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Longitudinal Associations Between Immigrant Ethnic Density, Neighborhood Processes, and Latino Immigrant Youth Depression

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Abstract Depression rates rise in adolescence and the prevalence of depression is higher among Latino adolescents than other race/ethnic groups. Ethnic density among immigrant populations is associated with better health and mental health outcomes among adults, but little is known about its effects among adolescents or its mechanisms. This study examines the pathways by which immigrant density may affect mental health outcomes among Latino youth. Using data from the National Longitudinal Study of Adolescent Health (Add Health), we drew a sample of 2,678 Hispanic youth. Multivariate multilevel logistic regression analyses found that Latino immigrant density predicted lower odds of depression among both male and female immigrant but not non-immigrant Latino adolescents. No mediating effects of neighborhood efficacy, perceived safety or perceived contentment were observed in this study. Results reaffirm the need to further explore the mechanisms through which ethnic density exerts its salubrious effect on immigrant youth mental health.

Keywords Ethnic density · Ethnic enclaves · Adolescent depression · Latino immigrants · Neighborhood processes · Neighborhood context

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Background

Prevalence of depression rises considerably throughout adolescence [1] and is highly correlated with depression in adulthood [2, 3]. Adolescent depression is associated with adverse outcomes including academic difficulties [4], smoking and substance use [5], suicidality [6], and disordered eating behaviors [7]. According to a national study of US youth in grades 6–10 (n = 9,863), Latino youth reported higher prevalence of depression (22 %) than White (18 %), Asian American (17 %), or African American youth (15 %) [8]. A recent report from the US Youth Risk Behavior Surveillance Survey showed that the prevalence of youth who had seriously considered suicide was higher among Latino (16.7 %) than White (15.5 %) and Black students (13.2 %); and was higher among females (19.3 %) than males (12.5 %) [9].

In addition to high rates of depression, Latino youth in the US often experience other disadvantages including lower educational attainment and socioeconomic status [10, 11]. *Immigrant* Latino adolescents may face additional challenges such as language barriers, acculturative stress, discrimination, or cultural conflicts with parents [12, 13]. Studies have found detrimental effects of these stressors on Latino immigrant youth, particularly internalizing behaviors such as depression, low self-esteem, and suicidality [14]. Therefore it is important to identify factors and mechanisms that decrease the risk of depression among Latino youth, both immigrant and non-immigrant.

Immigrant generational status may also contribute to development of internalizing problems among Latino youth [15–18]. For example, some studies found that first and second generation immigrant youth appear to have worse mental health outcomes [17] and lower self-efficacy [16] than third generation youth. However, others found that first

or second generation youth experienced *lower* levels of depression compared to later generations [15, 18]. Possible explanations for this discrepancy may be related to individual, family and neighborhood environments that differ by generational status. Immigrant optimism among first and second generation but not third or later generation individuals could buffer the detrimental effects of discrimination and social inequality [19]. Family support [12] and familismo [20] were also found to be associated with lower depressive symptoms. In addition, first and second generation immigrants benefit from living in high ethnic density neighborhoods [21]; and findings among Hispanics from the Project on Human Development in Chicago Neighborhoods (n = 1,040) indicated that first and second generation adolescents are more likely to live in high density immigrant neighborhoods than third and later generations [17].

Ethnic minorities living in neighborhoods with a high density of residents from their own racial or ethnic group are likely to have better health and mental health than those living outside of such neighborhoods, also known as the ethnic density hypothesis [22–24]. Beneficial effects of ethnic density on depressive symptoms have been found in immigrants in Western Europe [21] and Latino adults in the US [25, 26] including a systematic review across 34 articles based on 29 datasets [27]. However, much less is known about associations between ethnic density and Latino *adolescent* depression.

Previous studies on racial/ethnic density among minority youth found that higher non-Hispanic White concentration was associated with higher risk of depressive symptoms among African American but not Hispanic youth [12]. Higher African American concentration was associated with lower depressive symptoms among African American adolescents [28]. Further, the pathway of this protective effect was through high social support and social cohesion [28], suggesting the key role of neighborhood processes. However, it is unclear if findings for African American adolescents apply to Latino adolescents.

Neighborhood processes is a broad concept that encompasses community and interpersonal dynamics. Neighborhood collective efficacy refers to residents' belief in their ability to impact and shape their neighborhoods and can be measured by social cohesion and informal social control [29]. Social cohesion refers to the degree of connection among people living in the neighborhood. Informal social control refers to the capacity of a group to spontaneously regulate its members according to desired principles such as monitoring child play groups or resident deviant behaviors [29]. It has been suggested that social cohesion and social control in the neighborhood contribute to a sense of solidarity and to collective self-efficacy, which may reduce risk of depression [30], but this link among adolescents warrants further research.

Conceptural Framework

This study examines two seemingly competing theoretical predictions about the effects of ethnic density on immigrant youth depression. In the stress process model, primary stressors (e.g. unemployment) contribute to development of psychological strains (secondary stressors) that account for increasing depression [31, 32]. Latino density has been associated with economic disadvantage [33]; and so poverty in Latino concentrated neighborhoods would be expected to contribute to higher rates of depression among Latino youth. On the other hand, the ethnic density hypothesis posits that individuals will have better mental health outcomes when they live in areas with a higher concentration of the same ethnicity [34]. Stronger social ties and social cohesion in these neighborhoods are purported to foster better emotional support [25] and access to resources such as health care, compared to people in low ethnic density neighborhoods [22]. Thus, even though Latino ethnic density is often correlated with poverty and could exacerbate depression based on the stress process model, research also suggests that ethnic social supports [35] and residents' sense of belonging in high density neighborhoods [24] can override material disadvantage, which would be consistent with the ethnic density hypothesis. Latino ethnic density may provide enough resources to counteract secondary stressors.

This study explores the pathways from Latino immigrant density to Latino adolescent depression via three neighborhood processes: collective efficacy (i.e., social cohesion and informal social control), adolescents' perceived safety, and perceived contentment. We hypothesized that: (1) Latino immigrant density will be positively associated with neighborhood collective efficacy, and with Latino adolescents' perceived safety and perceived contentment. (2) Latino immigrant density will reduce the odds of depression onset among immigrant Latino youth. (3) Associations between Latino immigrant density and adolescents' favorable mental health outcomes will be mediated by neighborhood collective efficacy, perceived neighborhood safety, and perceived neighborhood contentment. (4) Gender differences in these associations will be observed. All models will be stratified by immigrant status in order to examine hypotheses for each group.

Methods

We used the adolescent In-Home survey, Parent survey, and the Contextual data from Wave 1 (W1) and Wave 2 (W2) of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is the largest nationally representative longitudinal study of adolescents in the US. Participants were in grades 7 through 12 in 1994–1995

when the study began, and W2 data were collected approximately 1 year later. Add Health incorporated systematic sampling strategies to enroll 80 high schools and 52 middle schools representative of youth in US schools. Neighborhood level variables were drawn from the Contextual Files linked to block level data from the 1990 US Census. This study was deemed exempt by the University of Illinois Institutional Review Board.

Participants

Adolescents with data in both waves who identified as Hispanic or Latino were selected and classified by their immigrant generational status (see below). The sample (n = 2,678) consisted of immigrant Latino youth (n = 1,114) and non-immigrant Latino youth (n = 1,564). See Table 1 for sample characteristics.

Table 1 Participant characteristics at wave 1 (N = 2,678)

	Immigrant (N = 1,114)		Non-immigrant (N = 1,564)	
	N (%) or M (SD)	Range	N (%) or M (SD)	Range
Age	16.6 (1.6)	12–20	16.2 (1.8)	12–20
Female	50.3		48.8	
Spanish spoken at home	81.3		19.1	
Two parent household	95.1		47.3	
Parent education high school or less	73.2		63.3	
Parent education some college	19.9		21.3	
Parent education college or more	6.9		14.4	
Level of family participation in public services	0.4 (0.72)		0.57 (0.9)	
Self-esteem	24 (3.6)	0–4	24.3 (3.8)	0–4
Family support	16.4 (2.8)	5–30	15.9 (2.9)	8–30
NB[a] collective efficacy	3.3 (1.4)	5–23	3.6 (1.4)	4–23
Perceived NB contentment	7.2 (1.9)	0–5	7.2 (1.9)	0–5
Perceived NB safety	81.2	2–10	82.6	2–10
Depression W1 (CES-D scale ≥16)	30.2		30.8	
Females (% among females)	35.3		39.1	
Male (% among males)	25.1		23.2	
Depression W2 (CES-D scale ≥16)	20.7		23.1	
Female (% among females)	23.2		28.2	
Male (% among males)	17.4		18.1	
Onset of depression at W2	7.6		8.8	
Neighborhood level variables[b]				
Latino immigrant density index[c]	2.5 (0.9)	0–3	1.6 (1.3)	0–3
% Latino	0.5 (0.3)	0–1	0.3 (0.3)	0–1
% Foreign-born	0.4 (0.3)	0–0.9	0.2 (0.2)	0–0.9
% Age >5 non-English speaking	0.2 (0.2)	0–0.8	0.1 (0.1)	0–0.8
NB poverty index[d]	2.3 (1.2)	0–4	1.9 (1.3)	0–4
% Female-headed household	0.3 (0.2)	0–0.9	0.3 (0.2)	0–0.9
% Age >25 with less than high school degree/GED	0.4 (0.2)	0–0.8	0.3 (0.2)	0–0.9
% Below the federal poverty line	0.2 (0.1)	0–0.7	0.2 (0.1)	0–0.7
% Unemployment	0.1 (0.1)	0–0.3	0.1 (0.1)	0–0.6

[a] NB refers to neighborhood

[b] All proportions of neighborhood-level variables were based on US Census block information

[c] Latino ethnic density index ranged from 0-3; each item=1 if the value was above the sample mean

[d] NB poverty index ranged from 0-4; each item=1 if the value was above the sample mean.

Measures

Immigrant Generational Status

Adolescents who reported that they were not born in the US were coded as first generation immigrants; those reported that they were born in the US but that one or both of their parents were foreign-born were coded as second-generation immigrants. Adolescents who reported that they and both of their parents were born in the US were coded as non-immigrants. First and second-generation immigrant youth were collapsed into one category to achieve adequate sample sizes and because it is the parent not child generational status that would influence neighborhood location. Parents of first and second generation youth share first generation immigrant status (by definition), while parents of third and later generation would not.

Demographics

Age was measured as a continuous variable. Sex and race/ethnicity were self-reported. Highest education attained by either parent was used and collapsed into college degree or more, some college, and high school or less. Family participation in public services and language spoken in the home were self-reported (see Table 1).

Self-esteem

The 6-item Rosenberg self-esteem scale was assessed in the Add Health data [36]. Higher scores indicate higher self-esteem (Cronbach's alpha = 0.85).

Family Support

We used four items concerning the adolescent's relationships with parents and other family members at W1. Responses to each item ranged from 1 (not at all) to 5 (very much). A higher index score indicates a better relationship with family (Cronbach's alpha = 0.67).

Latino Immigrant Density

Three items in Add Health's contextual variables, based on the 1990 US Census, were combined to create an indicator of Latino immigrant density. These were the proportion of individuals living in the census block who were: of Hispanic origin, foreign born, and aged 5 and over that do not speak English well or not at all (Cronbach's alpha = 0.91). These measures are consistent with other neighborhood studies that examine immigrant concentration [37–40].

Neighborhood Poverty

Four items were combined to assess neighborhood poverty including the proportion of female-headed households; persons living below the poverty level; persons 18 and over with no high school diploma; and unemployed residents ($\alpha = 0.86$). These measures are consistent with previous studies of neighborhood disadvantage [37].

Neighborhood Collective Efficacy

Neighborhood collective efficacy was assessed at the individual level with five items pertaining to social cohesion and informal social control. Three items measured social cohesion (sample item: *You know most of the people in your neighborhood*). Two items measured informal social control asking parents whether they would tell if they saw a neighbor's child getting into trouble or be told if their child was observed getting into trouble. These five binary items (yes/no) were reverse coded where appropriate and summed, so that higher scores indicate higher collective efficacy.

Perception of Neighborhood

Perceived safety and perceived contentment were separately measured. To assess perceived safety participants answered whether they feel safe in their neighborhood (yes/no). Perceived contentment about living in the neighborhood was assessed with two scaled items (1–5) that were summed so that higher scores indicated greater contentment.

Depression

Depressive symptoms were assessed with 19 items from the Center for Epidemiologic Studies Depression Scale [41]. A sample item reads: *During the last week how often have you felt sad?* Items were reverse coded as appropriate and summed as an index. A score at or above 16 indicates at risk for clinical depression [42].

Data Analysis Strategy

Descriptive and correlation analysis were performed using SPSS 21.0. We used logistic regression since the dependent variable (onset of depression) was dichotomized to allow for a clearer interpretation of risk for clinical depression [42]. To test the hypotheses, we ran a series of multivariate regressions to determine direct and indirect effects in fully adjusted models controlling for depression at W1 and for confounding variables such as self-esteem and family support (see Table 3). Standard tests of mediation effects

Table 2 Correlations among immigrant and non-immigrant Latino youth depression at waves 1 and 2 and neighborhood characteristics at wave 1

Variables	1	2	3	4	5	6	7
1. CES-Depression W1[a]	–	0.60**	0.12**	0.12**	−0.09**	−0.21**	−0.27**
2. CES-Depression W2	**0.60****	–	0.13**	0.10**	−0.07**	−0.16**	−0.18**
3. NB[b] poverty	**0.03**	**0.03**	–	0.39**	−0.01	−0.13**	−0.19**
4. Latino immigrant density	**−0.01**	**−0.04**	**0.32****	–	−0.02	−0.04	−0.17**
5. NB collective efficacy	**−0.04**	**−0.03**	**−0.03**	**−0.05**	–	0.25*	0.13**
6. Perceived NB contentment	**−0.16****	**−0.14****	**−0.06****	**−0.01**	**0.26****	–	0.37**
7. Perceived NB safety	**−0.17****	**−0.19****	**−0.12****	**−0.07****	**0.16****	**0.33****	–

The lower diagonal in bold represents immigrant Latino youth (N = 1,114), and the upper diagonal represent non-immigrant youth (N = 1,564)

* $p < 0.05$; ** $p < 0.01$

[a] Mean CES-D score (range 0–3)

[b] NB refers to neighborhood

were followed [43]. To assess if patterns of associations were consistent across gender, we stratified all models by gender. To account for the clustered sampling and complex survey design of Add Health, we used STATA survey commands to yield unbiased estimates [44].

Results

Prevalence of depression was similar among Latino immigrant (30 %) and non-immigrant (31 %) adolescents at W1. The percent of cases with depression at W2 attributable to *new onset* of depression was 7.6 % among immigrant youth and 8.8 % among non-immigrant youth. The first hypothesis was not supported. Among the full sample of all Latino youth at W1, we found that higher Latino immigrant density was correlated with less favorable neighborhood processes (i.e., lower collective efficacy, perceived contentment, and perceived safety) (not shown in table); and Latino immigrant density was correlated with neighborhood perceived safety in stratified analyses among both immigrant and non-immigrant Latino youth (Table 2). Hypothesis two was supported. In longitudinal multivariate models stratified by immigrant status, Latino immigrant density lowered the odds of depression onset among immigrant youth (OR 0.60, CI 0.43–0.83, $p = 0.003$) but not non-immigrant Latino youth (Table 3).

Hypothesis 3 tested whether or not neighborhood processes mediated associations between Latino immigrant density at W1 and onset of depression at W2. We did not find support for indirect effects of immigrant density through any of the three neighborhoods processes on Latino adolescent depression. When each mediator was added separately to Model 1, the coefficients for ethnic density did not change (see Models 2–4 in Table 3). Although neighborhood perceived safety and perceived contentment were significantly correlated with lower depressive symptoms at W1 among immigrant and non-immigrant youth (Table 2), these neighborhood processes did not predict lower odds of depression onset at W2 in fully adjusted longitudinal models and were thus not candidates as mediators [43, 45]. Further, neighborhood processes did not mediate associations between Latino immigrant density and depression onset for either sex in the gender-stratified regression models (not shown).

Finally, contrary to what we expected in Hypothesis 4, our hypothesis on gender differences was not supported. In gender stratified models, Latino immigrant density was directly related to lower odds of depression onset among both female (OR 0.61, CI 0.39–0.94, $p = 0.02$) and male (OR 0.56, CI 0.31–0.97, $p = 0.04$) Latino immigrant youth (data not shown).

Discussion

The purpose of this study was to examine longitudinal associations between immigrant ethnic density and Latino male and female adolescents' onset of depression at W2, and to test neighborhood process as mediators between these longitudinal associations. Furthermore, immigrant status and gender differences were also examined in order to explore specific groups for whom Latino immigrant density may be beneficial. Findings suggested that Latino ethnic density lowered the odds of depression onset among both genders of immigrant youth but not among non-immigrant Latino youth of either sex.

Contrary to prior assumptions and theories about why ethnic concentration is beneficial for immigrant health, we found no evidence that neighborhood processes mediate associations between Latino immigrant density and depression. The stress process model [31] suggests the

Table 3 Multivariate logistic regression predicting onset of depression from individual, family and neighborhood characteristics among immigrant and non-immigrant Latino youth (n = 2,678)

	Model 1		Model 2		Model 3		Model 4	
	Immigrants OR[a] (95 % CI)	Non-immigrants OR (95 % CI)	Immigrants OR (95 % CI)	Non-immigrants OR (95 % CI)	Immigrants OR (95 % CI)	Non-immigrants OR (95 % CI)	Immigrants OR (95 % CI)	Non-immigrants OR (95 % CI)
Mediators								
NB[b] collective efficacy			1.07 (0.88, 1.30)	0.94 (0.75, 1.17)	–	–	–	–
Perceived NB[b] contentment			–	–	1.06 (0.75, 1.50)	1.16 (0.89, 1.51)	–	–
Perceived NB[b] safety			–	–	–	–	1.33 (0.58, 3.09)	0.82 (0.37, 1.77)
Neighborhood-level predictors								
Latino immigrant density	0.63** (0.46, 0.87)	0.82 (0.66, 1.02)	0.63** (0.46, 0.86)	0.82 (0.65, 1.03)	0.63** (0.44, 0.87)	0.83 (0.66, 1.02)	0.65** (0.48, 0.83)	0.81 (0.65, 1.01)
NB[b] poverty index	1.34* (1.02, 1.77)	1.27* (1.03, 0.56)	1.34* (1.02, 1.75)	1.27* (1.03, 1.57)	1.35* (1.02, 1.79)	1.27* (1.04, 1.54)	1.31 (0.99, 1.75)	1.27* (1.03, 1.57)
Individual-level predictors								
Age	1.10 (0.91, 1.33)	1.01 (0.89, 1.14)	1.10 (0.91, 1.33)	1.01 (0.89, 1.14)	1.10 (0.92, 1.33)	1.01 (0.90, 1.15)	1.09 (0.89, 1.36)	1.01 (0.90, 1.15)
Female	1.57 (0.82, 3.00)	2.26 (1.44, 3.55)	1.56 (0.82, 2.96)	2.22 (1.41, 3.49)	1.57 (0.82, 3.04)	2.31 (1.48, 3.60)	1.77 (0.96, 3.28)	2.24 (1.41, 3.57)
Spanish spoken at home	1.08 (0.61, 1.97)	0.88 (0.41, 1.89)	1.09 (0.61, 1.95)	0.89 (0.41, 1.90)	1.06 (0.59, 1.92)	0.89 (0.41, 1.92)	1.03 (0.57, 1.85)	0.89 (0.42, 1.89)
Two parent household	1.13 (0.19, 6.80)	0.85 (0.52, 1.40)	1.05 (0.17, 6.56)	0.85 (0.52, 1.41)	1.17 (0.19, 7.05)	0.85 (0.51, 1.40)	1.27 (0.21, 7.64)	0.84 (0.51, 1.39)
Parent education some college	0.20** (0.07, 0.58)	1.15 (0.53, 2.46)	0.20** (0.07, 0.57)	1.15 (0.54, 2.46)	0.20** (0.07, 0.56)	1.14 (0.53, 2.49)	0.18** (0.07, 0.48)	1.15 (0.54, 2.45)
Parent education college degree or more	0.63 (0.28, 1.46)	0.96 (0.46, 1.97)	0.63 (0.28, 1.44)	0.96 (0.47, 1.98)	0.63 (0.28, 1.43)	0.95 (0.46, 1.97)	0.63 (0.27, 1.48)	0.94 (0.46, 1.92)
Level of family participation in public services	0.88 (0.64, 1.22)	1.05 (0.84, 1.32)	0.87 (0.62, 1.22)	1.06 (0.84, 1.34)	0.89 (0.65, 1.22)	1.07 (0.85, 1.35)	0.89 (0.63, 1.24)	1.03 (0.82, 1.30)
CES-Depression[c] W1	5.58** (2.68, 11.6)	5.88** (3.36, 10.27)	5.52** (2.68, 11.38)	5.97** (3.45, 10.33)	5.63** (2.67, 11.87)	5.99** (3.40, 10.57)	6.65** (2.95, 14.28)	5.76** (3.26, 10.15)
Self-esteem	0.89 (0.52, 1.52)	0.92 (0.58, 1.45)	0.86 (0.49, 1.51)	0.93 (0.59, 1.47)	0.88 (0.52, 1.51)	0.91 (0.58, 1.45)	0.89 (0.51, 1.55)	0.91 (0.58, 1.45)
Family support	0.44** (0.29, 0.67)	0.69 (0.41, 1.12)	0.44** (0.29, 0.65)	0.69 (0.42, 1.15)	0.43** (0.29, 0.66)	0.67 (0.41, 1.08)	0.45** (0.29, 0.68)	0.70 (0.43, 1.14)

Model 1 presents the independent effects of Latino immigrant density on youth depression adjusting for neighborhood poverty and individual-level confounders. Models 2 through 4 present the mediating effects of neighborhood collective efficacy, perceived neighborhood contentment, and perceived neighborhood safety, respectively, between Latino immigrant density and youth depression, adjusting for neighborhood poverty and all individual-level confounders. All models also controlled for adolescent age and sex. Continuous variables include: age, level of family participation in public services, self-esteem, family support, NB poverty index, Latino immigrant density, NB collective efficacy and perceived NB contentment. Reference groups for categorical variables are: male, English or other language spoken at home, other than two parent household, parent education high school or less, CES-Depression <16, and perceived NB safety as not safe

* $p < 0.05$; ** $p < 0.01$

[a] OR refers to odds ratio

[b] NB refers to neighborhood

[c] Depression is a binary variable (mild depression ≥16)

potential for harmful effects of ethnic density due to higher levels of poverty and material deprivation found in ethnic concentrated neighborhoods [33]. This is thought to result in "downward assimilation," particularly among US born children who may not benefit as much from ethnic concentration as their first generation immigrant parents did [46]. Overall, findings supported the ethnic density hypothesis [34]. Male and female Latino immigrant youth who resided in Latino immigrant concentrated neighborhoods reported lower odds of depression onset at W2, even after controlling for neighborhood poverty and other confounding factors. A possible resolution to the ostensible discrepancy between the stress process model and the ethnic density hypothesis is that Latino immigrant density may function as a key resource in the stress process model [31] that outweighs or mitigates effects of stressors for Latino immigrant youth.

The current study addresses research gaps including *who* benefits from immigrant ethnic density, its effect on youth mental health outcomes, and potential mechanisms. Add Health data are well suited to answer these questions. The added rigor of using longitudinal data to control for baseline depression and a wide variety of demographic, individual, and neighborhood factors, builds upon previous cross-sectional studies examining associations at one point in time or in unadjusted models. This study was able to assess the impact of Latino immigrant ethnic density controlling for the poverty and material deprivation that often accompanies immigrant concentration. The nationally representative, multivariate findings in this study suggest that among Latino immigrant youth, the psychosocial benefits of immigrant density appear to outweigh the material determinants with regards to risk of depression.

To our knowledge this is one of the first studies to test three specific neighborhood processes as potential mechanisms among youth. Findings suggest that ethnic density is an important aspect for Latino immigrant youth that may lower risk for depression, though further exploration of other possible mechanisms among adolescents is needed. This may also be among the first studies to examine the effects of Latino immigrant concentration on Latino immigrant and non-immigrant adolescent depression. Latino immigrant concentration appears to be salutary for immigrant but not non-immigrant youth. In addition, few studies on ethnic density have included adolescent immigrant youth and mental health outcomes. Our findings extend existing knowledge about the beneficial effects of ethnic density on depression among immigrant adults [25, 47] to Latino immigrant adolescents.

Finally, this study examined gender differences in the effects of immigrant density on Latino youth. Research suggests that women may be more sensitive to neighborhood quality than men. For example, a study among adults found that women's health and mental health were more likely than men's to be adversely influenced by perceived community problems [47]. Gender differences were also observed among youth in the Moving To Opportunity study, a randomized controlled trial assessing the effects of neighborhood poverty on outcomes among low-income youth age 12–19 years (n = 2,829) [48]. Girls without health vulnerabilities appeared to benefit from the improved neighborhood conditions, but not boys, regardless of health status [48]. In contrast to the gender differences observed in other studies, we found that both female and male Latino immigrant youth mental health benefited from immigrant density. A possible explanation is that developmentally, immigrant adolescents of both genders may be sensitive to the potential benefits of residing in an ethnic affirming neighborhood during a period of life in which establishing cultural and self-identity is crucial to well-being [49].

Several limitations of this study should be noted. First, there may be other unmeasured confounders not accounted for in this model that affect youth depression and the potential mediating role of neighborhood processes. Additionally, Add Health W1 was collected in 1994–1995 and the environmental context for immigrants could be different today compared to 1995 regarding economic changes, immigration policy reforms, and an increasing Latino immigrant population. However, the challenges faced by first and second generation immigrants remain the same, such as discrimination, adequate housing, employment, and poverty. Add Health is one of the few datasets that include measures of immigrant generational status, depressive symptoms and immigrant ethnic density among Latino adolescents. These findings provide important context for future studies on Latino immigrant youth. Second, sample size limitations of Latino youth precluded us from investigating ethnic variation and subgroups within Latino immigrant populations, although we recognize that Latinos are a highly diverse population. Despite these limitations, Add Health is the largest and most comprehensive nationally representative longitudinal study of adolescents in the US and does have a relatively large sample of Latino youth.

Results of our analyses have important implications for future research. Future studies are needed to identify mediators between immigrant ethnic concentration and adolescent mental health outcomes, so that interventions and programs can enhance the resources that facilitate immigrant youth successful adaptation and well-being. Additionally, qualitative research is needed to understand how youth experiences of neighborhood ethnic density may vary by migration histories, settlement patterns, and legal status. Qualitative research could also provide valuable insights based on youth perspectives for how immigrant

neighborhood factors may influence adolescents' mental health, health, identity, and well-being.

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References

1. Thapar A, Collishaw S, Pine DS, Thapar AK. Depression in adolescence. Lancet. 2012;379:1056–67.
2. Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL. Subthreshold depression in adolescence and mental health outcomes in adulthood. Arch Gen Psychiatry. 2005;62:66–72.
3. Jonsson U, Bohman H, Von Knorring L, Olsson G, Paaren A, Von Knorring A. Mental health outcomes of long-term and episodic adolescent depression: 15-year follow-up of a community sample. J Affect Disord. 2011;130:395–404.
4. Owens M, Stevenson J, Hadwin JA, Norgate R. Anxiety and depression in academic performance: an exploration of the mediating factors of worry and working memory. School Psychol Int. 2012;33:433–49.
5. Diego MA, Field TM, Sanders CE. Academic performance, popularity, and depression predict adolescent substance use. Adolescence. 2003;38:35–42.
6. Balázs J, Miklõsi M, Keresztény A, Hoven CW, Carli V, Wasserman C, Apter A, Bobes J, Brunner R, Cosman D, Cotter P, Haring C, Iosue M, Kaess M, Kahn J, Keeley H, Marusic D, Postuvan V, Resch F, Saiz PA, Sisask M, Snir A, Tubiana A, Varnik A, Sarchiapone M, Wasserman D. Adolescent subthreshold-depression and anxiety: psychopathology, functional impairment and increased suicide risk. J Child Psychol Psychiatry Allied Disciplines. 2013;54:670–7.
7. Liechty JM, Lee M. Longitudinal predictors of dieting and disordered eating among young adults in the US. Int J Eat Disord. 2013;46:790–800.
8. Saluja G, Iachan R, Scheidt PC, Overpeck MD, Sun W, Giedd JN. Prevalence of and risk factors for depressive symptoms among young adolescents. Arch Pediatr Adolesc Med. 2004;158:760–5.
9. Eaton DK, Kann L, Kinchen S, Shanklin S, Flint KH, Hawkins J, Harris WA, Lowry R, McManus T, Chyen D, Whittle L, Lim C, Wechsler H. Centers for Disease Control and Prevention (CDC): youth risk behavior surveillance-United States, 2011. MMWR Surveill Summ. 2012;61:1–162.
10. Kuperminc G, Wilkins N, Roche C, Álvarez Jiménez A. Risk, resilience and positive development among Latino youth. In: Villarruel FA, Carlo G, Grau JM, Azmitia M, Cabrera NJ, Chahin TJ, editors. Handbook of US Latino psychology developmental and community-based perspectives. Thousand Oaks, CA: Sage; 2009. p. 213–33.
11. Rodriguez MC, Morrobel D. A review of Latino youth development research and a call for an asset orientation. Hisp J Behav Sci. 2004;26:107–27.
12. Potochnick SR, Perreira KM. Depression and anxiety among first-generation immigrant Latino youth: key correlates and implications for future research. J Nerv Ment Dis. 2010;198:470–7.
13. Behnke AO, Plunkett SW, Sands T, Bámaca-Colbert MY. The relationship between Latino adolescents' perceptions of discrimination, neighborhood risk, and parenting on self-esteem and depressive symptoms. J Cross Cult Psychol. 2011;42:1179–97.
14. Umaña-Taylor AJ, Vargas-Chanes D, Garcia CD, Gonzales-Backen M. A longitudinal examination of Latino adolescents' ethnic identity, coping with discrimination, and self-esteem. J Early Adolesc. 2008;28:16–50.
15. Harker K. Immigrant generation, assimilation, and adolescent psychological well-being. Soc Forces. 2001;79:969–1004.
16. Kao G. Psychological well-being and educational achievement among immigrant youth. In: Donald JH, editor. Children of immigrants: health, adjustment, and public assistance. Washington, DC: National Academy Press; 1999. p. 410–77.
17. Lara-Cinisomo S, Xue Y, Brooks-Gunn J. Latino youth's internalizing behaviors: links to immigrant status and neighborhood characteristics. Ethn Health. 2013;18:315–35.
18. Cervantes RC, Padilla AM, Napper LE, Goldbach JT. Acculturation-related stress and mental health outcomes among three generations of Hispanic adolescents. Hisp J Behav Sci. 2013;35:451–68.
19. Suárez-Orozco C, Suárez-Orozco MM. The psychosocial experience of immigration. In: Children of Immigration. Cambridge, MA: Harvard University Press; 2001. p. 66–86.
20. Ayon C, Marsiglia FF, Bermudez-Parsai M. Latino family mental health: exploring the role of discrimination and familismo. J Commun Psychol. 2010;38:742–56.
21. Veling W, Susser E, van Os J, Mackenbach JP, Selten J, Hoek HW. Ethnic density of neighborhoods and incidence of psychotic disorders among immigrants. Am J Psychiatry. 2008;165:66–73.
22. Eschbach K, Ostir GV, Patel KV, Markides KS, Goodwin JS. Neighborhood context and mortality among older Mexican Americans: is there a barrio advantage? Am J Public Health. 2004;94:1807–12.
23. Halpern D, Nazroo J. The ethnic density effect: results from a national community survey of England and Wales. Int J Soc Psychiatry. 2000;46:34–46.
24. Mullings L, Wali A, McLean D, Mitchell J, Prince S, Thomas D, Tovar P. Qualitative methodologies and community participation in examining reproductive experiences: the Harlem Birth Right Project. Matern Child Health J. 2001;5:85–93.
25. Mair C, Diez Roux AV, Osypuk TL, Rapp SR, Seeman T, Watson KE. Is neighborhood racial/ethnic composition associated with depressive symptoms? The Multi-ethnic Study of Atherosclerosis. Soc Sci Med. 2010;71:541–50.
26. Ostir GV, Eschbach K, Markides KS, Goodwin JS. Neighbourhood composition and depressive symptoms among older Mexican Americans. J Epidemiol Community Health. 2003;57:987–92.
27. Shaw RJ, Atkin K, Bécares L, Albor CB, Stafford M, Kiernan KE, Nazroo JY, Wilkinson RG, Pickett KE. Impact of ethnic density on adult mental disorders: narrative review. Br J Psychiatry. 2012;201:11–9.
28. Hurd NM, Stoddard SA, Zimmerman MA. Neighborhoods, social support, and African American adolescents' mental health outcomes: a multilevel path analysis. Child Dev. 2013;84:858–74.
29. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: a multilevel study of collective efficacy. Science. 1997;227:918–24.
30. Kawachi I, Berkman LF. Social cohesion, social capital, and health. In: Berkman L, Kawachi I, editors. Social epidemiology. New York: Oxford University Press; 2000. p. 174–90.

31. Pearlin LI, Menaghan EG, Lieberman MA, Mullan JT: The stress process. J Health Soc Behav. 1981;22:337–356.
32. Pearlin LI, Bierman A. Current issues and future directions in research into the stress process. In: Aneshensel CS, Phelan JC, Bierman A, editors. Handbook of the sociology of mental health. Netherland: Springer; 2012. p. 325–40.
33. Osypuk TL, Galea S, McArdle N, Acevedo-Garcia D. Quantifying separate and unequal: racial-ethnic distributions of neighborhood poverty in metropolitan America. Urban Aff Rev. 2009;45:25–65.
34. Halpern D. Minorities and mental health. Soc Sci Med. 1993;36:597–607.
35. Rios R, Aiken LS, Zautra AJ. Neighborhood contexts and the mediating role of neighborhood social cohesion on health and psychological distress among Hispanic and non-Hispanic residents. Ann Behav Med. 2012;43:50–61.
36. Rosenberg M. Society and adolescent self-image. Princeton, New Jersey: Princeton University Press; 1965.
37. Desmond SA, Kubrin CE. The power of place: Immigrant communities and adolescent violence. Sociol Q. 2009;50:581–607.
38. Leclere FB, Rogers RG, Peters KD. Ethnicity and mortality in the United States: individual and community correlates. Soc Forces. 1997;76:169–98.
39. Sampson RJ, Morenoff JD, Raudenbush S. Social anatomy of racial and ethnic disparities in violence. Am J Public Health. 2005;95:224–32.
40. Silver E, Miller LL. Sources of informal social control in Chicago neighborhoods. Criminol. 2004;42:551–83.
41. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas. 1977;1:385–401.
42. Rushton JL, Forcier M, Schectman RM. Epidemiology of depressive symptoms in the National Longitudinal Study of Adolescent Health. J Am Acad Child Adolesc Psychiatry. 2002;41:199–205.
43. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J Pers Soc Psychol. 1986;51:1173–82.
44. Chantala K, Joyce T: Strategies to perform a design-based analysis using the Add Health data. http://www.cpc.unc.edu/projects/addhealth/faqs/aboutdata/weight1.pdf.
45. Kraemer HC, Stice E, Kazdin A, Offord D, Kupfer D. How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. Am J Psychiatry. 2001;158:848–56.
46. Portes A, Min Z. The new second generation: segmented assimilation and its variants. Ann Am Acad Pol Soc Sci. 1993;530:74–96.
47. Burke J, O'Campo P, Salmon C, Walker R. Pathways connecting neighborhood influences and mental well-being: socioeconomic position and gender differences. Soc Sci Med. 2009;68:1294–304.
48. Osypuk TL, Tchetgen EJT, Acevedo-Garcia D, Earls FJ, Lincoln A, Schmidt NM, Glymour MM. Differential mental health effects of neighborhood relocation among youth in vulnerable families: results from a randomized trial mental health effects of neighborhood relocation. Arch Gen Psychiatry. 2012;69:1284–94.
49. Quintana SM, Scull NC. Latino ethnic identity. In: Villarruel FA, Carlo G, Grau JM, Azmitia M, Cabrera NJ, Chahin TJ, editors. Handbook of US Latino psychology: developmental and community-based perspectives. Thousand Oaks, CA: Sage; 2009. p. 81–98.