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ORIGINAL PAPER

Social Isolation Among Latino Workers in Rural North Carolina: Exposure and Health Implications

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Abstract Immigrant Latinos frequently experience social isolation in their receiving communities. This paper investigates the prevalence of social isolation among immigrant workers in a new settlement area and delineates the association between social isolation and physical and mental health outcomes. Interviews were conducted in Spanish with immigrant Latino manual workers (N = 743) in western North Carolina. The CES-D and the SF-12 questionnaires assessed health outcomes. A social isolation scale was used to assess degree of social isolation. Nearly 1 in 5 workers (19.5 %) reported the highest level of social isolation. Social isolation was associated with higher depressive symptoms and poorer physical and mental health, related to quality of life. Social isolation is a common experience among immigrant Latinos that may have negative implications for physical and mental health. Community outreach efforts to minimize experiences of isolation may be useful in protecting immigrant physical and mental health.

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Introduction

Social ties and familism—frequently defined as strong feelings of loyalty, cohesion, strong connection, and centrality of the family [1]—are core characteristics of Latin American culture [1, 2]. With globalization and a changing global economy many people from Latin America make the decision to migrate to places with better employment opportunities. The United States (US) is a major migration destination for Latin American immigrants because of its proximity and relative economic stability. The migration journey has physical and psychological difficulties. Immigrants have to leave their families, the places innate to them, and a set of rules and social norms familiar to them [3]; and they often encounter physical and emotional traumas during the journey and at their destination in the US. Recent immigrants to the US encounter situations that are unfamiliar and stressful, including a different dominant language, a limited social network, concerns about legal status, and discrimination [4].Over the past two decades, the population of Latinos in rural areas and areas that had not previously experienced Latino immigration has increased. These areas are found mostly in the Southeast and Midwest of the US and are referred to as "new settlement" communities [5]. North Carolina had the sixth-greatest growth in Latino population from 2000–2010 of any state. The Latino population in North Carolina went from 378,963 in 2000 to 800,120 in 2010 [5]. Such new settlement areas are in contrast with places like the border areas of the Southwest, or the urban centers of the Northeast and Midwest,

where there have been sizable Hispanic populations as far back as the Spanish colonization [6].

The establishment of agribusiness and meat processing companies is responsible for much of the growth of Latino population in rural parts of the new settlement areas [7, 8]. Such companies are often established in rural areas because of economic benefits offered to them by local governments. These companies hire immigrants from different parts of the world; however, the majority are from Latin America [9, 10]. Despite their reliance on immigrants, new settlement areas lack the infrastructure necessary to offer basic services to new settlers. Because these are small areas, immigrants experience resentment from locals because both groups have to compete for limited resources [11], giving rise to conflict and xenophobic attitudes that encourage immigrants to remain hidden and socially isolated.

Humans are social and require interactions with others to reproduce and survive [12–14]. Epidemiological studies assessing the effects of social interactions and social isolation on health have taken place for several decades. The earliest theories of social isolation are attributed to Emile Durkheim and John Bowlby [8]. Their theories maintain that the structural arrangements of social institutions influence resources available to individuals, and therefore, their behavioral and emotional responses [15]. Studies have consistently shown that lack of social ties and networks affect mortality and morbidity [12, 16, 17]. The available evidence also suggests that social isolation is as strong a risk factor for morbidity and mortality as are smoking, high blood pressure, obesity, or a sedentary lifestyle [18].

Several studies have shown the effects of social isolation on health; however, few studies have been conducted among immigrants. The existing literature related to immigrants has mainly studied social networks and the positive effects these have on health [1, 19–22], and other studies have considered the importance of social isolation and its effect on adherence to HIV treatments [23, 24]. There have been no studies of the potential significance of social isolation on the physical and mental health of Latino immigrants in new settlement communities. The purposes of this paper are to (1) determine the prevalence of social isolation among immigrant Latino workers, (2) to delineate the demographic and acculturative sources of variation in social isolation, and (3) to document associations of social isolation with physical and mental health outcomes.

Methods

Participants

The variables analyzed in this manuscript were obtained from a cross-sectional study of Latino immigrant manual workers intended to assess the prevalence and incidence of occupational illnesses and diseases [25–27]. All participants had to self-identify as Latino or Hispanic, be immigrant manual workers, 18 years of age or older, and work 35 hours or more per week. Manual work was defined as employment in non-managerial jobs in industries such as landscaping, construction, restaurant work, hotel work, child care, or manufacturing.

The study took place in four western rural counties in North Carolina designated as new settlement areas for Hispanic/Latino residents [28]. These groups of workers are often hidden and hard to reach. The research team did not have access to workplaces, and no census existed of Latino manual workers in the area. Therefore, community-based sampling was used to assure that a representative sample would be selected [29]. A total of 4,376 possible Latino dwellings were identified; 1,681 dwellings were selected, and 965 were screened, for a screening rate of 57 %. A total of 1,526 residents were screened; 957 of those screened were eligible, and 743 were interviewed. Upon meeting the inclusion criteria and consenting participation, up to 3 residents from the same dwelling could be part of the study.

Data Collection

Face-to-face interviews were conducted in Spanish by trained native Spanish-speaking interviewers. The interview took approximately 60 minutes to complete and included information on demographics, work history, work environment, symptoms and disabilities, and psychosocial characteristics. The interviewers explained the purpose, procedures, risks and benefits of the study, answered questions, and obtained written informed consent. The respondents were given a $10 incentive in appreciation of their participation. Participant recruitment and data collection procedures were approved by the Wake Forest School of Medicine Institutional Review Board.

Measures

Social Isolation

Social isolation was measured using an 8-item scale used in previous research with immigrant Latinos [23]. Five of the eight items (e.g., "How often do you feel there is no one you can turn to?") used a 4-point response set that ranged from *never* to *always*. The remaining three items (e.g., "Do you feel there are people who really understand you?") used a 4-point response set that ranged from *definitely yes* to *definitely no*. For each of the items, participants who reported 1 or 2 were recoded as 0, and those who reported 3 or 4 were recoded as 1. After the responses were recoded the scores

were summed. The total scores could range from 0–8, and a greater score reflected greater social isolation. As expected, the summed scores were skewed; therefore, based on the distribution of the scores, we created three categories: 0, 1, and 2 or higher. We characterize participants with scores of 2 or higher as "high social isolation."

Self-Rated Health

Immigrant health was measured using the validated Spanish version of the SF-12. [30]. Proprietary scoring procedures were used to create mental (MCS-12) and physical (PCS-12) component summary scores that range from 0 to 100, have a mean score of 50 and have a standard deviation of 10. Higher scores reflect better perception of health (Cronbach's $\alpha = 0.62$). The self–rated health question was used to create a dichotomous variable (excellent/very good/good and fair/poor).

Depression

Depression was measured using the Spanish validated short version of the Center for Epidemiological Studies Depression scale (CES-D), which has demonstrated utility in immigrant Latino samples [31]. The short version of the CES-D is a 10-item instrument used to determine the frequency and severity of current depressive symptoms in community samples [32]. Items were scored in a 4-point scale (ranging from rarely or none of the time, to most or all of the time), and summed. Possible scores range from 0 to 30 (Cronbach's $\alpha = 0.73$); greater scores reflect higher levels of depression [3].

Covariates

Age was assessed continuously and classified into four categories (17–25, 26–35, 36–45, ≥46). Gender is a binary variable, females were coded one and males were coded zero. Education was assessed by asking the number of years completed. Marital status was assessed by asking whether the person was married or living as married with their spouse in the US, married without their spouse in the US, or not married. Parental status was assessed continuously and classified into two categories (no children in the household, and ≥1 children in the household). Country of origin was assessed by asking participants where they were born. Indigenous origin was assessed by asking participants in what language they were spoken to as children. This was classified into two categories: a non-Spanish indigenous language spoken to as a child, or no indigenous language spoken to as a child. The latter category included those who listed only Spanish or English as their childhood language. Years in the US and NC were assessed continuously and classified into three categories (<5, 6–10, and >10 years). Comfort speaking English was determined by asking participants to self-assess how well they speak English and was classified in three categories (not at all, somewhat/a little, and well).

Analysis

Data were summarized using means and standard deviations (SDs) for continuous variables, and frequencies and percentages for categorical variables. All analyses accounted for the study sample design, and clustering in county of residence and dwelling unit. Associations between social isolation and participant characteristics were explored using Rao-Scott Chi square tests. Outcomes included dichotomous self-rated health, PCS-12, MCS-12 and CES-D. Unadjusted associations between social isolation and these outcomes were explored with a Rao-Scott Chi square test for categorical outcomes and ANOVA tests for continuous outcomes. Multivariate linear regression models were fit to test associations of social isolation with physical health, mental health, and depressive symptoms scores, adjusting for covariates. All analyses were completed using SAS version 9.2 (SAS Institute, Inc, Cary, NC). A p-value of 0.05 or less was considered statistically significant.

Results

Univariate analyses are presented in Tables 1 and 2. Of the 743 workers interviewed 57 % were males, and over half (61.6 %) were 35 years or younger (Table 1). The majority of participants (57 %) reported having 6 or fewer years of education. Over half the workers were married, lived with their spouses in the US, and had one or more children in the household. The majority of the participants were from Mexico or Guatemala (88 %), had been living in the US for 6 years or more (74.4 %), and reported not speaking English at all (58.8 %).

Over half (58.7 %) of the workers reported "most of the time/always" or "yes/definitely yes" to one social isolation question, and nearly one in five (19.5 %) had high social isolation, which was indicated by two or more signs of social isolation (Table 2). High social isolation was more prevalent among workers with 6 years of education or less (22.4 %, $p < 0.05$), who were not married or lived without their spouse in the US (52.7 %, $p < 0.05$), and who had no children in the household (23.8 % $p < 0.05$). High social isolation was also prevalent among workers from Guatemala (27.1 %, $p < 0.01$) and El Salvador (32.6 %, $p < 0.01$), workers who were spoken to in an indigenous language as children (27.6 %, $p < 0.05$), who have lived in

Table 1 Characteristics among immigrant Latino manual workers

Characteristics	N	%
Sex		
Male	423	56.9
Female	320	43.1
Age		
17–25 years	158	21.3
26–35 years	299	40.3
36–45 years	181	24.4
46 or more years	104	14.0
Years of education		
0–6 years	429	57.8
7–9 years	171	23.1
10 or more years	142	19.1
Marital Status		
Married/Living as married w. spouse in US	476	64.4
Married without spouse in the US	58	7.9
Not married	205	27.7
Country of birth		
Mexico	371	49.9
Guatemala	284	38.2
El Salvador	46	6.2
Other	42	5.7
Indigenous language spoken to as a child		
Yes	181	24.6
No	556	75.4
Parental status		
No children in household	193	26.0
≥1 Children in household	550	74.0
Years in NC		
Less than 5 years	238	32.6
6–10 years	265	36.3
More than 10 years	227	31.1
Years in the US		
Less than 5 years	187	25.6
6–10 years	247	33.7
More than 10 years	298	40.7
Comfort speaking english		
Not at all	436	58.8
Somewhat/a little	255	34.4
Well	51	6.9
Occupation		
Poultry	403	54.2
Non-poultry	340	45.8

the US 10 years or less (43 %, $p < 0.05$), and who reported not feeling comfortable speaking English at all (22.9 %, $p < 0.01$).

Bivariate analyses indicated significant associations of social isolation with physical and mental health (Table 3). Physical health and mental health scores decreased with increasing social isolation scores, depression scores increased with increasing social isolation scores, and poor/fair health was most often reported by those with high social isolation scores. Multivariate analyses presented in Table 4 confirmed these associations, indicating that individuals with high social isolation had poorer physical ($\beta = -3.16$, $p < 0.05$) and mental health ($\beta = -4.17$, $p < 0.01$), and greater depressive symptoms ($\beta = 3.54$, $p < 0.01$) than those who reported no signs of isolation after adjusting for gender, age, education, marital status, parental status, country of birth, indigenous language spoken to as a child, years living in the US, and comfort speaking English.

Poor health outcomes were also associated with other factors (Table 4). Women reported poorer mental ($\beta = -1.88$, $p < 0.05$) and physical ($\beta = -1.05$, $p < 0.05$) health and greater depressive symptoms ($\beta = 0.61$, $p = 0.05$) than men. Those without children in the household ($\beta = 0.98$ $p < 0.05$), those from El Salvador and other countries (excluding Mexico and Guatemala $\beta = 2.37$ and 2.67 respectively, $p < 0.01$), and those who reported comfort speaking English as somewhat/a little and well ($\beta = 1.65$ and 2.04 respectively, $p < 0.01$) reported greater depressive symptoms. Those from Guatemala and other countries (excluding Mexico and El Salvador) reported worse physical health-related quality of life.

Discussion

Fast economic growth of the southeast region in the United States has triggered an increased migration of foreign-born Latino immigrants to those areas. The rapid growth of Latino populations in those areas has strained the existing infrastructure necessary to provide basic services . The lack of infrastructure and the conflicts that emerge due to competition for resources with the local communities isolate immigrants in these communities [11]. Ample evidence exists that social isolation has negative effects on health [12, 15–17, 33]. The impact of social isolation among immigrant Latino workers in new settlement areas remains under-studied, in-part because they remain hidden due to fear of authorities and deportation.

Nearly one in five Latino immigrants reported high social isolation. That is, they reported experiences of two or more manifestations of social isolation most of the time or always. Approximately 60 % of participants reported feeling at least one manifestation of isolation regularly. High rates of social isolation among immigrant Latinos in new settlement areas can be attributed to factors such as the limited resources and social services that are characteristic of rural communities [10]. The local government services

Table 2 Prevalence of social isolation by demographic and acculturative characteristics

Outcomes	Social isolation score [N(%)]			
	0	1	2+	Chi square *p*-value
Overall	162 (21.8)	436 (58.7)	145 (19.5)	
Demographic characteristics				
Sex				
Male	90 (21.3)	252 (59.6)	81 (19.2)	0.88
Female	72 (22.5)	184 (57.5)	64 (20.0)	
Age				
17–25 years	44 (27.9)	86 (54.4)	28 (17.7)	0.15
26–35 years	61 (20.4)	169 (56.5)	69 (23.1)	
36–45 years	37 (20.4)	118 (65.2)	26 (14.4)	
46 or more years	19 (18.3)	63 (60.6)	22 (21.2)	
Years of education				
0–6 years	79 (18.4)	254 (59.2)	96 (22.4)	**<0.01**
7–9 years	34 (19.9)	113 (66.1)	24 (14.0)	
10 or more years	49 (34.5)	68 (47.9)	25 (17.6)	
Marital status				
Married/living as married w. spouse in US	116 (24.4)	287 (60.3)	73 (15.3)	**<0.01**
Married without spouse in the US	5 (8.6)	38 (65.5)	15 (25.9)	
Not married	41 (20.0)	109 (53.2)	55 (26.8)	
Parental status				
No children in household	27 (14.0)	120 (62.2)	46 (23.8)	**<0.01**
≥1 Children in household	135 (24.6)	316 (57.4)	99 (18.0)	
Acculturative characteristics				
Country of birth				
Mexico	94 (25.3)	230 (62.0)	47 (12.7)	**<0.01**
Guatemala	43 (15.1)	164 (57.8)	77 (27.1)	
El Salvador	8 (17.4)	23 (50.0)	15 (32.6)	
Other	17 (40.5)	19 (45.2)	6 (14.3)	
Indigenous language spoken to as a child				
Yes	36 (19.9)	95 (52.5)	50 (27.6)	**<0.01**
No	124 (22.3)	339 (61.0)	93 (16.7)	
Years in NC				
Less than 5 years	47 (19.8)	146 (61.3)	45 (18.9)	0.12
6–10 years	47 (17.7)	157 (59.3)	61 (23.0)	
More than 10 years	60 (26.4)	128 (56.4)	39 (17.2)	
Years in the US				
Less than 5 years	39 (20.9)	113 (60.4)	35 (18.7)	**<0.01**
6–10 years	34 (13.8)	153 (61.9)	60 (24.3)	
More than 10 years	82 (27.5)	166 (55.7)	50 (16.8)	
Comfort speaking english				
Not at all	66 (15.1)	270 (61.9)	100 (22.9)	**<0.01**
Somewhat/a little	67 (26.3)	148 (58.0)	40 (15.7)	
Well	28 (54.9)	18 (35.3)	5 (9.8)	

A *p*-value of 0.05 or less was considered statistically significant. Bold values indicate statistical significance

that exist frequently have limited experience and lack cultural competence to effectively help new immigrants settle into the community. Furthermore, community organizations that might enhance the sense of belonging among these new settlers and facilitate resources are often absent in these areas [34]. Also, spatial segregation between Latino immigrants and non-Hispanic whites is greater in new settlement areas [35] contributing to social isolation of

Table 3 Health outcomes

Outcomes	Overall		Social isolation = 0		Social isolation = 1		Social isolation = 2+		Chi-sq *p*-value
	N	%	N	%	N	%	N	%	
Self-rated health									
Excellent/VG/good	320	43.8	77	48.4	185	43.0	58	40.9	0.38
Fair/poor	411	56.2	82	51.6	245	57.0	84	59.1	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	ANOVA *p*-value
Physical health (SF-12)	43.3	6.4	44.9	6.4	43.3	5.8	41.0	7.4	**<0.01**
Mental health (SF-12)	39.5	8.8	40.1	8.9	40.3	8.6	36.1	8.4	**<0.01**
CES-D	5.9	4.5	5.5	4.0	5.1	4.3	8.8	4.3	**<0.01**

A *p*-value of 0.05 or less was considered statistically significant. Bold values indicate statistical significance

the immigrants. Latino immigrants to these new settlement communities also face hostility, discrimination, and exploitation [1, 36], which make them more likely to voluntarily segregate from the local communities [37], thereby perpetuating social isolation.

The distribution of high social isolation followed a predictable pattern. Social isolation was significantly more prevalent among those who had less education. McPherson and colleagues (2006) reported that those who have higher education have more people they can talk to about issues important to them. Those who are not married or whose partner is not in the US are more likely to report social isolation; studies have shown that people who report discussing important matters with their spouse are likely to have access to their partner's social networks [38]. Children give adults the opportunity to expand their social networks and interact with institutions such as schools [39]. We found that those without children in their household reported more social isolation.

Strong feelings of social isolation were also associated with acculturative stress predictors. In this study, immigrants from Central America reported more social isolation, which is consistent with Hovey and colleagues' findings that Central American immigrants experience increased levels of acculturative stress [40]. Further, the possibility of returning home is less tangible for Central American immigrants because there are more physical barriers, more borders to cross, and more hostilities to encounter, which likely minimizes the opportunity to visit and increases feelings of separation and isolation [41]. High social isolation was also more prevalent among immigrants who were spoken to in an indigenous language as children. This finding is consistent with previous research indicating that indigenous immigrants are discriminated against by both non-Hispanic Americans and Latinos who do not identify themselves as indigenous, which likely contributes to social withdrawal and feelings of isolation [41].

Social isolation was strongly associated with poorer health outcomes among immigrant Latinos in new settlement areas. These findings are consistent with the existing literature that links social isolation to poor physical and mental health outcomes [6, 19]. Social isolation is believed to affect physical health through stress processes, which can increase blood pressure and suppress the immune system [14, 21].

The stress explanation for the association of social isolation and physical health is supported by evidence suggesting that social support reduces the physiological response to both anticipated and experienced stressors [42]. Recognizing that immigrants confront many stressors in the process of migration as well as in their day-to-day lives in their new settlement community [19, 21], social isolation and the presumed absence of social support systems likely have substantial health consequences. Poorer health outcomes among those with high social isolation may also be attributed to lack of access to healthcare services. Future research will need to explore these and other explanations linking social isolation to poorer health outcomes among immigrants.

Even though we found that social isolation is linked to poor health outcomes, the results should be interpreted in light of the study's limitations. These results are derived from a study in which the main focus was occupational injuries among Latino immigrant workers. Therefore, those not in the labor force and who could be more isolated are not represented in this sample. The sample was not random; community-based sampling was used instead. There was also no measurement of the size of the networks or strengths of social relationships. Social isolation was based on the perceptions of the participants; however, other studies have shown that the size of a person's network is not as important as the individual's perception of whether he/she is socially isolated [12, 15]. Lastly, this study is not generalizable to all Latino communities in the US.

Table 4 Multivariate analysis of interactions with social isolation

Outcome	Physical health*		Mental health*		CES-d*	
	Beta	*p*-value	Beta	*p*-value	Beta	*p*-value
Social isolation		**<0.01**		**<0.01**		**<0.01**
0	**Ref**		**Ref**		**Ref**	
1	**−1.20**		**−0.24**		**−0.01**	
2+	**−3.16**		**−4.17**		**3.54**	
Gender		**0.04**		**<0.01**		0.05
Male	**Ref**		**Ref**		Ref	
Female	**−1.05**		**−1.88**		0.61	
Age group		**<0.01**		0.85		0.24
17–25	**Ref**		Ref		Ref	
26–35	**−1.05**		−0.54		0.78	
36–45	**−2.02**		−0.85		0.31	
46+	**−4.60**		−0.05		0.88	
Education		0.84		0.26		0.62
0–6 years	−0.24		1.32		−0.48	
7–9 years	−0.44		1.67		−0.47	
10+ years	Ref		Ref		Ref	
Marital status		0.89		0.67		0.50
Married/spouse in US	Ref		Ref		Ref	
Married/spouse not in US	0.18		0.78		0.43	
Not married	0.30		−0.44		−0.32	
Parental status		0.35		0.99		**0.03**
No children	−0.63		0.01		**0.98**	
1+ children	Ref		Ref		**Ref**	
Country of birth		**<0.01**		0.92		**<0.01**
Mexico	**Ref**		Ref		**Ref**	
Guatemala	**−2.81**		−0.72		**0.49**	
El Salvador	**−0.36**		−0.33		**2.37**	
Other	**−4.66**		−0.16		**2.67**	
Indigenous language spoken to as a child		0.39		0.84		**0.02**
Yes	−0.67		−0.20		**0.99**	
No	Ref		Ref		**Ref**	
Years in the US		0.52		0.71		0.11
0–5 years	Ref		Ref		Ref	
6–10 years	0.75		0.75		0.24	
>10 years	0.61		0.40		0.89	
Comfort speaking english		0.96		0.27		**<0.01**
Not at all	Ref		Ref		**Ref**	
Somewhat/a little	0.14		0.52		**1.65**	
Well	0.14		−2.03		**2.04**	

A *p*-value of 0.05 or less was considered statistically significant. Bold values indicate statistical significance

* Adjusted for gender, age, education, marital status, parental status, country of birth, indigenous status, years living in the US, and comfort speaking English

Conclusion

A substantial segment of the Latino population in one new settlement area reported social isolation, and those with higher social isolation possessed poorer physical and mental health. Although consistent with a larger body of evidence indicating that social isolation has a significant health threat, the health-related consequences of social

isolation among immigrant Latinos in new settlement areas remains undocumented. As immigrants continue to settle in rural communities and future generations become vital in the development of those communities it is essential to integrate them. Our results, therefore, contribute to the scientific literature of social isolation and health, and offer insight into segments of the immigrant population most at risk for social isolation.

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