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TALKING ABOUT TEETH: EGOCENTRIC NETWORKS AND ORAL HEALTH OUTCOMES IN A MEXICAN AMERICAN IMMIGRANT COMMUNITY

Erin Pullen, **Brea L. Perry**, **Gerardo Maupome**

Abstract

Latinos in the United States have poor outcomes for periodontal and dental health. However, a detailed description of the mechanisms driving these patterns has only recently started to be addressed in the literature. In the current study, we explore relationships between individual-level characteristics of Mexican immigrants, properties of their networks, and experiences of dental problems. Specifically, using data from an urban community of Mexican immigrants to the American Midwest (n = 332), this study examines how characteristics of oral health matters (OHM) discussion networks and individual-level sociodemographic characteristics are associated with four adverse oral health outcomes. The results provide strong support for relationships between immigrants' network characteristics and dental problems. We find that people with more dental problems talk about these issues more frequently with network ties. Conversely, stronger relationships with OHM discussion networks, as measured by mean closeness, are predictive of fewer dental problems. In addition, we identify a link between perceptions of alters' knowledge about teeth, mouth, and gums and egos reporting better oral health outcomes. The observed patterns are suggestive of mechanisms of social influence that are well replicated in the social, medical, and public health literatures, but that have seldom been empirically tested in the domain of oral health. Though preliminary, our findings suggest a potential explanatory role for social networks in some of the most important questions and problems in oral health disparities research. In all, our findings suggest that social network members are active participants in the management and response to oral health problems in this immigrant group and should be considered an important factor in the development and course of diseases.

Keywords

Social networks; oral health; immigrant health; health disparities; Latino immigrants

INTRODUCTION

Latinos in the United States have poor outcomes for periodontal (Eke et al., 2015) and dental health (Dye, Thornton-Evans, Li, & Iafolla, 2015). However, a detailed description of the mechanisms driving these patterns has only recently started to be addressed in the literature. This inattention is problematic because Latinos are one of the largest and fastest growing ethnic minority groups and represent a substantial proportion of the population affected by oral health disparities (OHD) (Dye et al., 2007; Sabbah, Tsakos, Sheiham, & Watt, 2009; USDHHS, 2000, 2010). The lack of information about OHD among Latinos

is further compounded by the possibility that an epidemiological paradox partially shapes oral health among Mexican Americans (MAs). That is, while MAs typically have lower socioeconomic status and less access to dental insurance and oral health services than other groups, some studies suggest that they have better outcomes than other ethnic or nationality of origin groups. For example, MAs have more numerous adverse oral health outcomes compared to White Americans, but these patterns are reversed once models are adjusted for socioeconomic status (Sabbah et al., 2009). That is, MAs are less likely to have lost teeth than Whites of similar socioeconomic position.

Moreover, there are substantial subgroup differences in risk for dental caries (tooth decay; Beck et al., 2014) and periodontal (gum) conditions (Jimenez, Dietrick, Shih, Li, & Joshipura, 2009) among Latino subgroups. For instance, MAs have the lowest prevalence of missing at least one tooth in a recent national study, with figures for all Latino subgroups ranging from 49.8% to 63.8% (Beck et al., 2014). However, MAs have some of the highest rates of untreated dental caries, and it remains unclear why they are among the least likely Latino subgroups to experience edentulism (loss of all teeth). Treatment options available to the individual patient, oral health behaviors, and clinical care decisions made by clients and dental professionals likely contribute to these profiles. Nonetheless, it appears contradictory that low edentulism in MAs co-exists with having more severe and extensive periodontal probing depths (a sign of gum disease; Jimenez et al., 2009; Spolsky, Marcus, Der-Martirosian, Coulter, & Maida, 2012; Wu et al., 2011).

This paradox - and particularly, MAs' apparent resilience to tooth loss despite other risk factors - is extremely important because it holds the potential to help identify protective factors that might be used to reduce OHD among Latinos as a whole. The prevailing theory is that MA immigrants maintain their positive oral health behaviors for a fairly prolonged period of time after immigrating and only gradually adopt more "industrialized, Western" dietary norms (Akresh, 2007; Ayala, Baquero, & Klinger, 2008; Pérez-Escamilla, 2009). This general trend belies the complexity of the relationship between immigration, acculturation, and health among MAs. For example, research indicates that there are considerable differences between men and women immigrating to the United States from Mexico, such that women tend to have a more significant immigrant health advantage than men (Lopez-Gonzalez, Aravena, & Hummer, 2005). The effects of acculturation on health also appear context-specific; that is, in addition to gender, factors like neighborhood composition, duration of residence in the United States, and age at migration may all impact rates of acculturation and their impact on health status (Kimbro, 2009).Given these findings, more research is needed to understand how and why duration in the United States drives changes in oral health among MA and other Latino immigrants in the United States.

Another explanation for this paradox as it relates to health in general is the protective role of a strong social safety net provided by kin, fictive kin, and community ties (Mulvaney-Day, Alegria, & Sribney, 2007). Compared to other racial and ethnic groups, Latinos (and especially Latino immigrants) tend to have more extensive kinship and community networks that are characterized by norms of mutual support provision and strong ties (Ebaugh & Curry, 2000; Kim & McKenry, 1998). This social safety net is critical for helping immigrants adjust to their new environment by providing emotional support, instrumental

aid, practical advice or information, and economic resources. In addition, social networks have stress-buffering properties, reducing social psychological and physiological stress responses in the face of chronic strains and negative life events (Thoits, 2011). However, such networks can also have a "dark side." Research indicates that network forces may drive unhealthy behaviors such as smoking through mechanisms like social modeling and learning (Christakis & Fowler, 2008, 2013). Further, the norms of reciprocity that characterize immigrant networks can be stressful - especially in the context of limited - resources as failing to provide support and other resources can hinder future efforts to mobilize network ties (Menjivar, 1997).

Social networks may also shape health behaviors through social regulation and health promotion, wherein family or friends provide information and encouragement that leads to improved behaviors, such as persuading a loved one to seek health services and offering advice about affordable providers (Kawachi & Berkman, 2001). Female ties may be especially involved in this process, as women are generally more likely to be named as health discussants than men (Cornwell, Schumm, Laumann, & Graber, 2009; Perry & Pescosolido, 2010), and issues of health and nutrition may be more likely to be considered "women's issues" among MAs (Cousins et al., 1992).

Importantly, the social networks of immigrant populations may promote access to important resources that shape oral and other health outcomes. Social capital represents the collective resources - including knowledge, norms, and skills - that may be accessed through individuals' social relationships (Kawachi & Berkman, 2000). The literature examining social capital among immigrant populations has tended to focus on the ways social capital structures opportunities for economic prosperity, including educational and employment outcomes (e.g., Hill & Torres, 2010; Livingston, 2006; Ream, 2005). Across studies, research highlights the norms of reciprocity that govern certain aspects of immigrant networks, including the provision of resources like housing and help finding employment (Bashi, 2007; Menjivar, 1997). With regard to health more specifically, research suggests that network knowledge of formal health care providers plays an important role in linking immigrants with culturally competent, language appropriate care (Cunningham & Kemper, 1998). Other research with immigrant populations supports this connection between social capital and use of health services (Viladrich, 2007; Zhao, Xue, & Gilkinson, 2010). In this way, beyond the structural characteristics of networks themselves, the knowledge, information, and resources embedded in these social relationships can play an important role in managing one's health. In all, the critical functions of social networks may have implications for immigrants' oral health and, given the network resources available to MA immigrants, could help explain the Latino oral health paradox.

There is also a growing body of literature on the relationship between stress, health behaviors, and oral health. For example, Genco and colleagues (Genco, Ho, Grossi, Dunford, & Tedesco, 1999) find that psychosocial stress is a risk factor for severe periodontal disease (as measured by attachment loss and alveolar bone loss) in adults. Moreover, their results suggest that, as with other health problems, the effects of stress are buffered (i.e., reduced) in individuals who engaged in problem-focused coping. Likewise, Rosania et al. (Rosania, Low, McCormick, & Rosania, 2009) find that poor oral health

behaviors during periods of elevated stress were associated with missing teeth. Deinzer and colleagues (Deinzer et al., 2005) identify a similar relationship between stress, oral hygiene, and levels of plaque and gingivitis. In short, immigrants' social networks may be protective of oral health, and particularly tooth loss, operating through mechanisms like stress-buffering, social regulation, and providing information that may link immigrants to care and other resources. However, there has been very little attention to the role of social network characteristics in predicting oral health outcomes among MA immigrants or other Latino subgroups.

In the current study, we address this gap in the literature, drawing on the social network perspective to explore the role of network characteristics in MA immigrants' level of tooth loss and other oral health outcomes. The social network perspective is grounded in the premise that attitudes and behaviors are shaped through interactions among social actors (Marsden, 2000) who are directly or indirectly connected (Lin & Peek, 1999). When individuals experience problems or make decisions, they actively engage members of their social network to provide support and guidance; thus, outcomes depend in part on the resources and information that are available through network ties (Perry & Pescosolido, 2015). This perspective allows us to place individuals in the larger social context of personal and community relationships, which are a central organizing feature and motivating force in the lives of MA immigrants (Patel, Eschbach, Rudkin, Peek, & Markidea, 2003).

We leverage data from the TalaSurvey Study, which uses social network methods to characterize the structure, function, and composition of egocentric (i.e., personal community) networks of MA immigrants in Indiana, United States. In the present manuscript, we explore the relationships between characteristics of individuals (i.e., egos), network properties, and experiences of dental problems. Outcomes include self-reported number of teeth extracted over a lifetime, recent experiences of sore/bleeding gums, dental pain, and receiving a prescription for antibiotics/painkillers for dental reasons. We hypothesize, based on the literature reviewed above, that poorer oral health outcomes will be significantly associated with larger, more active networks that contain a greater proportion of women than men - patterns that would be consistent with support and advice-seeking for dental problems. In addition, we expect that better oral health outcomes will be associated with more resource-rich networks (i.e., those that are more knowledgeable about oral health and that are characterized by stronger relationships), operating through access to beneficial information (i.e., social capital) and stress-buffering, respectively.

METHODS

The TalaSurvey Study was conducted with Institutional Review Board approval, including a letter of informed consent in Spanish or English after explanations in person in either language. This study had additional protection through a US Federal government Certificate of Confidentiality, to minimize self-selection of participants toward a biased group of MA immigrants with legal residence status in the United States.

The primary goals of this study were to gather egocentric network data on this population for the purpose of examining the relationships between immigrants' informal social

networks and their oral health status, beliefs, and behaviors. We adapted an instrument to identify immigrants' (i.e., egos) personal social network members (i.e., alters) through egocentric network methodology, specifically targeting Oral Health Matters (OHM) discussion networks. Egos were recruited from primarily Hispanic churches and community organizations in 2013 by way of announcements soliciting volunteers. Because participants were primarily from the Tala region of Mexico originally, which is predominantly Catholic, a considerable portion of the recruitment focused on Catholic congregations. Community organizations were not-for-profit groups that serve all Latino nationalities and religious affiliations and are funded through multiple sources including United Way, state contracts, and donations. Eligibility was limited to MA immigrants able to read and write either Spanish or English. Participants were compensated for their time. In-person interviews were conducted by trained staff, lasting 20–45 minutes, in English or Spanish (chosen by the interviewed ego).

Dependent Variables

Dental pain is coded 1 if egos reported experiencing a *dull, aching pain across face or cheek* (35%) in the past year, and 0 if not. Receiving a prescription for antibiotics or painkillers due to dental problems in the past year is coded 1 (26%), else 0. Egos who reported sore or bleeding gums *often* or *sometimes* in the past 6 months are coded 1 (37%), while those who reported *rarely* or *never* having these problems are coded 0 (63%). Finally, the number of teeth lost over a lifetime is a count variable ranging from 0 (70%) to 5 + (7%) ($\bar{x}$ =0.86, SD = 1.54).

Ego Sociodemographic Variables

Sociodemographic characteristics at the ego level include sex (1 for female, 63%, 0 for male); age in years ($\bar{x}$ =36.3); maximum level of formal schooling, coded as 0 for less than a high school education (58%) and 1 for graduating high school or receiving more education (42%). Marital status is coded 1 for married or having a partner (63%) and coded 0 for all other categories (37%). Finally, the mean logged value of years spent in the US is 2.70.

Ego Oral Health Variables

Three ego-level oral health factors are included. Dental insurance is coded 1 if the ego had dental insurance in the past year (37%), and 0 if not. Self-reported need of dental treatment for current oral health problems is coded 1 for yes (65%) and 0 for no. A subjective measure of dental fatalism is estimated (Finlayson, Siefert, Ismail, Delva, & Sohn, 2005) through agreement with the statement "*Most children will eventually have caries/cavities*" on a Likert-type scale (*strongly disagree* (1) to *strong agree* (5)). The overall mean score of 4.04 indicates a relatively high acceptance toward the inevitability of dental deterioration.

Network characteristics

Ego network data are collected using a standard important matters (IM) name generator to elicit names of friends, family members, and others with whom participants *discussed matters that are important* in the past six months. Additionally, an OHM name generator is used: *Looking back over the past 12 months, who are the people with whom you discussed*

issues about dental health, the people in your life that you feel you can really count on for help when you have dental health problems? Egos provide additional details about their relationship to the IM and OHM alters (e.g., relationship closeness and duration, frequency of communication) and their characteristics (e.g., gender, education), including data on each alters' knowledge (e.g., *how much do you think [alter name] knows about matters of teeth, gums, and mouth*) and behaviors (e.g., *does [alter name] see a dentist a least once a year?*).

In the present analyses, five network characteristics are examined. The proportion of each participants' network that is female is calculated by dividing the number of female alters listed by the total number of alters, with values ranging from 0 (*no women named*; 8.43%) to 100 (*all women named*; 21%) with an overall mean of 61% female. This proportion score was then divided by 10, so as to create more interpretable odds ratios (ORs) in the regression models. Mean relationship closeness is calculated by dividing the sum of relationship closeness with alters named by the total number of alters named (average closeness ranged from 1 (*not very close*) to 3 (*very close*)), with an overall mean of 2.8. OHM network size is the sum of alters listed as someone who egos talk to about their dental health in the past year and ranges from 0 (9%) to 6 (2%), with an overall mean of 2.6 OHM ties.

The mean dental health knowledge for each participant's network is also used in these analyses. This refers to how much egos report alters know *about matters of teeth, gums, and mouth* and is scored from 1 (*none*, 10%) to 4 (*a lot*, 13%). To calculate this score, the sum of dental knowledge for alters is divided by the number of alters listed for each ego. The overall mean is 2.67, suggesting alters on average have between a little and some oral health knowledge. Finally, the mean frequency egos discussed acute dental problems with alters in the past year is examined. Scores range from 1 (*never*, 30%) to 4 (*several times*). The average frequency is 2.46, indicating egos typically talk with alters about their oral health a few times in the past year.

Analyses

First, bivariate analyses are used to explore the differences between egos who report fair or poor condition of their teeth and gums and those that report good, very good, or excellent oral health. Test statistics include the Wilcoxon-Mann-Whitney test statistic for interval or ordinal variables, and chi-square and Fisher's exact tests for categorical variables.

Multiple regression is also used. For dichotomous outcome measures, logistic regression with results in ORs is presented. For the count variable of tooth loss, Poisson regression is used with results shown as incidence rate ratios (IRRs). Regression analyses are completed using a stepwise approach, wherein three groups of related variables - ego sociodemographic variables, ego oral health factors, and network characteristics - are examined individually to determine the influence of their effects independent of one another. A final model, which includes all independent variables, is then presented to determine the effect these measures have when included in the same model. Variance inflation factors are also calculated to check for multicollinearity.

RESULTS

A total of 332 immigrants (egos) are participants in the TalaSurvey Study at large. On average, egos name 3.9 alters in his/her IM + OHM personal networks, for a total of 1,299 alters. The mean number of alters in OHM networks is 2.6 (SE = 1.81, range 0–9).

Bivariate Results

Bivariate analyses are shown in Table 1, comparing egos across their perceived conditions of teeth and gums. Egos with fair or poor condition are, on average, more likely to report dental pain in the past year, sore or bleeding gums in the past six months, taking antibiotic or pain medication for a dental problem in the past year, and having ever experienced tooth loss. Those with fair or poor condition teeth and gums also tend to be older, have lower educational attainment, are less likely to have dental insurance, and more likely to report being in current need of dental treatment. Finally, those with fair or poor condition have slightly larger networks with whom they discuss OHM.

Multivariate Results for Ego and Oral Health Characteristics

Tables 2–5 present the results of regression models on the four conditions of interest, each including three restricted models examining ego sociodemo-graphics, ego oral health factors, and network characteristics separately, and a final model that includes both ego and network predictors. Tables 2, 3, and 4 include logistic regression results while Table 5 presents similar analyses using Poisson regression.

We find that sociodemographic characteristics of MA immigrants are associated with risk for dental problems. Findings presented in Table 2 suggest that women have greater odds of experiencing dental pain in the past year compared to men, net of covariates (OR = 1.91, $p \leq 0.05$ and OR = 1.96, $p \leq 0.05$; Table 2, Models 1 and 4, respectively). In addition, our results indicate that as the number of years spent in the US increases, the odds of reporting sore or bleeding gums or receiving a prescription for a painkiller or antibiotic decrease (OR = 0.61, $p \leq 0.05$, Table 3, Model 4; and OR = 0.57, $p \leq 0.05$, Table 4, Model 4, respectively) while the likelihood of dental pain increases (OR = 2.07, $p \leq 0.05$, Table 2, Model 4). Also, as shown in Models 1 and 4 of Table 5, for each one-year increase in age, the IRR for lifetime tooth loss increases 4%, net the other variables ($p \leq 0.001$).

Our findings also suggest, as would be expected, that MA immigrants' access to, need for, and attitudes toward dental health services are associated with dental problems. Perceived need for treatment is significantly associated with all measured outcomes. Egos who report needing dental treatment are more than four times as likely to experience pain (OR = 4.16, $p \leq 0.001$, Table 2, Model 4), and nearly three times as likely to experience sore or bleeding gums (OR = 2.95, $p \leq 0.001$, Table 3, Model 4), compared to those who do not report needing treatment. Further, perceived need for dental treatment is associated with higher predicted odds of being prescribed an analgesic or antibiotic for dental problems in the past year (OR = 2.48, $p \leq .05$, Table 4, Model 4) and for tooth loss (IRR = 1.43, $p \leq 0.05$, Table 5, Model 2). Also, dental fatalism (i.e., the attitude that dental problems are inevitable) is significantly associated with a number of outcomes in restricted models. As dental fatalism

score increases, so too do the predicted odds of having experienced dental pain (OR = 1.24, $p \leq 0.05$, Table 2, Model 2), being prescribed an analgesic or antibiotic for dental problems in the past year (OR = 1.39, $p \leq 0.01$, Table 4, Model 2), and lifetime tooth loss (IRR = 1.18, $p \leq 0.01$, Table 5, Model 2). However, dental fatalism does not retain significance in any of the full models, suggesting that this variable may be confounded by sociodemographic or network characteristics. Finally, as shown in Model 2 of Table 5, egos with dental insurance have an IRR for tooth loss 0.77 times that of those uninsured egos, that is, 23% lower ($p \leq 0.05$), though this result is non-significant in the full model.

Multivariate Results for Social Network Characteristics

Results provide strong support for a relationship between MA immigrants' network characteristics and dental problems. As the percent of the network that is female increases, so too do the odds of reporting dental pain (OR = 1.11, $p \leq 0.05$, Table 2, Model 4). Findings on oral health network size and frequency of discussion about oral health support the hypothesis that MAs consult with members of their social networks when they are experiencing dental problems. Larger oral health networks are associated with higher odds of reporting dental pain (OR = 1.22, $p \leq 0.05$, Table 2, Model 4), sore or bleeding gums (OR = 1.23, $p \leq 0.01$, Table 3, Model 4), receiving a prescription for a dental problem (OR = 1.41, $p \leq 0.001$, Table 4, Model 4), and tooth loss (IRR = 1.16, $p \leq 0.001$, Table 5, Model 4). Similarly, higher frequency of discussion about dental problems with alters', on average, is associated with greater odds of reporting dental pain (OR = 1.63, $p \leq 0.01$, Table 2, Model 4), having sore and bleeding gums (OR = 1.42, $p \leq 0.05$, Table 3, Model 4), and being prescribed a medication for a dental problem (OR = 1.51, $p \leq 0.05$, Table 4, Model 4). Network discussion about dental problems also predicts tooth loss in a restricted model (IRR = 1.23, $p \leq 0.01$, Table 4, Model 3), but there is no significant relationship in the full model.

In addition, our findings support the hypothesized scenario whereby having close and knowledgeable networks is linked to better oral health outcomes. With increases in the average closeness between ego and alters, we observe decreases in the predicted odds of reporting pain (OR = 0.38, $p \leq 0.05$, Table 2, Model 4) and of experiencing tooth loss (IRR = 0.63, $p \leq 0.05$, Table 5, Model 4). Also, egos who report having alters that are more knowledgeable about oral health, on average, have smaller odds of experiencing dental pain (OR = 0.61, $p < 0.01$, Table 2, Model 4).

DISCUSSION

In the present research, we sought to identify linkages between MA immigrants' social network properties and oral health outcomes, controlling for individual sociodemographic and oral health characteristics. In terms of our exploration into the immigrant paradox scenario, we find that time residing in the US is inconsistently related to oral health outcomes - sometimes associated with higher risk of disease and sometimes with lower risk. With respect to need for treatment and access to services, we find - predictably - that egos' assessments of need are significantly related to dental pain, sore/bleeding gums, prescriptions related to oral health, and tooth loss. Likewise, those with dental insurance experience better oral health outcomes.

The most novel and noteworthy findings to emerge from these analyses are related to immigrants' social networks. Specifically, our results identify an association between the size of OHM discussion networks and dental problems. We also find that people who talk more frequently with friends and family members are more likely to report oral health problems, and that for the outcome of dental pain, they are more likely to have networks containing a greater proportion of female alters. Conversely, stronger relationships with OHM discussion networks, as measured by mean closeness, are predictive of fewer dental problems. In addition, we identify a link between perceptions of alters' knowledge about teeth, mouth, and gums and ego reporting better oral health outcomes.

In all, our findings suggest that social networks are active components in the management and response to oral health problems in this ethnic minority/national origin group and should be considered an important factor in the development and course of diseases (Pescosolido, 1992). While we cannot confirm the causal nature of these relationships given the cross-sectional design of our study, or identify the mechanisms underlying the network findings, these patterns are consistent with network research in the broader health literature (Berkman & Glass, 2000; Perry & Pescosolido, 2015). MA immigrants with symptoms of oral disease may seek advice and information from network members regarding dental services or folk remedies for addressing these problems. Alternatively, it is reasonable that immigrants with more oral health problems discuss these in the context of networks in order to receive emotional support or reassurance (i.e., they want someone to listen to them talk about their problems). Also, there may be increased discussion around oral health when problems arise because family and friends are attempting to convince or coerce the ego to seek clinical care (i.e., social regulation) (Kawachi & Berkman, 2001).

The findings related to network closeness and knowledge are consistent with a social resources or social capital mechanism, though this interpretation is speculative. Existing research suggests that subjective and physiological stress are linked to adverse oral health and that chronic strain and negative life events lead to negative outcomes (Deinzer et al., 2005; Genco et al., 1999; Rosania, Low, McCormick, & Rosania, 2009). At the same time, the relationship between a strong social safety net and stress-buffering is prevalent and robust in the mental and physical health literatures broadly; it has also been cited as an important contributing factor of the immigrant health paradox (Mulvaney-Day et al., 2007; Thoits, 2011). Thus, it is plausible that networks have a similar protective function in the domain of oral health. That is, in a low socioeconomic status immigrant population that likely experiences elevated levels of stress, having strong ties to family and community attenuates the physiological and behavioral consequences of difficult life circumstances on oral disease. With respect to knowledge of OHM in alters, accurate information and advice accessible through social network ties may lead to more proactive behaviors, including help-seeking (Kawachi & Berkman, 2001). Additional research that measures stress experiences directly and that explores how network social capital is used by egos is needed to confirm these theorized mechanisms.

Because of the cross-sectional nature of this study, the theorized mechanisms driving the significant relationships revealed must be interpreted with caution. Alternative mechanisms may be at work, shaping the patterns identified in this research - though our interpretation

of the findings is consistent with the existing network literature. It may be, for example, that oral health shapes network size such that those with poor oral health may form networks with similar others, perhaps to seek understanding and sympathy. It may also be that those who report having larger, more active oral health networks are simply more likely than those with smaller, less active networks to identify and report oral health problems. Longitudinal data collection expanding on the findings of the Tala Study is currently underway and will provide stronger evidence for hypothesized mechanisms contributing to the relationship between networks and oral health status.

The present study has some limitations in addition to those regarding causality. The research employed respondent-driven sampling and relied heavily on church-based recruitment in one state in the American Midwest. This is not a probability sample. Although generalizability to other Latino immigrant populations should be inferred only with caution, our approach to data collection is common in studies of hidden and underrepresented populations, such as this one. Further, because data were sampled in an urban location, the conclusions may not be relevant to MA agricultural workers or rural communities. Important directions for future research efforts ought to include examining the timing and content of communication with network ties about matters of oral health. Longitudinal data collection and advanced analytic techniques will be required to better understand the nuances of interaction within these social networks, as well as the potential impacts of social interactions on outcomes like those examined in the present report.

The current study is an important initial step in building a research agenda in oral health that is informed by network science principles and methodologies. Net of more traditional individual-level factors, properties of social networks had distinct associations with selected oral health outcomes. The observed patterns are suggestive of mechanisms of social influence that are well replicated in the social, medical, and public health literatures, but have seldom been empirically tested in the domain of oral health. Though preliminary, our findings suggest a potential explanatory role for social networks in some of the most important questions and problems in OHD research, including the immigrant paradox and mechanics underlying OHD among MAs. Future research is needed to identify mechanisms of these relationships so that social networks are leveraged through interventions or public policy, to improve the health of disadvantaged and minority populations.

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Table 1.

Bivariate Differences between Participants with Fair/Poor Condition Teeth and Gums and those with Good/Very Good/Excellent Condition.

	Overall % or Mean	SD	Fair/Poor Condition of Teeth and Gums[a]		Good/V. Good/Excellent Condition of Teeth and Gums		Test Stat.[b]
			N	Mean/Prop	*N*	Mean/Prop	
Ego dental health status							
Dental pain/past year	35.24%	0.48	83	40.49%	30	25.42%	**
Sore/bleeding gums/past 6 moNTHS	36.99%	0.48	87	44.85%	25	21.37%	***
Antibiotic/painpill for dental/year	25.94%	0.44	59	30.26%	22	19.30%	*
Tooth loss (0–5)	0.86	1.54	205	1.08	118	0.50	**
Ego sociodemographics							
Female	62.95%	0.48	134	65.37%	72	61.31%	
Age	36.26	12.20	203	37.52	118	33.92	*
Education (HS Grad)	42.17%	0.49	71	34.63%	64	54.24%	**
Married	62.65%	0.48	133	64.88%	69	58.47%	
Years in US (logged)	2.70	0.57	204	2.66	118	2.73	
Ego oral health factors							
Dental insurance	36.56%	0.48	56	28.57%	59	51.30%	***
Currently need dental treatment	65.20%	0.48	147	76.17%	53	45.30%	***
Dental fatalism: Child cavities	4.04	1.28	204	4.10	118	3.92	
Network characteristics							
Proportion female	61.23%	29.27	205	60.85%	118	61.09%	
Mean closeness	2.83	0.35	204	2.80	118	2.88	
Oral health network size	2.60	1.81	205	2.77	118	2.34	*
Mean dental health knowledge	2.67	0.88	197	2.62	118	2.79	
Frequency talk dental problems	2.46	0.97	197	2.49	113	2.43	
N (332)	323		205	63.47%	118	36.53%	

Notes:

[a] Includes egos who report having no natural teeth.

[b] Test statistics examined include the Wilcoxon-Mann-Whitney test statistic calculated for interval or ordinal variables; Chi-square test and Fisher's exact test are used for categorical variables.

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$.

Table 2.

Logistic Regression of Dental Pain in the Past Year on Ego and Network Characteristics.

	Model 1	Model 2	Model 3	Model 4
Ego sociodemographics				
Female	1.91 (0.48)**	–	–	1.96 (0.60)*
Age	1.01 (0.01)	–	–	1.00 (0.01)
Education (HS Grad)	0.87 (0.22)	–	–	0.99 (0.31)
Married	1.32 (0.35)	–	–	1.47 (0.47)
Years in US (logged)	1.02 (0.05)	–	–	2.07 (0.59)*
Ego oral health factors				
Dental insurance	–	1.28 (0.34)	–	1.22 (0.37)
Currently need dental tx.	–	3.77 (1.12)***	–	4.16 (1.44)***
Dent. fatalism: Child cavities	–	1.24 (0.13)*	–	1.17 (0.14)
Network characteristics				
Proportion female	–	–	1.12 (0.05)*	1.11 (0.01)*
Mean closeness	–	–	0.47 (0.19)*	0.38 (0.18)*
Oral health network size	–	–	1.21 (0.09)**	1.22 (0.10)*
Mean dent. health knowl.	–	–	0.69 (0.10)*	0.61 (0.11)**
Freq. talk dental problems	–	–	1.73 (0.24)***	1.63 (0.26)**
N	328	307	315	287
LR χ^2	11.56*	29.63***	33.30***	67.15***
Pseudo R^2	0.02	0.07	0.08	0.18

Notes: Odds ratios presented, standard errors in parentheses.

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$.

Table 3.

Logistic Regression of Sore or Bleedings Gums in the Past 6 Months on Ego and Network Characteristics.

	Model 1	Model 2	Model 3	Model 4
Ego sociodemographics				
Female	1.01 (0.25)	–	–	0.83 (0.24)
Age	1.00 (0.01)	–	–	1.01 (0.01)
Education (HS Grad)	0.78 (0.20)	–	–	0.86 (0.26)
Married	1.29 (0.34)	–	–	1.17 (0.36)
Years in US (logged)	0.54 (0.12)**	–	–	0.61 (0.15)*
Ego oral health factors				
Dental insurance	–	0.90 (0.24)	–	0.88 (0.26)
Currently need dental tx.	–	3.43 (1.00)***	–	2.95 (0.97)**
Dent. fatalism: Child cavities	–	1.15 (0.11)	–	1.10 (0.12)
Network characteristics				
Proportion female	–	–	1.03 (0.05)	1.04 (0.05)
Mean closeness	–	–	0.84 (0.33)	0.69 (0.30)
Oral health network size	–	–	1.27 (0.09)**	1.23 (0.10)**
Mean dent. health knowl.	–	–	0.84 (0.12)	0.93 (0.15)
Freq. talk dental problems	–	–	1.54 (0.21)**	1.42 (0.21)*
N	315	296	303	277
LR χ^2	11.83*	24.50***	20.53**	41.13***
Pseudo R^2	0.03	0.06	0.05	0.11

Notes: Odds ratios presented, standard errors in parentheses.

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$.

Table 4.

Logistic Regression of Prescribed Painkiller or Antibiotic for Dental Problem in the Past Year on Ego and Network Characteristics.

	Model 1	Model 2	Model 3	Model 4
Ego sociodemographics				
Female	1.47 (0.42)	–	–	1.61 (0.56)
Age	1.03 (0.01)	–	–	1.02 (0.02)
Education (HS Grad)	1.29 (0.36)	–	–	1.32 (0.46)
Married	1.16 (0.34)	–	–	1.05 (0.37)
Years in US (logged)	0.53 (0.12)	–	–	0.57 (0.16)*
Ego oral health factors				
Dental insurance	–	1.42 (0.33)	–	1.45 (0.50)
Currently need dental tx.	–	2.45 (0.79)**	–	2.48 (0.96)*
Dent. fatalism: Child cavities	–	1.39 (0.17)**	–	1.32 (0.19)
Network characteristics				
Proportion female	–	–	1.01 (0.05)	0.98 (0.05)
Mean closeness	–	–	0.51 (0.23)	0.40 (0.20)
Oral health network size	–	–	1.44 (0.12)***	1.41 (0.13)***
Mean dent. health knowl.	–	–	0.82 (0.14)	0.80 (0.15)
Freq. talk dental problems	–	–	1.60 (0.25)**	1.51 (0.27)*
N	312	293	299	273
LR χ^2	14.83*	18.52***	29.95***	53.01***
Pseudo R^2	0.04	0.05	0.09	0.17

Notes: Odds ratios presented, standard errors in parentheses.

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$.

Table 5.

Poisson Regression of Lifetime Tooth Loss (0–5+) on Ego and Network Characteristics.

	Model 1	Model 2	Model 3	Model 4
Ego sociodemographics				
Female	1.24 (0.16)	–	–	1.19 (0.17)
Age	1.04 (0.01)***	–	–	1.04 (0.01)***
Education (HS Grad)	0.87 (0.12)	–	–	0.81 (0.12)
Married	0.90 (0.12)	–	–	0.99 (0.14)
Years in US (logged)	1.03 (0.11)	–	–	1.07 (0.12)
Ego oral health factors				
Dental insurance	–	0.77 (0.10)*	–	0.77 (0.11)
Currently need dental tx.	–	1.43 (0.20)*	–	1.30 (0.20)
Dent. fatalism: Child cavities	–	1.18 (0.06)**	–	1.11 (0.06)
Network characteristics				
Proportion female	–	–	1.03 (0.02)	1.03 (0.02)
Mean closeness	–	–	0.65(0.11)*	0.63(0.11)*
Oral health network size	–	–	1.23(0.04)***	1.16(0.04)***
Mean dent. health knowl.	–	–	0.89 (0.07)	0.89 (0.07)
Freq. talk dental problems	–	–	1.23 (0.08)**	1.12(0.08)
N	328	307	315	287
LR χ^2	83.62***	25.52***	50.65***	140.57***
Pseudo R^2	0.08	0.03	0.05	0.15

Notes: Incidence rate ratios presented, standard errors in parentheses.

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$.