

Neighborhood cultural environment and anxiety and depression symptoms among majority
Mexican American adults: Results from the HCHS/SOL

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Abstract

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Previous research on associations of neighborhood ethnic composition with indicators of mental health is limited, with findings mixed regarding the impact of Latine ethnic composition, language isolation, and other related factors in relation to depression. We hypothesized that neighborhood environments characterized by greater concentration of Latine culture were associated with lower odds of elevated self-reported depression and anxiety symptoms. We assessed cross-sectional associations at baseline between GIS-derived indicators of neighborhood cultural environments and self-reported depression and anxiety symptoms among San Diego Latines of mostly Mexican heritage. Logistic regression models adjusted for age, gender, education level, household income and place of birth/duration of US residence were used. We found that for each standard deviation of increased perceived social cohesion, participants experienced a 15% reduction in the odds of displaying depressive symptomatology (OR 0.85, CI [0.74, 0.99], p 0.03). However, the cultural environment index, which reflects neighborhood acculturation, was not associated with depression or anxiety symptomatology.

Introduction

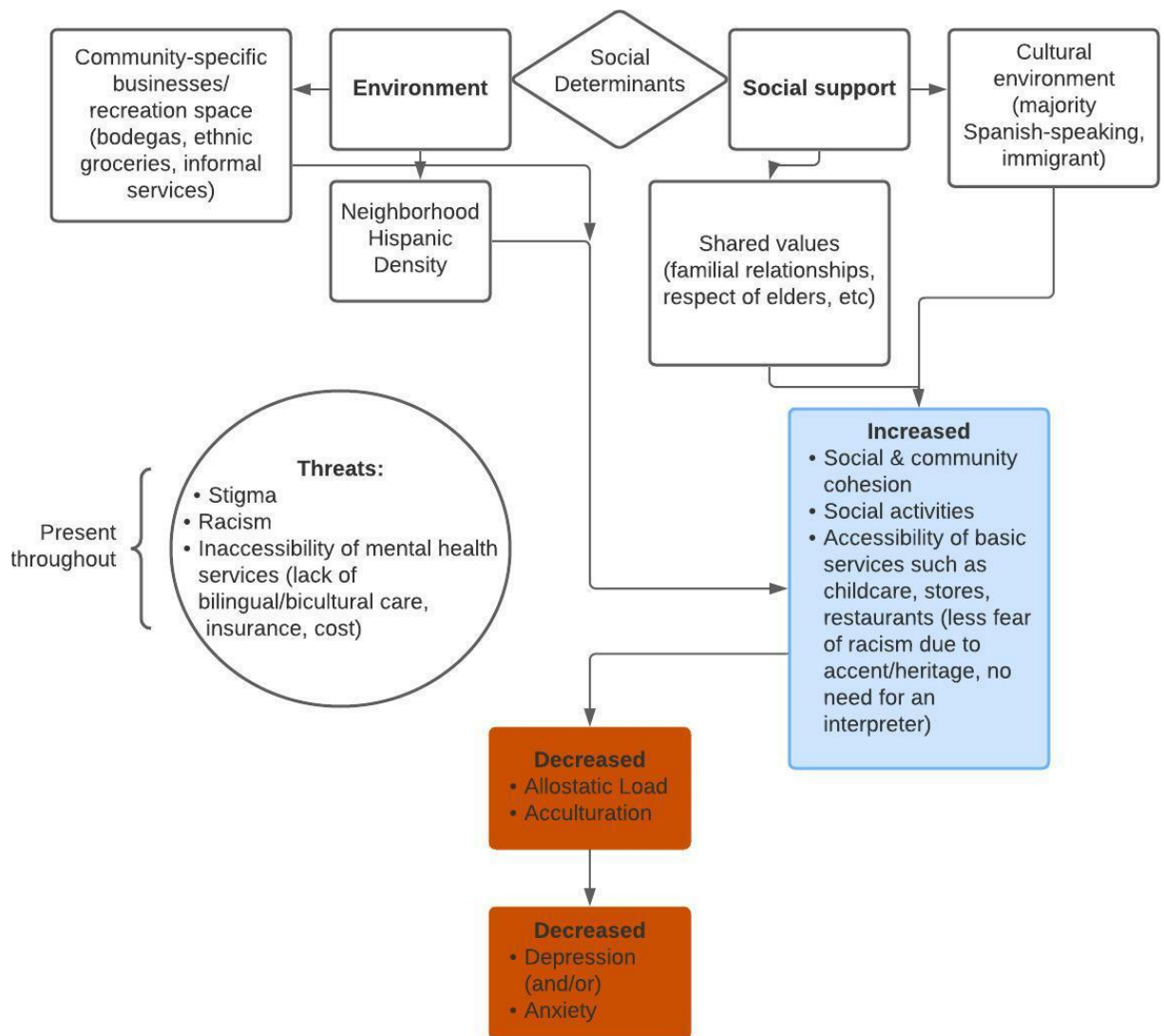
Compared to non-Hispanic Whites, Latines' rates of accessing and receiving mental health care trail behind.¹ Structural barriers and community stigmatization of mental illness lead to a dearth of culturally responsive care and an overall lower utilization of mental health services.¹ As with other racialized groups, Latines of Mexican heritage often live in historically disinvested neighborhoods and navigate the repercussions of gentrification² and segregation.³

The cultural characteristics of neighborhoods, such as co-ethnic density (proportions of people of the same ethnicity living in a neighborhood) and language use patterns (e.g., the percent of people who speak Spanish versus English), may be related to health and well-being among Latine populations.⁴⁻⁸ Past research on ethnic enclaves, which are characterized by a concentration of a single ethnicity (Latine) within a specific geographic region, historically assessed by shared cultural identity and economic drivers⁹, have suggested protective effects with regards to a number of health issues, including decreased lung cancer mortality¹⁰, decreased odds of smoking during pregnancy¹¹ and improved respiratory health among children⁶ living within such regions. Previous studies on the health impacts of cultural characteristics of neighborhoods among Latines are mixed, with some finding protective effects with regards to cancer rates¹⁰ and cardiovascular disease¹² and others reporting negative effects with regards to cancer rates¹³ and self-reported physical health.¹

Additionally, research on associations of neighborhood ethnic composition with indicators of mental health is limited, with findings mixed regarding the impact of Latine ethnic composition, language isolation, and other related factors in relation to depression.^{7,8,14-16} Building off the conceptual framework put forth by Velasco-Mondragon and colleagues¹⁷, we propose the following model to examine potential pathways through which neighborhood

cultural environments may affect mental health, specifically within the context of social determinants.

Figure 1: A Conceptual Model Outlining Possible Protective Pathways Impacting Symptomatology Among Latine Individuals Living in Majority-Hispanic Neighborhoods



As with Velasco-Mondragon et al's framework¹⁷, this model assumes that upstream social determinants – conceptualized within this manuscript as the neighborhood environment and social support structures – interact with threats to mental wellbeing via a variety of causal pathways.

The aim of this study was to assess cross-sectional associations at baseline between GIS-derived indicators of neighborhood cultural environments and self-reported depression and anxiety symptoms among San Diego Latines of mostly Mexican heritage. Using data from two ancillary studies from the Hispanic Community Health Study/ Study of Latinos (HCHS/SOL), we examined the associations of neighborhood cultural characteristics (e.g., concentration of Latine ethnicity, language use patterns of the neighborhood) with depression and anxiety symptoms among Latines. We focused on symptoms of depression and anxiety, as anxiety and depression disorders are estimated to be the most prevalent in the United States among adults.¹⁸ Among individuals in the larger HCHS/SOL study, adults of Mexican heritage had a prevalence of depression of 22.3%¹⁹ compared to the 8.1%²⁰ prevalence of depression observed in the general adult population. We hypothesize that neighborhood environments characterized by greater concentration of Latine culture (as defined below, e.g., Latine population concentration; Spanish language use) will be associated with lower odds of elevated self-reported depression and anxiety symptoms at baseline.

Methods

Study Design

The Hispanic Community Health Study/Study Of Latinos is a community-based prospective cohort study of 16,415 self-identified Latine adults, aged 18-74 at recruitment, from four sites across the United States.²¹ Sites used a two-stage probability sample of household addresses for comparisons between selected Latine heritage groups (Mexican, Puerto Rican, Cuban, etc).²¹ For the purposes of this study, only participants from the San Diego site who had their addresses geocoded as part of two cross-sectional ancillary studies were included in this analysis (ancillary studies described in further detail below). The Community And Surrounding Areas Study (CASAS) ancillary study participants are included for Aim 1 (N=3,851) and a

smaller subset of those also included in the Sociocultural Ancillary Study (SCAS) are examined for assessing the relationship of perceived social cohesion with mental health symptomatology (N=1,225). CASAS and SCAS are both cross-sectional studies.^{22,23}

CASAS & SCAS Study Setting

San Diego participants were sampled from a group of neighboring census tracts selected due to their proximity to the HCHS-affiliated clinic, tract-level demographic distributions available from the 2000 Census, and local information about neighborhoods. 97% of HCHS/SOL participants at the San Diego site report Mexican descent).²¹

CASAS Study Subjects

Participants at the San Diego site were enrolled in CASAS between December 17th, 2015 and September 30th, 2017.²² Recruitment occurred by phone or in person during their HCHS/SOL visit, during an annual follow-up call or while scheduling for other ancillary studies.²² HCHS/SOL participants who could not provide informed consent or could not walk at least one block unassisted were excluded; all other HCHS/SOL participants were eligible. While CASAS had a final sample of 1,776 participants, we utilized the macro-level geocoded data of the San Diego baseline sample (N= 4,086).

CASAS Data Sources

Participants at the San Diego HCHS/SOL baseline sample (N=4,086) had their baseline addresses geocoded to identify macro-scale attributes. Locations were not found for 235 participants, resulting in n=3,851 geocoded participants from 2,042 unique addresses.²² These geocoded locations were linked to the United States Census (2010) and American Community Survey (2009-2013) data to identify neighborhood characteristics. Constructed component variables include the Shannon-Wiener diversity index, neighborhood Hispanic density and cultural environment. These are further detailed in the Analysis section below. An 800m circular buffer was constructed around participants' geocoded home locations.²²

SCAS Study Subjects

Eligibility criteria for SCAS were: completion of the HCHS/SOL associated parent study, ability to provide consent for future research and willingness to attend a separate visit within 9 months of their HCHS/SOL clinical baseline exam (between September 2015 and June 2018).²³ Participants missing the social cohesion variable were excluded (n=88) for a final total of 1,225 participants.

SCAS Data Sources

Neighborhood cohesion was assessed via the Discrimination & Neighborhood Stress Assessment completed by participants²³. Neighborhood was defined as “the area around where you live and around your house...where you might perform routine tasks, such as shopping, going to the park, or visiting with neighbors.” Sampson’s Social Cohesion 5-item scale²⁴ was used to assess perceived neighborhood social cohesion (e.g., “People around here are willing to help their neighbor” and “People in this neighborhood can be trusted”). Within the context of this paper, the DCEA and the Sampson’s Social Cohesion scale are used interchangeably, as Sampson’s scale comprises the entirety of the Neighborhood Social Cohesion construct in SCAS.

Analysis

Primary Exposures

Neighborhood Cultural Environment: Table 1 details the primary exposure variables and data sources. In CASAS, participant addresses were geocoded and characterized using an 800 m radial buffer. GIS was then used to quantify the cultural characteristics of the neighborhood, using data from the Census and American Community Survey. Several indicators of neighborhood cultural environment were created as shown in Table 1. Our primary exposure was the cultural environment construct, which includes: % of population that identifies as Hispanic, % of Spanish-speaking individuals who speak English less than “very well”, % of individuals not

born in the US, % of population who report speaking Spanish. We also considered other indices used in prior research as shown in Table 1.

Perceived Neighborhood Social Cohesion was measured by self-report in SCAS. This was defined in further detail above, under “SCAS Data Sources”.

Table 1. Description of neighborhood cultural environment variables			
Composite indices	Individual variables included	Data source & date	Participants for whom measure is available (N)
Cultural environment	% of population that identifies as Hispanic, % of Spanish-speaking individuals who speak English less than “very well”, % of individuals not born in the US, % of population who report speaking Spanish	Census (2010) ACS ^a (2009-2013)	3,851
Shannon-Wiener Diversity Index	# identified as Hispanic, # identified as non-Hispanic and one of the following races: White, Black, American Indian/ Alaskan Native, Native Hawaiian/ Pacific Islander, Other, # identified as non-Hispanic and two or more races	ACS (2009-2013)	3,851
Neighborhood Hispanic Density (NHED)	% of population that identifies as Hispanic, % of individuals not born in the US, % of individuals who are not US citizens, % of Spanish-speaking households, % of limited English-speaking households, % of Spanish-speaking individuals who speak English less than “very well”	Census (2010) ACS (2009-2013)	3,851

Neighborhood Social Cohesion	Perceived ability of neighborhood to be close knit, neighbors willing to help, getting along, trust in others, shared community values	SCAS: DCEA ^b (2015)	1,225
^a ACS (American Community Survey) ^b DCEA (Discrimination & Neighborhood Stress Questionnaire in HCHS/SOL Sociocultural Ancillary Study)			

Outcomes

Two psychosocial dependent variables were examined: symptoms of depression and anxiety. Depression was assessed using the shortened 10-item Center for Epidemiological Studies Depression Scale (CES-D). Responses had values ranging from 0-3, with 0 corresponding to “rarely or none of the time” and 3 to “all of the time”. Positively worded items were reverse coded, with final CES-D10 score ranging from 0-30; higher values indicate higher depressive symptomatology.²⁵ Anxiety was measured using the 10-item version of the State Trait Anxiety Inventory (STAI10). Responses values range from 1-4, corresponding to range from “rarely”, “some”, “occasionally” or “all of the time”. As with the CES-D, positively worded items were reverse coded and higher scores correspond to higher anxiety symptomatology.²³ For ease of interpretability, high CES-D scores were categorized as CES-D10 greater than or equal to 10 and high STAI scores were defined as STAI greater than or equal to sex-specific quartiles (22 for women, 19 for men).²⁵

Covariates

Covariates included age, gender, educational attainment (less than high school/GED, high school/GED, or greater than high school/GED), household income (<\$10,000, \$10,000- \$20,000, \$20,000- \$40,000, \$40,000 - \$75,000, or did not respond), place of birth/duration of US

residence (born in US 50 states; born outside 50 states and duration of US residence ≥ 10 years; born outside 50 states and duration of US residence < 10 years).

While most analysis involved participants from the CASAS geocoded sample, we also examined whether perceived social cohesion helped explain the association between neighborhood cultural characteristics with depression and anxiety symptoms in the subset of participants who also completed SCAS. Logistic regression models were used to examine associations of neighborhood cultural variables (independent variables) with odds of elevated anxiety and depression symptoms (dependent variables) at $\alpha < 0.05$. All independent (exposure) variables were z-score standardized (Mean = 0; SD = 1) prior to analysis to improve interpretability of the coefficients. Depression and anxiety symptoms were examined in separate models. All models included covariates as defined above. All analysis was conducted in R 4.1.2 (R Project for Statistical Computing; <https://www.r-project.org>). Analyses used the complex sampling features in R to account for the HCHS/SOL sampling design and the CASAS sampling weights; all statistics presented are weighted unless otherwise specified.

Results

Characteristics of participants included in this analysis (N= 3,851) are presented in **Table 2**. The mean age for participants was 39.4 years, with a standard deviation of 0.38 years. Women comprised slightly more than half of the sample (53.3%). Reflecting one of the HCHS/SOL aims of studying acculturation, nearly half of the participants were born outside of the United States but had lived in the country for at least 10 years (47.0%). Participants's weighted depression scores at baseline (based on CES-D10 scores) were 6.30, indicating limited depression symptomatology among participants. Similarly, weighted anxiety scores at baseline (based on STAI scores) fall below levels that would indicate the presence of anxiety symptoms (16.8, below sex-specific cutoffs of 19 for men and 22 for women). Weighted depression and anxiety

scores among participants indicated limited symptomatology for both illnesses, but standard deviation ranges were wide, and one standard deviation difference tipped scores to the “high” symptomatology range. Participant characteristics between the larger CASAS sample (N= 3,851) and the SCAS subsample (N= 1,225) were overall similar, except that in the weighted samples a greater proportion of participants within the SCAS subsample (32%) completed university or college when compared to the CASAS sample (27%).

Table 3 provides an overview of the model adjusted for the covariates described in the analysis plan. In this model, for each standard deviation of increased perceived social cohesion, participants experienced a 15% reduction in the odds of displaying depressive symptomatology (OR=0.85; 95% CI 0.74, 0.99). All other exposure variables examined were not associated with depressive symptomatology. Similarly, the exposures examined were not associated with anxiety symptomatology. While there was a slight reduction in odds of anxiety symptomatology when examining perceived neighborhood social cohesion among both sexes (17% reduction for men, 2% reduction for women), women experienced a nominal increase in odds of anxiety symptomatology when living in neighborhoods with higher densities of Hispanic/Latine residents (8% increase) or Hispanic/Latine culture (Cultural Environmental Index; 10% increase). On the other hand, men only experienced heightened odds of anxiety symptomatology in neighborhoods that were more diverse (Shannon-Weiner Diversity Index; 15% increase). Again, these exposures were not associated with anxiety symptomatology in analysis.

Table 2. Descriptive characteristics of participants at the San Diego field center, neighborhood variables and depression and anxiety symptoms				
	CASAS 2017 (N = 3,851)		SCAS 2018 (N = 1,225)	
	Unweighted n (%)	Weighted n (95% CI)	Unweighted n (%)	Weighted n (95% CI)
	or M (SD)	or M (SE)	or M (SD)	or M (SE)
Participant Sociodemographic Variables				

Age, years	45.5 (14.0)	39.4 (0.38)	45.0 (13.9)	39.8 (0.76)
Sex				
Male	1355 (35.19)	1881 (46.69)	423 (34.53)	526 (45.05)
Female	2496 (64.81)	2148 (53.31)	802 (65.47)	641 (54.95)
Education Level				
Less than High School/ GED	1348 (35.19)	1135 (28.27)	392 (32.08)	295 (25.29)
High School/ GED	980 (25.58)	1143 (28.47)	308 (25.20)	302 (25.90)
High School/ GED with some college	639 (16.68)	642 (16.00)	215 (17.59)	197 (16.90)
University or College	864 (22.55)	1095 (27.27)	307 (25.12)	372 (31.92)
Annual Household Income				
<\$10,000	422 (11.55)	381 (9.85)	146 (12.48)	128 (11.35)
\$10,001-\$20,000	971 (26.58)	933 (24.13)	313 (26.75)	262 (23.29)
\$20,001-\$40,000	1352 (37.01)	1361 (35.20)	427 (36.50)	408 (36.21)
\$40,001-\$75,000	676 (18.51)	817 (21.15)	200 (17.09)	206 (18.34)
>\$75,000	232 (6.35)	374 (9.67)	84 (7.18)	122 (10.81)
Place of Birth/ Duration of US Residence				
Born in US 50 states	892 (23.28)	1276 (31.76)	304 (24.82)	384 (32.89)
Born outside of 50 states & duration of residence >= 10 years	2274 (59.34)	1886 (46.95)	718 (58.61)	544 (46.58)
Born outside of 50 states & duration of residence <10 years	666 (17.38)	855 (21.29)	203 (16.57)	240 (20.53)
Neighborhood Cultural Variables				
Cultural Environment Index	1.37 (0.60)	1.21 (0.01)	1.35 (0.64)	1.12 (0.07)
Neighborhood Hispanic Density Index	1.31 (0.63)	1.14 (0.02)	1.28 (0.67)	1.04 (0.08)
Perceived Neighborhood Social Cohesion ¹	NA	NA	15.96 (3.07)	15.83 (0.13)
Depression and Anxiety				

Depression at baseline	6.62 (5.42)	6.30 (0.14)	6.72 (5.60)	6.36 (0.25)
Anxiety at baseline	17.00 (5.46)	16.84 (0.13)	17.07 (5.61)	16.97 (0.23)
*SCAS participant sample only; SCAS is an ancillary study within the CASAS San Diego sample				

Table 3. Associations between neighborhood cultural variables and elevated anxiety & depression symptoms						
	Low CES-D score (ref.) vs High CES-D score (Depression)			Low STAI score (ref.) vs High STAI score (Anxiety) <i>Men/Women</i>		
Neighborhood cultural variable	Odds Ratio	Confidence Limit	p	Odds Ratio	Confidence Limit	p
Cultural environment index	1.10	(0.91, 1.11)	0.88	0.92/ 1.08	(0.81, 1.05) / (0.96, 1.20)	0.20 / 0.19
Shannon-Weiner Diversity Index	1.01	(0.92, 1.11)	0.82	1.10 / 0.93	(0.97, 1.24) / (0.82, 1.05)	0.13 / 0.21
Neighborhood Hispanic Density Index	1.00	(0.91, 1.10)	0.98	0.90 / 1.07	(0.80, 1.03) / (0.95, 1.20)	0.12 / 0.25
Perceived neighborhood social cohesion~	0.85	(0.74, 0.99)	0.03*	0.88 / 0.98	(0.73, 1.08) / (0.81, 1.19)	0.22 / 0.84
Models were adjusted for age, gender, education, household income and place of birth/duration of US residence						
High CES-D is defined as CESD10>=10						
High STAI is defined as STAI greater than or equal to sex-specific quartiles (22 for women, 19 for men)						
~ SCAS 2017 participants only						
* significant at p<0.05						

Discussion

Our study of neighborhood cultural environment and mental health found that Hispanic/Latine respondents who lived in neighborhoods they perceived as socially cohesive experienced fewer depression symptoms than those who did not. However, the cultural environment index, which reflects neighborhood acculturation, was not associated with depression or anxiety symptomatology. Ultimately, we were unable to reject the null hypothesis

for the observed associations between anxiety symptomatology and the exposure variables selected. These mixed findings regarding ethnic composition and mental health are consistent with the broader literature on this topic.^{7,8,14-16}

The majority of study participants (68%, weighted) were foreign born, therefore our results could reflect migration patterns that prioritize settling in areas with established social support via relatives or close friends. Despite the increased stress and economic costs incurred by migration, foreign-born Hispanic/Latine individuals report lower prevalence of mental health disorders.^{5,6} Our findings align with existing literature that posits socio-cultural ties and social cohesion are important factors contributing to the immigrant paradox, as many first-generation Hispanic/Latine immigrants settle in neighborhoods that have a lower overall socioeconomic status and tend to be more disadvantaged than surrounding areas.^{5-7,14} We did not identify an association between individual and neighborhood level perceptions of neighborhood cohesion and cultural environment among Hispanic/Latine populations and mental health symptomatology. This discrepancy could be explained by the limit of quantitative measures of sociocultural dynamics as captured in the data source. Social cohesion was the only measure that was assessed via self-report on a quantitative likert scale; it might pick up on differences between participant perceptions of dynamics within their communities in ways that objective measures like neighborhood cultural environment were not able to, augmenting our ability to detect associations, especially within the SCAS subsample.

Our findings should be interpreted in the context of several limitations. The cross-sectional design allowed us to compare only baseline measurements for participants, thus we can only report associations and make no causal inferences. Findings are also not generalizable to the Hispanic/Latine population in the United States as a whole, as the larger

population encompasses a variety of cultural and heritage backgrounds. Given the sampling and recruitment strategies (purposive sampling within the San Diego HCHS/SOL cohort), selection bias is present. While the larger CASAS sample was representative in its representation of major Hispanic/Latine groups in the United States, we restricted analysis to a single site, which was majority Mexican heritage. Previous research with the HCHS/SOL sample found that Latines of Mexican heritage had the lowest prevalence of depressive symptoms among the six largest background groups (Cuban, Puerto Rican, Mexican, Dominican, Central American and South American)¹⁹, which may have biased our measures of association. The way that Neighborhood Hispanic Ethnic Density was calculated also limits our ability to compare findings with other studies that utilize Hispanic/Latine composition strictly as a percentage of the population living in that neighborhood.^{7,14} Furthermore, this study did not account for the effects of acculturation or stress via discrimination, which have been shown to mediate the protective effect of living in a high Hispanic/Latine composition neighborhood.⁷

There is limited research on the effects of neighborhood cultural characteristics and its impacts on mental health among Hispanic/Latine communities. Therefore, a strength of this study is enhancing understanding of a fast-growing demographic group. Our results offer insight as to how perceptions of social cohesion influence depressive symptomatology. One of the strengths of the perceived neighborhood social cohesion measure in SCAS is that the self-report of cohesion and neighborhood boundaries more closely captures the behaviors individuals display within their community. Although self-reported measures are limited by their intrinsic subjectiveness, the proximity of perceived neighborhood social cohesion to the construct of social cohesion is important to note. Building on that work by conducting qualitative and

community-based participatory research will allow researchers to create more valid constructs for measures that rely heavily on individual's self-report.

Among Hispanic/Latine residents, those living in neighborhoods they perceived as socially cohesive experienced fewer depression symptoms than residents living in neighborhoods not perceived as socially cohesive. Future research that examines differences between baseline and the follow-up periods (2014-2017) in CASAS and SCAS could highlight changes in mental health that may occur as a result of neighborhood change due to social forces such as gentrification, increased migration to the area or increased anti-immigrant sentiment in the lead up to the Trump administration. Furthermore, improving measurement of aspects within the social context (e.g. social cohesion, social ties and social support) in order to create a construct that more accurately reflects the lived experiences of cohesion among participants is critical to ensure comparability between study populations and settings. While this work provides some insight, future research that is primarily interested in social cohesion and neighborhood environment can better describe associations and patterns that shape intragroup dynamics that impact mental health. Interventions that support community level facilitators of mental health, such as community health educator outreach aimed at reducing stigma associated with treatment or encouraging combining formal (e.g. mental health specialist, general practitioner) and informal providers (e.g. folk healer, priest), can help strengthen social cohesion among neighbors and increase health system utilization which could improve mental health symptomatology.

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