary files can also be produced for the whole nation down to the block level.

To combine these data, we matched respondents from the ACS PUMS data to the county where they reside. The ACS PUMS data were then merged with SF 1 and SF 3 by county code. We selected counties with a population of 1,000 or more Puerto Ricans (estimated from SF 1) given that a large number of Puerto Ricans is necessary to create reliable segregation indices (Wilkes & Iceland, 2004, p. 24), and reliable multilevel regression parameters (Raudenbush & Bryk, 2002). These criteria resulted in a large sample of Puerto Ricans (n = 44,661) living in 72 different counties throughout the U.S.—or about 620 Puerto Ricans per county. When the data are weighted, they represent a population of 1,958,100 Puerto Ricans in the U.S. To date, this is largest and most geographically varied multilevel study on segregation and Puerto Rican health.

**Person Level-1 Variables from 2008-2010 ACS**

**Dependent Variable.** Disability: The U.S. Census defines disability as a long-lasting sensory, physical, mental, or emotional condition. This condition can make it difficult for a person to do activities such as walking, climbing stairs, dressing, bathing, learning, or remembering. It can impede a person from being able to go outside the home alone or to work at a job or business, and it also includes persons with severe vision or hearing impairments (U.S. Census Bureau 2007). In this ACS PUMS sample, respondents were asked six yes or no questions on whether they had any of the following difficulties: 1)
cognitive 2) ambulatory (e.g., walking, climbing stairs), 3) independent living, 4) self-care, 5) vision, and 6) hearing. For all these questions, the answers were coded 1 = Yes and 0 = No. Disability refers to a yes response to any of the disability questions described above.

### TABLE 1. DESCRIPTIVE STATISTICS FOR SELECTED 2008-10 ACS PERSON-LEVEL VARIABLES AND U.S. CENSUS 2000 SF 1 AND 3 CENSUS VARIABLES

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.E.</th>
<th>Range</th>
<th>Any Disability</th>
<th>No Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPENDENT VARIABLES: DISABILITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Difficulty</td>
<td>0.073</td>
<td>0.001</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Ambulatory (e.g., walking, climbing stairs) Difficulty</td>
<td>0.080</td>
<td>0.001</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Independent Living Difficulty</td>
<td>0.057</td>
<td>0.001</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Self-Care Difficulty</td>
<td>0.027</td>
<td>0.000</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Vision Difficulty</td>
<td>0.029</td>
<td>0.001</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Hearing Difficulty</td>
<td>0.117</td>
<td>0.003</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Any Disability</td>
<td>0.152</td>
<td>0.002</td>
<td>0 - 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>LEVEL-1: PERSON VARIABLES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>38.060</td>
<td>0.124</td>
<td>18.0 - 64.0</td>
<td>44.337</td>
<td>36.93***</td>
</tr>
<tr>
<td>Male (1=male) [0=female]</td>
<td>0.473</td>
<td>0.002</td>
<td>0 – 1</td>
<td>0.151 (0.153)</td>
<td>0.849 (.847)</td>
</tr>
<tr>
<td>Married (1=married) [0=other]</td>
<td>0.357</td>
<td>0.005</td>
<td>0 – 1</td>
<td>0.110 (0.173)</td>
<td>0.889 (.827)**</td>
</tr>
<tr>
<td>Black (1=Black) [0=Mixed or White]</td>
<td>0.054</td>
<td>0.001</td>
<td>0 – 1</td>
<td>0.151 (0.169)</td>
<td>0.831 (.849)*</td>
</tr>
<tr>
<td>P.R. Born (1=yes) [0=no]</td>
<td>0.386</td>
<td>0.002</td>
<td>0 – 1</td>
<td>0.203 (0.119)</td>
<td>0.797 (.880)**</td>
</tr>
<tr>
<td>Total personal income (logged)</td>
<td>9.973</td>
<td>0.006</td>
<td>1.609 – 15.046</td>
<td>9.523</td>
<td>10.054***</td>
</tr>
<tr>
<td>Education (1= no high school . . . 17 = Doctoral Deg.)</td>
<td>6.282</td>
<td>0.013</td>
<td>1.0 – 17</td>
<td>5.139</td>
<td>6.487***</td>
</tr>
<tr>
<td>Poverty Threshold (&lt; 1 = below poverty)</td>
<td>2.957</td>
<td>0.010</td>
<td>1.0 – 5.0</td>
<td>2.164</td>
<td>3.099***</td>
</tr>
<tr>
<td><strong>LEVEL-2: COUNTY VARIABLES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation Index (Puerto Rican/White)</td>
<td>0.159</td>
<td>0.000</td>
<td>0 – 0.376</td>
<td>0.183</td>
<td>0.155***</td>
</tr>
<tr>
<td>Social Disorganization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentrated Disadvantage</td>
<td>19.306</td>
<td>0.000</td>
<td>9.012 – 34.356</td>
<td>20.086</td>
<td>19.165***</td>
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<tr>
<td>Ethnic Heterogeneity</td>
<td>0.544</td>
<td>0.000</td>
<td>0.188 – 0.761</td>
<td>0.536</td>
<td>0.545***</td>
</tr>
<tr>
<td>Residential Instability</td>
<td>524.789</td>
<td>0.25</td>
<td>515.322 – 540.264</td>
<td>524.279</td>
<td>524.880***</td>
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<tr>
<td><strong>County-Level Controls</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Puerto Rican (2008-2010 ACS Estimate)</td>
<td>7.995</td>
<td>0.029</td>
<td>0.397 – 25.890</td>
<td>8.951</td>
<td>7.827***</td>
</tr>
<tr>
<td>Percent Low Service Occupations</td>
<td>4.756</td>
<td>0.012</td>
<td>2.827 – 20.152</td>
<td>4.695</td>
<td>4.766</td>
</tr>
<tr>
<td>Percent Manufacturing</td>
<td>10.26</td>
<td>0.023</td>
<td>3.596 – 24.243</td>
<td>10.581</td>
<td>10.208***</td>
</tr>
<tr>
<td>Percent Urban</td>
<td>95.730</td>
<td>0.034</td>
<td>61.087 – 100</td>
<td>95.359</td>
<td>96.792***</td>
</tr>
</tbody>
</table>

Notes: ***p < .001, **p < .01, p < .05. Numbers in brackets are means for reference categories (i.e. females, not married, not black, not P.R. born); means and standard errors for all variables are weighted (Taylor Linearized); Data consist of 44,661 Puerto Ricans across 72 U.S. Counties.
Independent Variables.
Our models control for basic demographic variables including age in years as of the last birthday, dummies for sex (1 = male, 0 = female), marital status (1 = married with spouse present, 0 = other), race (1 = Black Puerto Rican, 0 = mixed or White), and place of birth (1 = born in Puerto Rico, 0 = born elsewhere). Socioeconomic status indicators (SES) include respondents’ total personal income, educational attainment (e.g., 1 = no high school completed, 5 = 5th-8th grade, 9 = 12th grade, no diploma, 10 = high school graduate, or GED, 14 = bachelor’s degrees, 17 = doctorate degree), Duncan’s (1961), socioeconomic index of occupational prestige, which ranges from low to high, and poverty status (1 = at or below poverty threshold to 5 = 500 percent or more above poverty threshold).

County Level-2 Variables from 2000 U.S. Census

Residential Segregation.
The isolation index measures the extent to which Puerto Ricans are exposed to other Puerto Ricans and ranges from zero (Puerto Ricans are completely integrated with Whites) to one (Puerto Ricans are completely isolated from Whites). Formally:

\[ I = \sum \left[ \frac{pr_i}{PR} \left( \frac{t_i}{w_i} \right) \right] \]

where \( pr_i \) is the total number of Puerto Ricans in census tract \( i \), \( PR \) is the total number of Puerto Ricans in a county, \( t_i \) is the total population in census tract \( i \), and \( w_i \) is the total non-Latino White population in tract \( i \). Unlike dissimilarity indices, exposure indices are sensitive to both the distribution and size of the minority population (Lieberson, 1981; Bell, 1954). Early on, Blau (1977) showed that minorities can be evenly distributed in census tracts throughout a city and still have little exposure to Whites and the resources enjoyed in majority tracts. As such, some scholars argue that exposure indices should be stronger predictors of poor health than other indices of segregation, such as the Index of Dissimilarity (Acevedo-Garcia, Lochner, Osypuk and Osypuk 2003; Kramer and Hogue 2009). Because we are interested in the effects of both the size and distribution of the Puerto Rican population, the isolation index is preferred to other segregation indices.

Following standard practice in urban sociology and criminology (Sampson and Morenoff 1997; South and Crowder 1999), three measures of social disorganization (i.e., concentrated disadvantage index, ethnic heterogeneity, and residential instability) are included in the analyses. Such measures are incorporated since both social
disorganization theory and the place stratification framework predict higher levels of social disorganization to be related with problems such as crime and poor health, among other social ills (Latkin and Curry 2003). Concentrated disadvantage is an index consisting of the percent of households making less than $10,000 a year, percent on public assistance, percent below the federal poverty line, percent of adults with no high school diploma, percent unemployed, and percent renting in each county, respectively ($\alpha = .74$). As Kubrin and Stewart (2006) note, measures of concentrated disadvantage are preferable over single-item indicators (e.g., percent poor) since they reflect concentration effects that are more consistent with social disorganization theory and theories of urban disadvantage.

Ethnic heterogeneity is measured with the Herfindahl index of diversity (Rose 2000; Osgood and Chambers 2000). As shown in Table 1, heterogeneity ranges from .18 to .76 with higher values indicating higher levels of ethnic/racial heterogeneity in a county. Residential instability was measured by a standardized four-item index (i.e., percent occupied housing units moved into, year householder moved into unit, percent living in different house/county in 1995, and percent living in different house in 1995), with a high internal consistency ($\alpha = .79$). Larger values represent higher levels of residential instability. County level controls include percent Puerto Rican (calculated from the 2008-10 ACS PUMS), percent employed in low service occupations, percent employed in manufactory, and percent urban (from SF 3). In sum, controlling for these important social and economic conditions, ones that have been implicated with poor health, allows for a more nuanced assessment of the relationship between segregation and disability and the robustness of such a relationship.

**Method and Analytic Strategy**
The multivariate analyses in this paper are conducted using hierarchical linear models with the statistical package MPlus 6.12 (Muthén and Muthén 2010). As McArdle and Hamagami (1996: 89) note, multi-level models have become increasingly popular over the years because they provide a way of dealing with the complexities of “clustered” or “nested” data—such as individuals in counties, neighborhoods, schools and households. Such nesting of individuals within larger social units represents a hierarchical structure where individuals—referred to as level-1 in the hierarchical linear model framework (HLM)—are clustered/found within counties or level-2 units (Raudenbush and Bryk 2002). This technique has several advantages over traditional methods such as ordinary least square regression where individual-level and county level-variables are included in the same regression equation. HLM allows the analyst to model the dependence of observations within counties, parcel out the error variance
at level-1 and level-2, and simultaneously model the effects of county level-2 variables separately from the effects of level-1 covariates (Muthén and Satorra 1995; Goldstein 2010). With nested data, multi-level modeling produces more reliable and less biased estimates than those generated by traditional single-level regression approaches.

The individual level-1 model used in this paper takes the following form:

\[ \eta_{ij} = \beta_{0j} + \sum \beta_{qj} X_{qij} + e_{ij} \]

where \( \eta_{ij} \) is the log-odds of the estimated risk of having a disability for individual \( i \) in county \( j \), \( \beta_{0j} \) is the intercept, \( X_{qij} \) is the score of independent variable \( q \) (e.g., age, income etc.), and \( \beta_{qj} \) is the regression coefficient associated with variable \( q \).

At level-2, the means as outcome model estimates the average log-odds of disability as a predicted by isolation and other county level variables:

\[ \beta_{0j} = \gamma_{00} + \gamma_{01} W_{kj} + \gamma_{02} W_{kj} + \gamma_{03} W_{kj} + \ldots + \gamma_{0k} W_{kj} + u_{0j} \]

where is \( \gamma_{00} \) is the grand mean, \( \gamma_{0k} W_{kj} \) capture the effects of county level variables (isolation, social disorganization, controls) on the risk of having a disability, and \( u_{0j} \) is a county-level random error term. To aid with interpretation, the log of the odds of having a disability can be converted to odds ratios by exponentiating each logit coefficient (e.g., \( \exp[\text{isolation}] \)) that is produced by the statistical package, and converted to a probability with a simple transformation \( \frac{1}{1 + e^{-\text{isolation}}} \). These transformations allow for simple interpretation of regression parameters, as shown below (Cheong & Raudenbush, 2000).

**Analytic Plan**

In Table 1, summary and bivariate statistics are presented for all variables to examine social characteristics among individuals with a disability compared to those without a disability. Tables 2 and 3 are organized to test for statistical mediation. Building on the work of Zhang, Zyphur, and Preacher (2009), who discuss how to test for mediation within an HLM context, this paper follows a three-step approach for examining if SES mediates the relationship between segregation and disability. A crucial first step is establishing a relationship between isolation (\( X \)) and disability (\( Y \)), and the second step consists of establishing a relationship between isolation and the mediators (\( M \)) of interest, or SES in this paper. Table 2 shows logistic regression coefficients for the effects that isolation has on disability (Model 1), and maximum likelihood regression coefficients for the effect that isolation has on log income (Model 2), education (Model 3), occupational prestige (Model 4), and above poverty threshold (Model 5). The effects that isolation has on disability and SES are explored while controlling for other
A third step in evaluating statistical mediation consists of determining if the effect of isolation on disability (X \rightarrow Y) is explained by the introduction of county and individual-level covariates, particularly SES (M). In Model 1 of Table 3, the means as outcome model estimates the average log-odds of disability across counties, a first step in any HLM analyses. Model 2 introduces the Puerto Rican/White isolation index, Models 3 adds county level predictors, Model 4 introduces individual level covariates, and Model 5 inserts measures of SES into the previous equation. Statistical mediation occurs when the statistically significant effect of isolation on disability that may be observed in Model 2 of Table 3 is reduced in magnitude and/or becomes insignificant once the indicators of SES are introduced in Model 5.
RESULTS

Bivariate Results
Table 1 shows descriptive statistics for all variables used in the analyses. It also examines whether individuals with a disability are more socially marginalized than individuals who do not have a disability. Specifically, adjusted chi-square tests gauge bivariate associations between the dependent variable (i.e., 1 = has a disability, 0 = no disability) and categorical independent variables, and adjusted Wald tests are utilized to examine bivariate relationships between continuous independent variables and the dependent variable (King and Goh 2002).

Table 1 reveals that about 15.2 percent of Puerto Ricans report any type of disability, including the following difficulties: cognitive (7.3 percent), ambulatory (8.0 percent), independent living (5.7 percent), self-care (2.7 percent), vision (2.9 percent), and hearing (11.7 percent). The overall rate of having any disability among Puerto Ricans in this sample (15 percent) is higher than the 13 percent rate of disability reported by Erickson and Houtenville (2005) for all Latino groups in the 2000 U.S. Census, and higher than the national average of 12.3 percent for individuals 16 to 64 (U.S. Census Bureau, 2007).

As expected, there is a strong bivariate relationship between age and disability status. Whereas the average age among individuals with any disability is 44 years, those reporting no disability tend to be almost 10 years younger, or 36 years old ($\chi^2 = 518$, $p < .001$). The proportion of Puerto Rican males who report having any disability (15.1 percent) is not significantly different than the proportion of females (15.3 percent). Married individuals who are living with their spouse are less likely than individuals with other marital statuses to report having a disability (11 percent versus 17.3 percent, $p < .01$), and Puerto Ricans born in Puerto Rico are more likely (20.3 percent vs 11.9 percent) to have a disability than Puerto Ricans born elsewhere. There is also a strong association between social class and disability to the extent that individuals with higher incomes (9.53 vs. 10.05), higher levels of education (5.13 vs. 6.48), higher occupational prestige (15.15 vs. 34.06), and those who are above the poverty threshold (2.16 vs. 3.09) are significantly ($p \leq .001$) less likely than individuals of lower SES to have a disability. In short, Puerto Ricans who are older, unmarried, born in P.R., and have lower levels of SES are at increased risk of having a disability than of not having a disability.

Table 1 also examines whether individuals with disabilities tend to live in counties with higher levels of structural disadvantage than individuals with no disability. On average, Puerto Ricans with a disability live in counties where they are more
isolated from non-Hispanic Whites (I = .18) than individuals without a disability (I = .15). Compared to individuals without a disability, those with a disability are also more likely to live in counties with greater levels of concentrated disadvantage, in counties with a higher proportion of Puerto Ricans, and counties with greater levels of manufacturing. In sum, Puerto Ricans with disabilities seem to live in counties with greater levels of structural disadvantage when compared to Puerto Ricans who do not have a disability.

**Multivariate Results**

*The direct effect of isolation on disability and class.*

We begin our multilevel analyses by plotting the average disability rate as a function of county level isolation (see Figure 2). This figure was plotted based on the equation from Model 2 in Table 3 and allowing the isolation index to vary from its minimum to its maximum. In counties where Puerto Ricans are highly integrated with Whites (i.e., isolation = 0) we can expect an average rate of disability of 15 percent, which is the grand mean or the overall disability rate that also appears in Table 1. In the most segregated county, the expected rate of disability is 32 percent. Figure 2 also shows that the average rate of disability steadily increases in counties where Puerto Ricans are more isolated from Whites. For example, in Hampden County Massachusetts, which had total Puerto Rican/White isolation index of 0.32, the expected rate of disability is 32 percent.
Rican population of 68,595 in the year 2006 (see Vélez and Burgos 2010), we could expect 10,289 \((68,595 \times 15\%\) Puerto Ricans to have a disability if they were completely integrated with Whites (i.e., isolation = 0). If Puerto Ricans in this county were highly isolated from Whites (isolation = .37), we could expect a phenomenal increase in the number of individuals with a disability \((68,595 \times 32\%\) = 21,950). At least in this county, the number of individuals with a disability is expected to double when Puerto Ricans are highly segregated from Whites than if they were completely integrated with Whites.

How robust is the relationship between isolation and disability, and between isolation and SES? Table 2 examines whether structural disadvantage (i.e., county-level variables) increases the risk of individuals’ disability, net of county level controls, and how these macro-level conditions affect the mediators or SES (income, education, occupational prestige, above poverty threshold). Model 1 of Table 2 shows a highly significant relationship between isolation and disability to the extent that a one unit (.01) increase in the isolation index increases the odds of having a disability by a factor of 1.02 \([\exp(2.188 \times 0.01) = 1.02]\), as predicted by the RPIF.

The two other county-level variables in Table 2 that significantly affect the chances of having a disability are concentrated disadvantage and ethnic heterogeneity: A one-unit increase in the index of concentrated disadvantage increase the odds of having a disability by 3 percent \([\exp(0.036) = 1.03, p \leq 0.01]\), and a one unit increase in the ethnic heterogeneity index decreases the odds of having a disability by 74 percent \([\exp(-1.360) = .26, p < .01]\). It appears then, that segregation harms health and ethnic/racial diversity promotes health.

The remaining models in Table 2 examine whether isolation significantly predicts social class across counties \((\Gamma_{01})\) while controlling for other county level variables. Puerto Ricans living in counties with higher levels of isolation tend to have, on average, lower levels of income \((-1.104, p < .001)\), lower levels of education \((-4.601, p < .05)\), significantly lower levels of occupational prestige \((-48.079, p < .001)\), and are less likely to be above the poverty threshold \((-3.26, p < .001)\) than individuals living in counties where they are less isolated from Whites. As would be predicted by the ethnic enclave perspective (see Martin 2006), Puerto Ricans reap an SES advantage by living in counties with a higher proportion of Puerto Ricans \((\Gamma_{02})\) as evidenced by significant positive effects of percent Puerto Rican on education \((.03)\), occupational prestige \((.24)\), and likelihood of being above poverty \((.03)\), even after controlling for other county level variables. In addition, there is a negative relationship between concentrated disadvantage and SES \((\Gamma_{06})\) to the extent that individuals living in disadvantaged counties have lower SES than individuals living in less disadvantaged counties. Puerto Ricans who live in counties with greater levels of ethnic heterogeneity also have significantly higher levels of income, education, occupational prestige, and are more likely to live above the poverty threshold.
### TABLE 3. MULTILEVEL LOGISTIC REGRESSION OF DISABILITY ON SELECTED 2008-2010 ACS PERSON-LEVEL VARIABLES AND U.S. CENSUS 2000 SF CENSUS VARIABLES AT COUNTY LEVEL.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1 Unconditional</th>
<th>Model 2 Isolation</th>
<th>Model 3 Country Controls</th>
<th>Model 4 Person Controls</th>
<th>Model 5 SES</th>
</tr>
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<tbody>
<tr>
<td><strong>LEVEL-2: COUNTY VARIABLES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept $\gamma_{00}$</td>
<td>1.742***</td>
<td>1.741***</td>
<td>1.765***</td>
<td>3.680***</td>
<td>0.020</td>
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<tr>
<td></td>
<td>(0.060)</td>
<td>(0.054)</td>
<td>(0.037)</td>
<td>(0.081)</td>
<td>(0.132)</td>
</tr>
<tr>
<td>Isolation Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Percent Puerto Rican) $\gamma_{01}$</td>
<td>2.617***</td>
<td>-2.188***</td>
<td>1.921**</td>
<td></td>
<td>0.390</td>
</tr>
<tr>
<td></td>
<td>(0.281)</td>
<td>(0.574)</td>
<td>(0.641)</td>
<td></td>
<td>(0.579)</td>
</tr>
<tr>
<td>Percent Puerto Rican $\gamma_{02}$</td>
<td>---</td>
<td>-0.010</td>
<td>-0.006</td>
<td></td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.009)</td>
<td>(0.010)</td>
<td></td>
<td>(0.008)</td>
</tr>
<tr>
<td>% Low Service $\gamma_{03}$</td>
<td>---</td>
<td>0.021</td>
<td>0.025*</td>
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<td></td>
<td></td>
<td>(0.012)</td>
<td>(0.011)</td>
<td></td>
<td>(0.009)</td>
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<tr>
<td>% Manufacturing $\gamma_{04}$</td>
<td>---</td>
<td>0.005</td>
<td>0.008</td>
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<td>(0.008)</td>
<td>(0.009)</td>
<td></td>
<td>(0.008)</td>
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<tr>
<td>% Urban $\gamma_{05}$</td>
<td>---</td>
<td>0.000</td>
<td>-0.001</td>
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<td>0.000</td>
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<td></td>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td></td>
<td>(0.004)</td>
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<td><strong>SOCIAL DISORGANIZATION</strong></td>
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<td></td>
</tr>
<tr>
<td>Concentrated Disadvantage $\gamma_{06}$</td>
<td>---</td>
<td>0.036***</td>
<td>0.028***</td>
<td></td>
<td>0.003</td>
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<td>(0.010)</td>
<td>(0.012)</td>
<td></td>
<td>(0.009)</td>
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<tr>
<td>Ethnic Heterogeneity $\gamma_{07}$</td>
<td>---</td>
<td>-1.360***</td>
<td>-1.388***</td>
<td>-0.723**</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(0.329)</td>
<td>(0.336)</td>
<td>(0.279)</td>
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<td>Residential Instability $\gamma_{08}$</td>
<td>---</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
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<td>(0.007)</td>
<td>(0.006)</td>
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<td><strong>LEVEL-1: PERSON VARIABLES</strong></td>
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<td></td>
</tr>
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<td>Age</td>
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<td>---</td>
<td>---</td>
<td>0.051***</td>
<td>0.049***</td>
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<td></td>
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<td>(0.002)</td>
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<td>Male (1=Male) [0-Female]</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.078**</td>
<td>-0.042</td>
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<td></td>
<td></td>
<td></td>
<td>(0.028)</td>
<td>(0.030)</td>
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<tr>
<td>Married (1=Married) [1=Other]</td>
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<td>---</td>
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<td>-0.840***</td>
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<td>(0.050)</td>
<td>(0.050)</td>
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<tr>
<td>Black (1=Black)</td>
<td>---</td>
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<td>---</td>
<td>0.110</td>
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<td></td>
<td></td>
<td></td>
<td>(0.086)</td>
<td>(0.089)</td>
</tr>
<tr>
<td>PR. Born (1=Yes)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.203***</td>
<td>-0.105**</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>(0.037)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>Total personal income (logged)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>-0.201***</td>
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<td></td>
<td></td>
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<tr>
<td>Education</td>
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<td>---</td>
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<td>(0.009)</td>
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<tr>
<td>Occupational Prestige</td>
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<td>-0.022***</td>
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<td>Above Poverty Threshold</td>
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<td>(0.012)</td>
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<tr>
<td>BIC</td>
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<td>37041.153</td>
<td>37093.106</td>
<td>34458.187</td>
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</tbody>
</table>

Notes: ***p < .001, **p < .01, *p < .05.; standard errors in parentheses.
Overall, results from Figure 2 and Table 2 show that segregation is not only directly harmful to the health of Puerto Ricans, as has been documented for other groups (Kramer and Hogue 2009), but, also, that segregation also concentrates economic disadvantage, as predicted by the RPIF and the Place Stratification Frameworks (Massey and Fischer 2000; Cashin 2004; Williams and Collins 2001).

**Residential Isolation and Disability: The Mediating Effect of Social Class.**

The results in Table 3 show hierarchical logistic regression to examine the likelihood of having a disability across all counties (Model 1), the effect of isolation on disability (Model 2), and if the relationship between isolation and disability remains significant after introducing county level controls (Model 3), person level controls (Model 4), and SES (Model 5). Mediation can be observed if the relationship between segregation and disability (in Models 2 to 4 of Table 3) is significantly decreased by the introduction of SES in Model 5. If the effect of segregation on disability is no longer significant and the magnitude of the relationship is reduced, there is strong evidence that SES mediates the effect of isolation on disability (see Zhang et al. 2009).

The unconditional Model 1 in Table 3 shows a .15 probability of having a disability 

\[
\frac{1}{1+\exp(-(-1.742))} = .15, \text{ which is equivalent to the average rate of disability that appeared in Table 1.}
\]

Model 2 of Table 3 shows that a while a .01 increase in the isolation index increases the odds of having a disability by a factor of 1.02 \([\exp(2.617*.01) = 1.026, p \leq .01]\), the addition of county level and individual level controls in Model 3 and 4, respectively, does not affect the statistically significant relationship between isolation and disability. That is, even after controlling for these important correlates of health in Models 2-4 of Table 3, isolation continues to have a significant effect on the odds of having a disability, with a .01 point increase in the isolation index still resulting in a 1.02 increase \([\exp(1.921*.01) = 1.019, p \leq .019]\) in the odds of having a disability, as seen Model 4 of Table 3.

Model 5 of Table 3 introduces measures of income, education, occupational prestige, and above poverty threshold, with the aim of assessing if the association between isolation and disability decreases to an insignificant level once SES is introduced into the equation. There is strong support for statistical mediation in that once these indicators of SES are taken into account, the relationship between isolation and disability is no longer statistically significant. Equally important, every single measure of SES is significantly related to disability in the expected direction. The odds of having disability are lowest among Puerto Ricans of higher SES.

Take as a whole, there is clear support for the RPIF. As predicted by this perspective, segregation is harmful to the health of minorities because it concentrates economic
disadvantage at the individual level. As such, the hypothesis that SES functions as an intervening variable between isolation and disability is supported by these findings.

DISCUSSION

On July 25th, 2010, U.S. President Barack Obama attended the 19th anniversary of the signing of the Americans with Disabilities Act (ADA), a landmark civil rights legislation that sought protections against discrimination for individuals with disabilities. The ADA also required that public and private institutions make reasonable accommodations to ensure that individuals with disabilities can live productive and fulfilling lives (Petrila 2009; Thomas and Gostin 2009). The president’s attendance at this event reflects not only the important challenges this population continues to experience, but it also resonates with a federal research priority that seeks to understand the social factors (including how communities are organized) that impact the onset and trajectory of disability (Oden, Hernandez and Hidalgo 2010; South Bend Tribune 2010).

As a result, advocates have begun to mobilize against this old paradigm way of thinking towards a new paradigm that focuses not on “fixing” individuals with disabilities, but eliminating attitudinal and institutional barriers that limit the life chances of individuals with disabilities, such as discrimination in employment, public services, and public accommodations.

For instance, Silverstein (2000: 1695) points out that persons with disabilities, their families, and policy makers have begun to recognize that people with disabilities are still experiencing attitudinal and institutional barriers that subject them to “unjust dependency, segregation, isolation, and exclusion” across institutional contexts, such as education and the labor market. Silverstein contends that barriers may result from deep-seeded prejudice that consider individuals with disabilities as being “defective” and in need of “fixing.” As a result, advocates have begun to mobilize against this old paradigm way of thinking towards a new paradigm that focuses not on “fixing” individuals with disabilities, but eliminating attitudinal and institutional barriers that limit the life chances of individuals with disabilities, such as discrimination in employment, public services, and public accommodations. In terms of institutional barriers, Silverstein identifies a number of entitlement programs that have been implemented to help individuals with disabilities to be meaningfully included in mainstream society. These entitlement programs include Social Security Disability
Insurance (SSDI), Supplemental Security Income (SSI), Medicare, Medicaid, Vocational Rehabilitation, and Children’s Health Insurance. In addition, there are discretionary grant-in-aid Federal assistance programs that help state and local government provide services for education, early childhood intervention, employment services, independent living services and community integration, legal protection against discrimination, job training, school reform and early child education, social services, maternal and child health services, training and research grants, voter registration, family leave, and tax credit for individuals and businesses.

Out of the many challenges that Silverstein identifies, one in particular resonates with the analyses we presented in this paper. Silverstein (Silverstein 2000: 1743) notes that a trend in disability policy is to “recognize and be responsive to the... needs” of racial and ethnic minorities. In fact, disability law requires that data be collected and reported to determine if there are racial disparities with respect to the identification of individuals with disabilities, and placement of those individuals in programs that would ensure they receive the accommodations that they need. Similarly, the Centers for Disease Control and Prevention (CDC) have called for more research on minorities with disabilities since they are one of the most marginalized groups in the U.S.—a population they refer to as being in “double jeopardy” (Centers for Disease Control and Prevention 2006). Still, notably absent from these discussions on disability is housing policy, and in particular, how access to racially integrated housing may affect even the onset of having a disability among racialized minorities such as Puerto Ricans.

The results in this paper show that Puerto Ricans living in counties with higher levels of segregation had lower levels of education, income, occupational prestige, and were more likely to live below the poverty line than Puerto Ricans living in counties with lower levels of segregation.

In this paper, we addressed three research questions. First, does residential segregation between Puerto Ricans and Non-Hispanic Whites at the county level increase the chances that Puerto Ricans have a disability? We found significant variability in the rates of disability across counties in the Puerto Rican population, with Puerto Ricans in some counties having rates of disability that were below the national average, and Puerto Ricans in other counties having rates that were much higher than the national average (see also Rivera and Burgos 2010). In addition, we found a strong relationship between segregation and disability rates to the extent that the rate of disability was twice as high in the most segregated county than
in the county with the lowest level of segregation (see Figure 2). If Puerto Rican culture, as has been narrowly defined at the individual level (e.g., values, beliefs, ethnic worldview) in debates of urban poverty was the underlying mechanism driving disability rates, then it would be unlikely that we would observe such huge variability in one cultural group. Overall, this finding is more consistent with structural explanations of Puerto Rican disadvantage than with cultural accounts, with the latter being widely critiqued as an over-individualistic account of life chances (Hays 1994; Kelley 1997; Mayhew 1980; Hunt et al. 2004).

The second question of this paper was whether segregation lowers the SES of Puerto Ricans in the U.S. Although SES is only one of the many hypothesized pathways through which segregation affects health, there are no studies, to the best of our knowledge, which trace this key pathway within a multilevel modeling framework, particularly for Latinos of different ethnic backgrounds. The results in this paper show that Puerto Ricans living in counties with higher levels of segregation had lower levels of education, income, occupational prestige, and were more likely to live below the poverty line than Puerto Ricans living in counties with lower levels of segregation. This finding is consistent with the theoretical expectations of the Racialized Place Inequality Framework that we briefly introduce in this paper. This framework suggests that one of the key mechanisms through which segregation harms the health of African Americans and Puerto Ricans is by concentrating both neighborhood poverty and lowering the SES of individuals and families (see also LaVeist 1993; Williams and Williams-Morris 2000). By showing that segregation lowers SES, this paper adds to the literature on urban inequality and demonstrates that economic consequences of segregation are not restricted to the experiences of African Americans (see also Martin 2006).

The third question driving the analyses in this study was whether SES mediates the relationship between segregation and disability. The results reveal that although segregation significantly increased the probability of disability, the relationship between segregation and disability was not statistically significant when measures of income, education, occupational prestige, and poverty were introduced in multivariate models. Thus, SES mediates the relationship between segregation and disability, at least with this population. The fact that SES mediates the relationship between segregation and disability does not mean that segregation is unimportant. To the contrary, this key finding indicates that segregation is best conceptualized as an upstream and macro-level social structure that sets into motion more proximal disadvantages, such as low SES, which in turn, are harmful to health (Osypuk and Galea 2007). To the extent that segregation is related to both higher rates of disability and lower levels of SES, these results are consistent with studies of racism and health (Jackson and Inglehart 1995; Williams and Williams-Morris 2000), but contrary to the expectations of ethnic enclave health models that tend to emphasize the
beneficial role of ethnic culture and ethnic concentration (for a historical critique of classic assimilation, see Steinberg 1981).

In sum, there are only a few multilevel studies of segregation and health, and as a result, there are many more questions than answers. As Tucker et al. (2010) note, we know that Puerto Ricans are at a health disadvantage, yet, we do not fully comprehend the reasons for such disparities. Future researchers should begin by synthesizing the explanations given for why Puerto Ricans have such poor health. Do most explanations focus on individual factors, culture, or even structural accounts? The answer to this question necessitates a theoretically driven content analysis of the academic repertoires that are invoked in the literature to explain such disparities. In addition, future research needs to examine the factors that link segregation to health, also in a theoretically informed manner, as shown in Figure 1. One of the drawbacks of this paper is that it does not trace many of the theorized factors that link segregation to health. Following the lead of House (2002), segregation and health scholars can utilize the RPIF to identify how segregation impacts health through processes such as social support and stress, and psychological dispositions such as anger, self-efficacy, and other negative affective states, as well as perceived neighborhood disorder. Scholars interested in studying the links between segregation and health need to look at other health outcomes besides disability. We know next to nothing about how segregation affects outcomes such as pulmonary problems, cardiovascular disease, obesity, diabetes, and different mental health issues, not just for Puerto Ricans, but also, for other Latino groups, such as Dominicans. There is also particular need for studies that integrate both individual risk factors and structural conditions of poor health. Finally, there is a dire need for public advocacy, in terms of alerting policy makers, health care providers, and other stakeholders of the health status of Puerto Ricans. There is much work to be done.

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NOTES
1 As we discuss below, this debate is largely founded on disagreements about the root causes of African American and Puerto Rican inner-city poverty. On the one hand, some scholars attribute cultural factors (e.g., values, beliefs) to poverty and other social disadvantages. On the other hand, place stratification scholars emphasize structural conditions, such as unemployment and segregation.

REFERENCES


