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Intersections Between Nativity, Ethnic Density, and Neighborhood SES: Using an Ethnic Enclave Framework to Explore Variation in Puerto Ricans' Physical Health

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Abstract Although past research has demonstrated a "health disadvantage" for Puerto Rican adults, very little is known about correlates of health among this group. Given Puerto Ricans' unique experiences of migration and settlement, an ethnic enclave framework that integrates nativity, ethnic density, and neighborhood SES may offer insight into factors influencing Puerto Ricans' health. This study uses a sample of 449 adult mainland- and island-born Puerto Ricans living in New York City and Chicago. The data, collected as a part of the MIDUS Survey of Minority Groups, are stratified by neighborhood ethnic density and neighborhood SES, allowing for the examination of the individual and joint influences of neighborhood characteristics on physical health. Results revealed that ethnic density and neighborhood SES were not independently or interactively related to physical health for mainland-born Puerto Ricans. However, the interaction between ethnic density and neighborhood SES was related to self-reported health, functional limitations, and health symptoms for island-born Puerto Ricans. Island-born Puerto Ricans living in ethnically dense, low SES neighborhoods reported worse health than island-born Puerto Ricans living in other types of neighborhoods. This may be a result of isolation from resources both within and outside the neighborhood.

Keywords Puerto Ricans · Physical health · Neighborhood · Ethnic density · Ethnic enclaves

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Introduction

There is a burgeoning body of work suggesting that Puerto Ricans may be at a disadvantage for a variety of health outcomes relative to other Latino groups. While previous research has found support for a "Latino paradox" in which Latinos fare better than non-Latino whites, particularly in terms of adult all-cause mortality (Abraido-Lanza et al. 1999; Lara et al. 2005), closer analysis of this pattern suggests that this finding may be concentrated among foreign-born Mexicans (Palloni and Arias 2004). In addition, comparisons of Latino sub-groups on other indicators of health have found Puerto Ricans to be at a disadvantage, specifically in terms of self-rated health (Hajat et al. 2000; Zsembik and Fennell 2005), diabetes during pregnancy (Kieffer et al. 1999) and prevalence of asthma among children (Lara et al. 2006) compared with other Latino groups such as Mexicans and Cubans.

Despite the growing body of research demonstrating what appears to be a Puerto Rican "health disadvantage", relatively little work has examined the correlates of health among Puerto Rican samples. Some studies have found individual-level characteristics such as nativity (Bond Huie et al. 2002; Landale et al. 1999; Zsembik and Fennell 2005) to be predictive of Puerto Ricans' health, however there is little work considering the influence of neighborhood-level characteristics, or the joint influence of individual and neighborhood-level characteristics on Puerto Ricans' health. This is surprising given the large body of work linking neighborhood characteristics such as socioeconomic status (SES) and racial/ethnic density with adults' physical health (Ellen et al. 2001; Pickett and Pearl 2001; Pickett and Wilkinson 2008), as well as work suggesting that ethnically dense neighborhoods (ethnic enclaves), may facilitate the successful adaptation of first-generation

immigrants (Fernandez Kelly and Schauffler 1996; Portes and Bach 1985; Portes and Stepick 1993; Wilson and Portes 1980). These factors may be particularly important for Puerto Ricans, whose patterns of residential segregation and geographic mobility differ from those of other major Latino groups (Denton and Massey 1989; Massey and Bitterman 1985; South et al. 2005). The current study seeks to addresses this gap in the literature by examining the independent and joint influences of neighborhood ethnic density and SES on adult physical health in a sample of island- and mainland-born Puerto Ricans.

Nativity and Puerto Ricans' Physical Health

Researchers have identified nativity as an important predictor of physical health amongst Latinos (Acevedo-Garcia et al. 2010). Prior work has found better outcomes among the first generation compared to later generations in terms of mortality (Borrell and Crawford 2009; Palloni and Arias 2004), chronic disease (Huh et al. 2008), and self-reported physical health (Franzini and Fernandez-Esquer 2004). Two potential explanations for this pattern of findings are migration selectivity and acculturation. If healthier people are more likely to immigrate to the U.S. and those who become ill are more likely to return to their country of origin, the health advantage observed among the first generation may be a function of migration selectivity (Abraido-Lanza et al. 1999; Palloni and Arias 2004). Alternatively, the first generation may experience cultural factors (i.e. social networks, community-level cohesion) that buffer against poor health behaviors, influences that then deteriorate with acculturation (Alegria et al. 2006; Lara et al. 2005). However, it is not clear whether this pattern holds across all Latino sub-groups.

Some researchers have considered the role of nativity in explaining variation in Puerto Ricans' health outcomes. Because Puerto Ricans are U.S. citizens, their patterns of migration and settlement makes them different from other Latino groups (Baer 1992). However, some have argued that because of the cultural and language differences between Puerto Rico and the mainland United States, the experience of Puerto Rican migration is likely to resemble that of other immigrant groups (Landale et al. 1999; Tienda 1989; Torres and Rodriguez 1991). Findings from research on nativity and Puerto Rican's physical health have produced mixed patterns of results. Some studies have found that island-born Puerto Ricans have better physical health outcomes, specifically lower mortality rates (Bond Huie et al. 2002) and better health behaviors during pregnancy (Landale et al. 1999), than mainland-born Puerto Ricans. However, other studies have found an opposite pattern of results with island-born Puerto Ricans having more medical conditions and functional impairments (Zsembik and Fennell 2005) and worse physical health (Jerant et al. 2008) than mainland-born Puerto Ricans. These contradictory findings suggest that although nativity may be an important determinant of health among Puerto Rican samples, additional factors may also be at play.

Intersections Between Nativity, Ethnic Density and Neighborhood SES

It has been argued that one of the key factors influencing immigrant adaptation is the structure and resources of the community of reception (Portes and Rumbaut 2001). As such, theory and research on ethnic enclaves provides an important framework for considering the intersections between nativity, neighborhood ethnic density, and neighborhood SES when examining correlates of health within immigrant populations. Prior work suggests that ethnic enclaves can facilitate the successful adaptation of first-generation immigrants through increased access to ethnic goods, social capital, and employment opportunities (Fernandez Kelly and Schauffler 1996; Portes and Bach 1985; Portes and Stepick 1993; Wilson and Portes 1980). Moreover, living in an ethnic enclave may influence the physical health of first-generation immigrants by providing access to instrumental or financial support, influencing behavioral health norms, connecting residents with informational resources and community services, and protecting residents from experiences of discrimination (Fernandez Kelly and Schauffler 1996; Menjivar 2000; Portes et al. 1992; Portes and Rumbaut 2006).

Although ethnic enclaves may be beneficial for first-generation immigrants' health, some research suggests that it may be detrimental for later generations. Spatial assimilation theory posits that immigrants are likely to move out of enclaves and into areas that are less ethnically defined as they adapt to a society (Alba and Logan 1991, Massey and Mullan 1984). Therefore, whereas first-generation immigrants may choose to live with co-ethnics as a strategy of adaptation, residence in an ethnic enclave for later generations may be a function of blocked opportunities and segregation in the housing market. In this case, residence in an ethnically dense neighborhood may reflect processes that have detrimental effects on physical health for mainland-born Puerto Ricans.

Some scholars have argued that ethnic enclaves may not be unequivocally positive even for first-generation immigrants. Ethnic enclaves can be characterized by concentrated poverty and low levels of resources (Chiswick and Miller 2005; Galster et al. 1999; Osypuk et al. 2009). Although residents of an ethnic enclave may have greater access to social networks, the resources available through these networks may be minimal (Fernandez Kelly and Schauffler 1996). Similarly, residence in an ethnic enclave may limit

residents' ability to access resources outside of the enclave, therefore restricting immigrants to high-poverty settings (Portes and Landolt 1996). As such, it may be that a minimum level of neighborhood SES is needed for the ethnic enclave to play a protective role for physical health.

Although past work has explored the role that ethnic enclaves play in immigrant adaptation among several Latino groups such as Cubans (e.g. Portes and Jensen 1989), Mexicans (e.g. Portes and Bach 1985), and Salvadorians (e.g. Menjivar 2000), the role of ethnic enclaves in Puerto Rican immigrant adaptation has largely been overlooked. Although Puerto Ricans are U.S. citizens, scholars have described the assimilation process of Puerto Ricans as similar to that of other U.S. immigrant groups (Landale et al. 1999; Tienda 1989). Therefore, ethnic enclaves, specifically the joint influence of neighborhood ethnic density and SES, may offer important insight into variations in physical health for both island-born and mainland-born Puerto Ricans.

The Context of Puerto Rican Migration and Residential Patterns

The unique patterns of Puerto Ricans' migration to and settlement in the mainland United States sets the context for understanding the influence of nativity, ethnic density, and neighborhood SES on individual health. Economic theory posits that migration flows are motivated by individuals' desire to reside in countries that maximize their economic well-being (Borjas 1987). Assuming this is true, the higher levels of income inequality in Puerto Rico relative to the mainland United States should motivate negative selection, in which those who choose to migrate will have lower levels of earnings than those who do not (Oropesa and Landale 2000; Ramos 1992). Although findings have been mixed, some work has shown that migrants to the mainland have less human capital and less skilled occupations than nonmigrants on the island (Ramos 1992). In addition, island-born Puerto Ricans living in the mainland U.S. have lower earnings than mainland-born Puerto Ricans (Oropesa and Landale 2000; Ramos 1992) although the size of this difference diminishes with length of residence in the mainland U.S. This pattern suggests that island-born migrants are able to close the economic gap over time, an adaptation that may be influenced by characteristics of the neighborhoods that migrants settle in.

Puerto Ricans have distinct residential patterns in the United States (Massey 1981; Santiago 1992; South et al. 2005). They tend to be segregated from non-Latino Whites at higher rates than other Latino groups and moderately segregated from African Americans. In addition, Puerto Ricans' higher levels of poverty relative to other Latino groups suggest that co-ethnic neighborhoods are more likely to be poor. Moreover, Puerto Ricans' residence in disadvantaged neighborhoods is stable (South et al. 2005), with Puerto Ricans being less likely than Whites, Cubans or Mexicans to move from a high-poverty to a lower-poverty neighborhood. Overall, this research suggests that highly concentrated Puerto Rican neighborhoods may be particularly isolated in terms resources and opportunities and provide few opportunities for relocation, potentially contributing to worse physical health outcomes.

The Current Study

While prior research has shown nativity, ethnic density, and neighborhood SES to be important correlates of physical health among Latinos, it is unclear whether these findings are generalizable to Puerto Rican samples. Drawing from prior work on ethnic enclaves, this study addresses this gap by exploring how neighborhood ethnic density and SES individually and interdependently are related to the physical health of mainland- and island-born adult Puerto Ricans. It is hypothesized that living in an ethnically dense neighborhood may be protective for island-born Puerto Ricans because of access to resources and social capital otherwise unavailable to them. However, the protective effect of ethnically dense neighborhoods for island-born Puerto Ricans may depend on the SES of the neighborhood. Ethnically dense neighborhoods that are low in resources may offer residents benefits in terms of social support and shared language, but limit access to financial resources and social services that directly impact physical health. In comparison, living in an ethnically dense neighborhood may be an indicator of blocked opportunities and discrimination for mainland-born Puerto Ricans, resulting in negative influences on physical health. Using a dataset that included both mainland- and island-born Puerto Ricans and varied in terms of both neighborhood ethnic density and neighborhood SES, this study is able to explore (1) whether ethnic density and neighborhood SES are related to the physical health of mainland- and island-born Puerto Rican adults and (2) if the interaction between these neighborhood characteristics is predictive of physical health. Increasing our understanding of how neighborhoods influence the physical health of Puerto Rican adults is an important first step towards the development of culturally-specific theory and interventions.

Methods

Sample

Data for this study come from The Survey of Minority Groups, a study of midlife development in the United States (MIDUS) conducted between 1995 and 1996, as part

of the John D. and Catherine T. McArthur Foundation's Research Network on Midlife. The sample consists of men and women, ages 25 and older. The full sample includes African Americans, Dominicans, and Puerto Ricans in New York City and Mexicans and Puerto Ricans in Chicago. Because of our interest in exploring variations in Puerto Rican health, the analytic sample was limited to the 449 Puerto Rican men and women living in New York City (N = 284) and Chicago (N = 165). Respondents are nested within 100 block groups, or neighborhoods in New York City (N = 61) and Chicago (N = 39). The number of respondents within each neighborhood ranges from 1 to 19, with an average of 4.5 respondents per neighborhood (SD = 3.99).

Using information from the 1990 U.S. Census, census block groups were categorized and selected according to whether they were high (>30 %) or low (0–30 %) ethnic concentration for a particular ethnic group and according to whether the median household income for the neighborhood was higher or lower than the median household income for each respective group in each city. Quotas were established that directed interviewers to recruit approximately equal numbers of target group members in each of four types of neighborhoods in a 2 (low vs. high density) by 2 (low vs. high SES) design. The sampling subgroups for Puerto Ricans differed slightly across the two cities. In New York, the ethnic composition of targeted neighborhoods was specific to the targeted ethnic group (i.e. percent Puerto Rican). In Chicago, the pan-ethnic category of Latino was used to select subgroups. Within selected census block groups, interviewers identified eligible respondents by screening residents door to door and administered the survey face-to-face. Because of the quota selection of respondents, the surveys were not designed as fully random samples; there was no means for calculating a precise response rate. However, it was estimated that of qualified respondents who were located by interviewers, more than 90 % agreed to be interviewed. The sampling procedure was not designed to yield a representative sample of African American, Puerto Rican, Dominican, or Mexican populations, but rather to permit a test of hypotheses regarding ethnicity and social context during midlife.

In this study neighborhood is defined as the census block group. The number of residents per block group ranges from 356 to 4,618 (μ = 1,472, SD = 778). There are several reasons why block groups may be a more appropriate unit than census tracts for analyzing neighborhood effects. First, given their smaller size, two to four blocks in metropolitan areas, block groups are more likely to be more homogeneous in terms of social and physical characteristics than census tracts (O'Campo 2003) and may provide more accurate measurements of neighborhood effects on health (Huie 2001). In addition, they are likely to better reflect the smaller boundaries that individuals use to define their neighborhoods (Coulton et al. 2012).

Measures

Physical Health

Three measures, commonly used to assess physical health, are used: self-reported health, functional limitations, and health symptoms. *Self-reported health* consists of one item that asks "In general, would you say your physical health is poor, fair, good, very good, or excellent?". *Functional limitations* is a 7-item index that asks the degree to which an individual's health limits common activities (e.g. lifting or carrying groceries; α = .94). Participants responded on a 4-point Likert scale (1 = Not at all, 4 = A lot). *Health symptoms* is a 13-item index that asks how often in the past three months participants experienced a series of symptoms (e.g. headaches, poor appetite; α = .92). Participants responded on a 5-point scale (1 = Never, 5 = Very often). Because of high positive skew, square root transformations of both indices were used in analyses. The three dependent variables were z-scored and the functional limitations and health symptoms indices were reverse-scored (higher values indicate better health) to facilitate comparability across measures. Correlations between the three dependent variables ranged from .49 to .62. This indicates that the scales shared between 24 and 38 % of their variance and, while correlated, still represent conceptually distinct constructs.

Neighborhood Predictors

All of the neighborhood characteristics were created at the level of the census block group using information from the Summary Tape File 3 of the 1990 Census. *Neighborhood ethnic density* is a dichotomous measure of the percentage of neighborhood population that is Puerto Rican. This variable was dichotomized at 18.84 so that values at 18.84 or below were coded as 0, representing low density neighborhoods, and values above 18.84 were coded as 1, representing high density neighborhoods. Initially, dichotomizing the neighborhood ethnic density variable was considered because the range was somewhat truncated (0–72 %). Further examination revealed that there was a particular point in the continuum at which the variable's relationship with the outcomes changed. More details on these analyses are available upon request from the first author. Moreover, past research has argued that the influence of urban segregation may be non-linear (Yizhaq and Meron 2002). *Neighborhood SES* is the median household income of residents in the census block group divided by 10,000 in order to avoid very small coefficient estimates.

Given that it is less likely that there is a distinct point at which neighborhood SES influences individuals, this variable was kept continuous. Neighborhood SES was centered around the sample mean.

Neighborhood-Level Covariates

Measures of *percentage White*, *percentage Black non-Hispanic*, and *percentage Latino* (excluding Puerto Ricans) were also included in the analyses. These groups represent the other most predominant racial/ethnic groups present in the sample neighborhoods. The percentage of the population who has not moved in the past 5 years was also included as a measure of *residential stability.* All neighborhood-level covariates were divided by 10 to avoid very small coefficients and centered around the sample mean.

Individual-Level Covariates

Individual demographic characteristics were included to further increase the precision of the models. City, gender, and employment status and education are binary variables, named *New York City*, *female*, *have partner*, *employed*, and *high school diploma or above*. *Age* and *years in neighborhood* are both continuous variables coded in years and divided by 10. *Annual family income* was collected in 36 categories. A random number was generated for each respondent within the boundaries of the income category they indicated. This variable was then divided by 10,000 in order to avoid small coefficient estimates. A measure of *years in the mainland U.S.* was also included in analyses with the island-born sample. All continuous variables were centered around the sample mean.

Statistical Analysis

All inferential analyses were conducted using the program MPlus (Muthen and Muthen 1998–2010), using the full-information maximum likelihood estimator option. This approach allows for all cases to be included in the analyses regardless of missing data. Multilevel random intercept regression models were used to test relationships between neighborhood ethnic density and neighborhood SES vis-a-vis physical health separately for the mainland- and island-born samples. Due to the fact that individuals are nested within neighborhoods, individual error terms may be correlated within neighborhoods leading to potentially biased ordinary least squares estimates and standard errors (Bryk and Raudenbush 1992). In order to take into account dependency, we estimated a random intercept model using the TYPE = TWOLEVEL option in MPlus to specify a model for each level of the multilevel data, thereby modeling the non-independence of observations due to clustering sampling (Muthen and Muthen 1998–2010); according to the equation

$$Y_{ij} = \beta_0 + \beta_1(X) + \beta_2(W)_j + \zeta + \varepsilon$$

In this model, the observed dependent variables, self-reported health, functional limitations, and health symptoms (Y_{ij}), for individual i in neighborhood j are predicted by individual level X variables and neighborhood level W variables. Random intercept models include error terms at the individual level (ε) and the cluster level (ζ) as well as their variances. In order to assess the influence of the interaction between neighborhood ethnic density and neighborhood SES, an interaction term was added to the model.

Results

Descriptive Statistics

Table 1 describes the total sample and the mainland- and island-born samples separately. There are several differences between the mainland-born and island-born samples; the mainland-sample is more likely to reside in New York $\chi^2(1, N = 449) = 5.62$, $p = .02$, to have a high school degree or above $\chi^2(1, N = 449) = 18.40$, $p < .001$, to be younger $t(447) = -6.65$, $p < .001$, and to have a higher income $t(352) = 3.35$, $p < .001$.

Relationships Between Ethnic Density, Neighborhood SES, and Health

Prior to running the primary analyses for the mainland- and island-born samples, preliminary analyses were run using the full sample (N = 449) to consider whether nativity was related to the three health outcomes. After adjusting for individual- and neighborhood-level covariates, nativity was not significantly related to self-reported health (B = .05 (.10), $p = .66$, β = .02,), functional limitations (B = −.03 (.08), $p = .66$, β = −.02), or health symptoms (B = .05 (.08), $p = .54$, β = .03).

In order to examine the independent relationship between neighborhood ethnic density, neighborhood SES, and the three health outcomes, multilevel random intercept regression models were run separately for the mainland- and island-born samples. In the mainland-born sample, neither neighborhood ethnic density nor neighborhood SES was related to self-reported health (Table 2, Model 1), functional limitations (Table 3, Model 1), or health symptoms (Table 4, Model 1). In the island-born sample, there was a trend-level relationship between neighborhood ethnic density and functional limitations (Table 3, Model 1) such that island-born individuals living in higher density

Table 1 Sample descriptives

	Full sample (N = 449)			Mainland-born (N = 207)			Island-born (N = 242)		
	N	%/Mean	SD	N	%/Mean	SD	N	%/Mean	SD
Individual-level variables									
New York City	449	63 %		207	69 %		242	58 %	
Female	449	49 %		207	50 %		242	48 %	
Partner	424	54 %		207	54 %		242	48 %	
Employed	424	54 %		196	57 %		228	50 %	
High school or above	441	56 %		204	67 %		237	47 %	
Age	449	43.82	14.06	207	39.27	(12.80)	242	47.72	(13.94)
Years in neighborhood	448	11.96	10.70	207	11.99	(9.94)	241	11.99	(11.34)
Annual family income	405	$26,182	23,435	189	$30,366	(26,087)	216	$22,520	(20,200)
Years in mainland U.S.	–	–	–	–	–	–	234	30.71	(13.41)
Neighborhood-level variables									
Ethnic density	100	41 %		72	44 %		77	47 %	
Median neighborhood income	100	$26,962	10,209	72	$26,863	(9,282)	77	$25,632	10,413
Residential stability	100	52.33	13.68	72	54.13	(12.50)	77	51.36	(13.91)
% White	100	28.70	22.66	72	29.35	(24.48)	77	26.98	(20.17)
% Black, non-Hispanic	100	24.18	26.61	72	24.08	(27.68)	77	22.62	(24.06)
% Latino	100	21.04	20.02	72	19.41	(19.12)	77	22.36	(19.06)

neighborhoods reported lower levels of health. In addition, neighborhood SES was positively related to health symptoms (Table 4, Model 1) such that island-born individuals living in higher income neighborhoods reported fewer symptoms.

The Joint Relationship of Ethnic Density and Neighborhood SES with Health

To examine the interactive relationship between neighborhood ethnic density and neighborhood SES on physical health, an interaction term was introduced into the model. In the mainland-born sample, there was a marginally significant relationship between the interaction and health symptoms (Table 4, Model 2). However, in the island-born sample there was a significant relationship between the interaction and self-reported health (Table 2, Model 2), functional limitations (Table 3, Model 2), and health problems (Table 4, Model 2). In order to examine the nature of these relationships, the interactions were graphed at ±1SD for each of the predictors. Figure 1 displays the interactive relationship between neighborhood ethnic density and neighborhood SES and self-reported health, functional limitations, and health symptoms. In addition, simple slopes calculated at one standard deviation above or below each of the predictors were tested to determine if they differed from zero.

There were consistencies in the shape of the interaction across outcomes. When neighborhood ethnic density was high, the positive neighborhood SES slope (C to D) was different from zero: self-reported health ($t(225) = 1.86$, $p = .07$), functional limitations ($t(225) = 2.45$, $p = .01$) and health symptoms ($t(225) = 3.10$, $p < .001$). As hypothesized, this pattern indicates that island-born Puerto Ricans living in ethnically dense, low SES neighborhoods reported lower levels of health than island-born Puerto Ricans living in ethnically dense high SES neighborhoods. In addition, when neighborhood SES was low, the negative ethnic density slope (A to C) was different from zero for functional limitations ($t(225) = -2.81$, $p < .001$) and health symptoms ($t(225) = -2.65$, $p = .02$). This pattern indicates that island-born Puerto Ricans living in ethnically dense, low SES neighborhoods reported lower levels of health than island-born Puerto Ricans living in ethnically sparse, low SES neighborhoods. Finally, in ethnically sparse neighborhoods, the neighborhood SES slope (A to B) was different from zero for self-reported health ($t(226) = -2.07$, $p = .04$) indicating that island-born Puerto Ricans living in ethnically sparse, high SES neighborhoods reported worse self-rated health than individuals living in ethnically sparse, low SES neighborhoods.

Discussion

This study explored variation in adult Puerto Ricans' health using an ethnic enclave framework. Specifically, it tested whether neighborhood ethnic density and neighborhood SES predicted Puerto Ricans adults' health and whether this relationship was consistent for mainland- and island-

Table 2 Neighborhood ethnic density and SES predicting self-reported health

	Model 1				Model 2			
	B	SE	95 % CI	β	B	SE	95 % CI	β
Mainland-born (N = 207)								
New York City	−.38	.22t	(−.81, .05)	−.18	−.42	.23t	(−.86, .02)	−.19
Female	−.24	.14t	(−.51, .04)	−.12	−.21	.13	(−.47, .05)	−.11
Have partner	−.09	.11	(−.31, .13)	−.05	−.09	.13	(−.34, .17)	−.04
Employed	.44	.15**	(.14, .73)	.22	.45	.15**	(.15, .75)	.23
High school	.38	.14**	(.10, .66)	.18	.35	.16*	(.04, .66)	.17
Age	−.11	.06*	(−.22, .00)	−.14	−.11	.06*	(−.22, .00)	−.14
Years in NB	−.03	.07	(−.16, .10)	−.03	−.04	.07	(−.17, .09)	−.04
Family income	.03	.03	(−.03, .10)	.08	.03	.03	(−.04, .09)	.06
Random intercept	−.13	.34	(−.79, .53)	.00	−.14	.35	(−.81, .54)	−.10
% White	−.04	.08	(−.20, .13)	−.09	−.05	.09	(−.22, .13)	−.02
% Black	.01	.07	(−.12, .14)	.02	−.01	.07	(−.15, .13)	.04
% Latino	.01	.07	(−.13, .15)	.02	.03	.07	(−.11, .16)	.11
Residential stability	.08	.07	(−.06, .22)	.10	.09	.07	(−.05, .23)	
Ethnic density (ED)	.09	.30	(−.49, .67)	.04	.07	.31	(−.54, .67)	.03
NB income	.05	.14	(−.22, .32)	.04	.26	.14t	(.00, .53)	.24
ED by NB income					−.34	.28	(−.89, .21)	−.22
Island-born (N = 242)								
New York City	−.20	.20	(−.59, .19)	−.09	−.18	.20	(−.58, .21)	−.09
Female	−.18	.11t	(−.40, .03)	−.09	−.16	.11	(−.38, .06)	−.08
Have partner	−.17	.12	(−.40, .07)	−.08	−.15	.12	(−.39, .09)	−.07
Employed	.17	.12	(−.06, .40)	.09	.19	.12	(−.04, .41)	.10
High school	−.04	.11	(−.26, .19)	−.02	−.02	.12	(−.25, .21)	−.01
Age	−.23	.05**	(−.33, −.13)	−.36	−.22	.05**	(−.32, −.13)	−.35
Years in NB	.11	.05*	(.01, .21)	.11	.12	.05*	(.02, .22)	.13
Family income	.10	.03**	(.03, .17)	.19	.10	.03**	(.03, .16)	.19
Years in mainland US	−.01	.01	(−.02, .01)	.02	−.01	.01	(−.02, .01)	.01
Random intercept	.22	.25	(−.27, .71)	.01	.22	.25	(−.27, .71)	.05
% White	.04	.06	(−.08, .16)	.09	.00	.23	(−.06, .17)	.13
% Black	.03	.06	(−.09, .15)	.06	−.18	.09	(−.06, .16)	.10
% Latino	−.01	.07	(−.15, .13)	−.03	.33	.12	(−.15, .13)	−.02
Residential stability	.16	.07*	(.02, .30)	.20	.06	.06*	(.03, .31)	.22
Ethnic density (ED)	.01	.23	(−.43, .45)	−.00	.04	.23t	(−.45, .46)	−.00
NB income	.03	.08	(−.13, .19)	.03	−.18	.09*	(−.36, .01)	.02
ED by NB income					.33	.12**	(.10, .55)	.16

t < .10; * <.05; ** <.01

born individuals. While neighborhood characteristics were not individually related to outcomes for either sample, their joint influence did predict self-reported health, functional limitations, and health symptoms for island-born Puerto Ricans. Island-born Puerto Ricans living in ethnically dense, low SES neighborhoods reported worse physical health than island-born Puerto Ricans living in other types of neighborhoods. This finding makes three important contributions to the literature. First, paralleling previous theory and research on ethnic enclaves, it demonstrates that neighborhoods are a salient context of adaptation for Puerto Rican adults. Second, it highlights the importance of considering the interactive relationship of neighborhood ethnic density and neighborhood SES when examining variation in physical health. Finally, it suggests that for island-born Puerto Ricans, the relationship between living in an ethnic enclave and physical health may vary according to the level of resources present in the neighborhood.

While neither neighborhood ethnic density nor neighborhood SES was consistently related to health among the island-born sample, their joint influence was. In general,

island-born Puerto Ricans living in ethnically dense, low SES neighborhoods reported lower levels of health than island-born Puerto Ricans living in other types of neighborhoods. This finding suggests that ethnic enclaves may in fact be detrimental for island-born Puerto-Ricans' health when neighborhood SES is low. Residence in ethnically dense, low SES neighborhoods may limit first-generation immigrants' access to resources outside of the neighborhood (Portes and Landolt 1996). In addition, past research has found that while the presence of organizational resources in a neighborhood (i.e. grocery stores, laundries, child care centers, and banks) increases as the poverty rate of the neighborhood increases, the number of resources decreases as the proportion of the neighborhood that is an ethnic minority increases (Small and McDermott 2006). Therefore, it may be that living in an ethnically dense, low SES neighborhood means that you have less access to resources within the neighborhood and less ability to access resources outside of the neighborhood, which in turn, may result in negative health outcomes.

The one exception to the pattern of the interactions was found for self-reported health. While the shape of the interaction was similar to the other two outcomes, individuals living in ethnically sparse, high income neighborhoods (Fig. 1, Column B) reported lower levels of self-rated health, comparable to individuals living in ethnically sparse, lower income neighborhoods (Fig. 1, Column A). In part, this may be driven by differences in the outcome measures. Given that self-reported health is a one-item measure that asks about physical health in general, it may be capturing a broader sense of well-being than the measures of functional limitations and health symptoms that ask about specific physical challenges and ailments. If this is the case, there may be differential underlying process driving these relationships. For example, the ethnically sparse, low and high SES neighborhoods differ in terms of their racial/ethnic makeup. The low SES, ethnically sparse neighborhoods are characterized by higher rates of other Latino residents (30 vs. 17 %) while the high SES, ethnically sparse neighborhoods are characterized by higher rates of White residents (47 vs. 39 %). While the analytic models adjust for variation in neighborhood racial/ethnic makeup, these differences may be related to differential neighborhood experiences (e.g. discrimination) that may also influence individual well-being. This highlights the importance of considering multiple indicators of health and examining potential mediating pathways in future work.

In contrast to prior research, we did not find differences in physical health between the mainland- and island-born samples. Moreover, the neighborhood characteristics were neither independently nor jointly related to the three health outcomes among mainland-born Puerto Ricans. A comparison of the two samples revealed demographic differences that offer insight into the differing patterns of results. Similar to past work (Oropesa and Landale 2000; Ramos 1992), we found that the island-born sample had lower levels of SES than the mainland-born sample, specifically in terms of education and income. In addition, there was a difference in English proficiency between the groups, with the mainland-born sample reporting higher levels of thinking in English ($\mu = 3.39$; 1 = Only Spanish to 5 = Only English) relative to the island-born sample ($\mu = 2.24$; $t(443) = 10.93$, $p < .001$). It is also important to note that the majority of the island-born sample (97 %) had lived in the mainland U.S. for at least 5 years and on average had spent 31 years in the mainland U.S., the majority of their adult lives. As such, in many ways the island-born sample may have acculturated to the cultural differences of the mainland U.S., resulting in the null findings for health differences between the two samples. However, the socioeconomic and language differences across the groups may have made them differentially susceptible to the influence of their neighborhoods. Prior work has identified English proficiency as a particularly important aspect of acculturation, linked to both structural and spatial assimilation (e.g. Alba et al. 2000). Therefore, among the island-born Puerto Ricans, who had lower levels of socioeconomic resources and English proficiency, neighborhood of residence may have played a more salient role in adaptation, and ultimately health. In comparison, the mainland-born sample, which had more individual-level resources to draw upon, may have been less influenced by neighborhood characteristics such as ethnic density and SES.

Although we hypothesize that neighborhood characteristics differentially affect mainland- and island-born Puerto Ricans' physical health, it may be that an individual's health influences decisions around migration and settlement. In fact, researchers have argued that migration selectivity may explain the better physical health found among foreign-born Latinos relative to the native-born (e.g. Palloni and Arias 2004). Although we failed to find nativity differences in health, health concerns may have motivated decisions around settlement and neighborhood choice. If this were the case, observed differences in health across neighborhood type may be a function of more or less healthy people favoring a type of neighborhood rather than the influence of neighborhood characteristics on health. In addition, the ethnic density and SES of a neighborhood may be shaped by the presence or absence of healthy people. Future work needs to capitalize on longitudinal data and analytical approaches robust to selection bias to strengthen causal claims about neighborhood effects among Puerto Rican samples.

Community psychologists have long called for research that positions individuals and communities within sociocultural

Table 3 Neighborhood ethnic density and SES predicting functional limitations

	Model 1				Model 2			
	B	SE	95 % CI	β	B	SE	95 % CI	β
Mainland-born (N = 207)								
New York City	.12	.36	(−.59, .83)	.10	.08	.51	(−.91, 1.08)	.09
Female	−.06	.19	(−.43, .31)	−.01	−.05	.28	(−.59, .49)	.00
Have partner	−.03	.19	(−.40, .33)	.00	−.03	.24	(−.51, .44)	.00
Employed	.52	.19**	(.16, .89)	.28	.54	.34	(−.14, 1.21)	.29
High school	−.07	.21	(−.47, .33)	−.02	−.10	.28	(−.65, .45)	−.03
Age	−.19	.08*	(−.33, −.04)	−.23	−.18	.10t	(−.37, .01)	−.23
Years in NB	−.01	.11	(−.24, .21)	−.02	−.02	.14	(−.29, .26)	−.02
Family income	.03	.03	(−.03, .10)	.07	.03	.08	(−.13, .19)	.06
Random intercept	−.31	.40	(−1.10, .48)	.00	−.30	.56	(−1.41, .80)	.00
% White	.00	.08	(−.16, .17)	.04	.00	.15	(−.30, .29)	.03
% Black	.01	.07	(−.13, .16)	.04	.00	.13	(−.26, .26)	.01
% Latino	.08	.08	(−.06, .23)	.15	.09	.15	(−.19, .38)	.17
Residential stability	−.05	.16	(−.37, .26)	−.08	−.04	.13	(−.30, .21)	−.07
Ethnic density (ED)	.06	.25	(−.44, .56)		.05	.52	(−.98, 1.07)	.05
NB income	.01	.14	(−.26, .29)		.16	.25	(−.32, .64)	.14
ED by NB income					−.23	.29	(−.80, .34)	−.15
Island-born (N = 242)								
New York City	.24	.20	(−.16, .64)	.12	.25	.20	(−.15, .64)	.12
Female	−.19	.10*	(−.37, −.00)	−.09	−.17	.10t	(−.36, .02)	−.08
Have partner	−.02	.10	(−.22, .18)	−.01	−.01	.10	(−.21, .19)	.00
Employed	.57	.13**	(.32, .82)	.28	.59	.13**	(.34, .94)	.29
High school	−.01	.13	(−.27, .25)	.00	.01	.13	(−.25, .26)	.01
Age	−.19	.05**	(−.29, −.10)	−.31	−.19	.05**	(−.28, −.09)	−.30
Years in NB	.07	.05	(−.02, .16)	.06	.08	.05t	(−.01, .17)	.08
Family income	.04	.03	(−.01, .10)	.08	.04	.03	(−.01, .17)	.07
Years in mainland US	−.01	.01	(−.02, .00)	−.02	−.01	.01	(−.02, .09)	−.03
Random intercept	−.10	.25	(−.60, .39)	.01	−.11	.24	(−.58, .37)	.04
% White	−.03	.05	(−.13, .06)	−.08	−.02	.05	(−.12, .07)	−.05
% Black	−.08	.04t	(−.17, .00)	−.17	−.07	.04	(−.15, .02)	−.13
% Latino	−.00	.05	(−.11, .10)	−.01	−.00	.05	(−.11, .10)	−.00
Residential stability	.05	.05	(−.05, .14)	.05	.06	.05	(−.04, .16)	.07
Ethnic density (ED)	−.34	.19t	(−.71, .03)	−.17	−.35	.18t	(−.70, .01)	−.18
NB income	.09	.07	(−.04, .22)	.09	−.10	.10	(−.29, .09)	.08
ED by NB income					.30	.13*	(.05, .54)	.15

t < .10; * <.05; ** <.01

context (e.g. Trickett 2002). By failing to consider whether patterns of results are generalizable across racial/ethnic groups, we run the risk of making assumptions that may mask important between-group differences. This study capitalizes on a within-group research design to explore individual- and setting-level correlates of health among Puerto Rican adults, a group that has been shown to be at a health disadvantage relative to other Latino groups. Grounded in theory and empirical work on ethnic enclaves, the findings suggest that patterns and processes identified in previous work with other Latino groups may also hold true among Puerto Ricans. Although the findings from this study cannot be generalized to all Puerto Rican adults living in the U.S. because of the non-random sampling design, they do provide important information on the relationships between neighborhood and health and suggest that community-level intervention efforts may be an effective approach to health promotion, particularly among island-born Puerto Ricans. Given the heterogeneity of experience among Latinos in the U.S., it is important that

Table 4 Neighborhood ethnic density and SES predicting health symptoms

	Model 1				Model 2			
	B	SE	95 % CI	β	B	SE	95 % CI	β
Mainland-born (N = 207)								
New York City	.17	.30	(−.42, .75)	.12	.14	.31	(−.47, .75)	.11
Female	−.30	.16t	(−.61, .01)	−.13	−.29	.15t	(−.58, .00)	−.13
Have partner	.17	.13	(−.09, .42)	.10	.17	.13	(−.08, .42)	.10
Employed	.45	.17**	(.12, .77)	.24	.46	.17**	(.13, .78)	.25
High school	−.06	.17	(−.40, .28)	−.01	−.08	.17	(−.42, .26)	−.02
Age	−.08	.06	(−.21, .04)	−.10	−.08	.07	(−.21, .05)	−.10
Years in NB	.03	.08	(−.12, .18)	.03	.03	.08	(−.13, .19)	.02
Family income	.04	.03t	(.00, .09)	.10	.04	.03	(−.01, .09)	.09
Random intercept	−.21	.32	(−.83, .41)	.00	−.21	.32	(−.83, .42)	.00
% White	.06	.08	(−.09, .21)	.16	.05	.08	(−.10, .20)	.15
% Black	.07	.06	(−.04, .19)	.18	.06	.06	(−.06, .18)	.15
% Latino	.06	.06	(−.06, .19)	.12	.07	.07	(−.06, .20)	.13
Residential stability	−.10	.07	(−.25, .04)	−.14	−.10	.08	(−.25, .05)	−.14
Ethnic density (ED)	−.08	.26	(−.60, .43)	−.02	−.09	.27	(−.61, .43)	−.03
NB income	−.06	.11	(−.28, .17)	−.04	.07	.13	(−.18, .32)	.06
ED by NB income					−.20	.12t	(−.42, .03)	−.12
Island-born (N = 242)								
New York City	.53	.23*	(.09, .98)	.27	.55	.22*	(.11, .99)	.28
Female	−.38	.11**	(−.59, −.17)	−.19	−.35	.11**	(−.57, −.14)	−.18
Have partner	−.09	.12	(−.32, .14)	−.04	−.07	.12	(−.30, .16)	−.03
Employed	.49	.13**	(.24, .74)	.24	.51	.13**	(.25, .77)	.25
High school	−.13	.12	(−.35, .10)	−.06	−.11	.12	(−.34, .12)	−.05
Age	−.10	.06	(−.22, .03)	−.17	−.09	.06	(−.21, .03)	−.15
Years in NB	.04	.05	(−.05, .14)	.04	.05	.05	(−.04, .14)	.05
Family income	.06	.03t	(−.00, .12)	.12	.06	.03t	(−.01, .12)	.11
Years in mainland US	−.01	.01	(−.02, .01)	−.01	−.01	.01	(−.02, .01)	−.02
Random intercept	−.06	.22	(−.49, .37)	.00	−.07	.22	(−.49, .35)	.03
% White	−.01	.05	(−.11, .09)	−.02	.00	.05	(−.10, .10)	.00
% Black	−.07	.05	(−.16, .03)	−.14	.06	.05	(−.15, .04)	−.11
% Latino	.01	.06	(−.10, .13)	.02	.01	.06	(−.10, .12)	.02
Residential stability	−.02	.05	(−.11, .08)	−.03	.01	.05	(−.10, .09)	−.02
Ethnic density (ED)	−.35	.22	(−.78, .08)	−.18	−.36	.21t	(−.77, .05)	−.18
NB income	.13	.05*	(.03, .24)	.13	−.03	.09	(−.20, .14)	.12
ED by NB income					.25	.11*	(.03, .47)	.12

t < .10; * <.05; ** <.01

researchers continue to explore both within-group and between-group variation in physical health outcomes and the correlates of health among this population.

Limitations

This study has several limitations. The cross-sectional nature of the data makes it impossible to draw causal inferences about the results. Future research needs to draw on longitudinal data to better explore the temporal relationship between nativity, neighborhood variables, and physical health. Similarly, the selection of people into and out of neighborhoods can bias the estimates of neighborhood-level effects (Tienda 1991). Because it is difficult to randomly assign people to neighborhoods, it is hard to determine what unmeasured factors may both steer people into particular neighborhoods and influence their health. Recent studies have drawn on quasi-experimental and

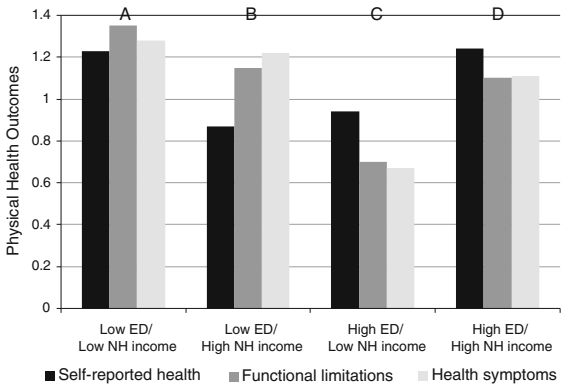

Fig. 1 Interaction between neighborhood ethnic density and neighborhood SES predicting self-reported health, functional limitations, and health symptoms among island-born Puerto Ricans. *ED* ethnic density, *NH* neighborhood

experimental designs, longitudinal data, and analytical approaches that are robust to selection bias to estimate neighborhood effects (e.g. Kling et al. 2005; Sharkey 2008), addressing the question of whether individuals with pre-existing characteristics self-select into certain types of neighborhoods or whether characteristics of neighborhoods actually influence individuals. These advancements in the area of neighborhood research lend support to research that makes assumptions about the directionality of neighborhood effects. Finally, while this study identified characteristics that predicted variations in health, it failed to identify the underlying factors that may be driving these relationships. Future research should explore mediating processes such as access to neighborhood resources, the availability of social networks, and behavioral norms surrounding health behaviors.

Conclusion

This study is one of the first to consider the role of neighborhood characteristics in explaining variation in Puerto Rican adults' health. The findings indicate that island-born Puerto Ricans living in ethnically dense, low income neighborhoods report lower levels of physical health than island-born Puerto Ricans living in other types of neighborhoods, which may indicate blocked access to resources both within and outside the neighborhood. This highlights the relevance of the neighborhood context in the health and adaptation of Puerto Rican adults. Moreover, it demonstrates the importance of considering intersections between neighborhood characteristics, specifically ethnic density and SES, and how these may operate differently dependent on nativity. These findings establish the utility of an ethnic enclave framework for studying variations in health with Puerto Rican samples and suggest the community context as a point intervention for culturally-specific health promotion programs and policies.

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