

Research Article

The Associations and Correlations Between Self-reported Health and Neighborhood Cohesion and Disorder in a Community-dwelling U.S. Chinese Population

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Received June 10, 2015; Accepted December 21, 2015

Decision Editor: Rachel Pruchno, PhD

Abstract

Purpose of the Study: Characteristics of neighborhood have been found to be associated with physical and psychological health status of older adults, especially in relationship to social dynamics like cohesion and disorder. This study aims to examine correlations and associations between sociodemographic characteristics, self-reported health status, cohesion, and disorder among Chinese older adults in the greater Chicago area.

Design and Methods: The Population Study of Chinese Elderly in Chicago is a cross-sectional, population-based study with community-dwelling Chinese older adults aged 60 and older, recruited through a community-based participatory research approach. Cohesion was measured through six questions; disorder was measured through eight questions. Correlation and regression analyses were conducted using SAS.

Results: Among 3,158 participants enrolled in the study, 92.3% reported any neighborhood cohesion; 69.8% reported any neighborhood disorder. After controlling for age, sex, education, income, marital status, living arrangement, number of children, years in the community, years in the United States, country of origin, language preference, and location, a higher level of cohesion is associated with higher quality of life (odds ratio [OR]: 1.25, 95% confidence interval [CI]: 1.13, 1.39) and a higher level of disorder is associated with lower overall health status (OR: 0.97, 95% CI: 0.95, 0.99) and lower quality of life (OR: 0.96, 95% CI: 0.95, 0.98).

Implications: Our findings suggest that neighborhood cohesion and neighborhood disorder are correlated to the health of U.S. Chinese older adults. Future longitudinal research should examine the relationship between community characteristics, both structural and social, and health-related outcomes.

Keywords: Chinese, Neighborhood cohesion, Neighborhood disorder, Chicago

Much research has shown observable variations in health which can be categorized by geographic location or place. As a result, theorists and researchers in anthropology, sociology, medical geography, and other related fields have conceptualized the intersection of place, people, and their health (Cummins, Curtis, Diez-Roux, & Macintyre, 2007; Knox & Pinch, 2014; Merlo, 2011; Merlo, Ohlsson, Lynch, Chaix, & Subramanian, 2009). There is a growing body of

literature which suggests that neighborhood characteristics are important factors in physical and psychological health outcomes among older adults (Aneshensel et al., 2007; Balfour & Kaplan, 2002), both in terms of protective and risk factors (Balfour & Kaplan, 2002; Cagney, Browning, & Wen, 2005).

This study follows the conceptual framework by Cagney and colleagues (2009) through their work with

urban-dwelling older adults. Their framework represents a more macrolevel understanding of neighborhood-level social processes and has been used by researchers to understand place effects on health (Clark et al., 2011; Y. Jang et al., 2015; E. S. Kim, Park, & Peterson, 2013; Marco, Wolfson, Sparling, & Azuaje, 2012). There are two elements of this framework: collective efficacy and social disorganization. Cagney and colleagues argue that normative/collective and contextual orientations influence health in urban environments due to their interaction with social relations. Collective efficacy, also known as neighborhood cohesion, relates to positive psychosocial resources and thus, behaves in a protective manner. Social disorganization, or neighborhood disorder, discourages positive psychosocial resources and therefore, compromises psychological and physical outcomes. These facets are examined on a neighborhood level to examine the normative expectations of neighborhood networks and sense of connectedness, which has been shown to affect health (D. Kim & Kawachi, 2006). Research concerning the neighborhood effects on health also has shown that neighborhood disorder moderates the positive effects of neighborhood cohesion on health (Bjornstrom, Ralston, & Kuhl, 2013). Therefore, not only do cohesion and disorder interact with health outcomes separately, cohesion and disorder also relate to each other, likely impacting the magnitude of some health outcomes. Both neighborhood cohesion and disorder help to evaluate these environments from the perspective of older adults and may elucidate the mechanisms behind health outcomes.

In particular, measures of neighborhood cohesion and disorder examine social processes, which may reveal how larger neighborhood characteristics influence individual health outcomes (Cagney et al., 2009). Research has shown that social cohesion among neighbors may increase a community's capability for contributing to a common goal and allow for better distribution of health knowledge and materials (Kawachi & Berkman, 2000; Sampson, Raudenbush, & Earls, 1997), as well as predict well-being of older adults (Cramm, van Dijk, & Nieboer, 2013). Neighborhood disorder may impact physical and psychological behaviors (Ross & Mirowsky, 2001). Specific facets, like vandalism, decay, or other unsafe conditions, are associated with outcomes like a higher risk of decreased physical functionality (Balfour & Kaplan, 2002), decreased social support (Thompson & Krause, 1998), and depression (Wilson-Genderson & Pruchno, 2013).

There is currently a paucity of research concerning social neighborhood characteristics and Asian older adults in the United States, especially regarding those of Chinese descent.

The Chinese population is the largest and oldest subgroup of Asians in the United States (United States Census Bureau, 2010). Chinese older adults also face high levels of physical and psychological health problems (Dong, Chang, & Bergren, 2014; Dong, Chang, & Simon, 2014a; Dong, Chen, Li, & Simon, 2014; Dong, Chen, & Simon, 2014a,

2014c; Dong, Chen, Wong, & Simon, 2014; Dong, Zhang, & Simon, 2014; Simon, Chang, Zhang, Ruan, & Dong, 2014), and their low income, and English language ability decreases health care utilization (M. Jang, Lee, & Woo, 1998).

Neighborhood cohesion and disorder may be especially influential in the health of Chinese older adults. Existing literature has suggested that neighborhood cohesion may positively influence Chinese older adults' health, though this evidence is not conclusive. In Hong Kong, one study found that neighborhood support was associated with fewer depressive symptoms among Chinese older adults in low-income housing developments (Chen et al., 2015). A national study of adult Asian Americans found that neighborhood cohesion was positively associated with higher overall health status (Zhang & Ta, 2009). Further, research has suggested that neighborhood disorder may negatively influence the health of older adults in urban places as a pathway between neighborhood socioeconomic status and self-rated health (Wen, Hawkey, & Cacioppo, 2006). Immigrant ethnic enclaves also may have lower overall levels of social cohesion and higher neighborhood disorder (Osypuk, Roux, Hadley, & Kandula, 2009). As many Chinese older adults in Chicago live in ethnic enclaves (Dong, Chen, & Simon, 2014b), neighborhood cohesion and disorder may be particularly relevant mechanisms to examine health outcomes for Chinese older adults.

Neighborhood cohesion and disorder measurements by Cagney and colleagues (2009) are appealing for studying Chinese older adults in the greater Chicago area due to its development and use in a Chicago-based longitudinal population study of older adults. These measurements have also been used to assess chronic diseases and social engagement in the elderly adults through longitudinal studies (Clark et al., 2011; M. Kim & Clarke, 2015). To our knowledge, these measurements have not been validated for use among Chinese older adults.

To fill this knowledge void, this study aims to (a) determine the validity of neighborhood cohesion and disorder scales for use in a U.S. Chinese older adult population, (b) examine the prevalence of neighborhood cohesion and disorder, and (c) examine correlations and associations between sociodemographic characteristics, self-reported health status, cohesion, and disorder among Chinese older adults in the greater Chicago area.

Design and Methods

Population and Settings

The Population Study of Chinese Elderly in Chicago (PINE) is a population-based epidemiological study of U.S. Chinese older adults aged 60 and older in the greater Chicago area. The purpose is to collect community-level data of U.S. Chinese older adults to examine the key cultural determinants of health and well-being. The project was initiated by

a community-academic collaboration among Rush Institute for Healthy Aging, Northwestern University, and many community-based social service organizations throughout the greater Chicago area.

The PINE study implemented culturally and linguistically appropriate community recruitment strategies strictly guided by a community-based participatory research approach. Eligible participants were approached during routine social service and outreach efforts serving Chinese American families in the greater Chicago area. All participants consented and were interviewed by trained bicultural research assistants (RAs) in the respondents' preferred language. Questions were administered orally; RAs spoke at least English and one dialect of Chinese. RAs had access to the survey questions in English, simplified Chinese characters, and traditional Chinese characters during the interview. Our response rate was 91.9%. The PINE study is representative of the Chinese aging population in the greater Chicago area (Simon, Chang, Rajan, Welch, & Dong, 2014). The study was approved by the Institutional Review Boards of the Rush University Medical Center.

Measurements

Sociodemographics

Basic demographic information was collected, including age (in years), sex (men and women), years of education completed, annual personal income (less than \$5,000 per year; \$5,000–\$10,000 per year; or more than \$10,000 per year), marital status (married, widowed, divorced, or separated), number of children, number of grandchildren, living arrangement (alone, with 1 person, with 2–3 persons, more than 4 persons), country of origin (China, Hong Kong/Macau, Taiwan, or others), years residing in the United States and in the current community, preferred language, and location of residence (Chinatown, non-Chinatown Chicago, Suburbs).

Overall Health Status, Quality of Life, and Health Changes Over the Last Year

Overall health status was measured by “In general, how would you rate your health?” on a 4-point scale. Quality of life (QoL) was assessed by asking “In general, how would you rate your quality of life?” on a 4-point scale. Health change in last year was measured by the question “Compared to one year ago, how would you rate your health now?” on a 5-point scale.

Neighborhood Cohesion and Neighborhood Disorder

Neighborhood cohesion and neighborhood disorder were adapted from the Chicago Health and Aging Project (Cagney et al., 2009). Neighborhood cohesion was measured through six questions: how often in your neighborhood... (i) do you see neighbors and friends talking outside in the yard or in the street? (ii) do you see neighbors taking care of each other such as doing yard work or watching

children? (iii) do you see neighbors watching out for each other such as calling if they see a problem? and how many neighbors... (iv) do you know by name? (v) do you have a friendly talk with at least once a week? (vi) could you call on for assistance in doing something around your home or hard to “borrow a cup of sugar” or some other small favor? The first three questions were measured on a 4-point scale (0 = *Never*, 1 = *Rarely*, 2 = *Sometimes*, 3 = *Often*). For the last three questions, participants were asked to indicate a number. Scores ranged from –1.08 to 2.84. Cronbach alpha was .86.

Neighborhood disorder was measured through eight questions: How often in your neighborhood... (i) Do you see trash and litter? (ii) Do you see vandalism, such as damaging property or graffiti? (iii) Do you see people walking around you do not recognize? (iv) Is there loud noise from neighbors, traffic, or other sources? (v) Do you see unsafe traffic conditions, such as speeding cars or cars that run stop signs? (vi) Do you feel it is unsafe to walk around your neighborhood? (vii) Do you see poorly maintained sidewalks or broken curbs? (viii) Do you see low or inadequate lighting at night? All eight questions were measured on a 4-point scale (0 = *Never*, 1 = *Rarely*, 2 = *Sometimes*, 3 = *Often*). Scores ranged from 0 to 22. Cronbach alpha was .80.

Data Analysis

Descriptive univariate statistics were used to summarize sociodemographic characteristics and neighborhood cohesion and disorder among the sample population. The prevalence of each cohesion and disorder item was calculated. Chi-squared tests were used to compare the bivariate sociodemographic differences between any cohesion group and no cohesion group and between any disorder group and disorder group. The Pearson correlation coefficients were used to examine the correlations between neighborhood cohesion items, as well as disorder items, and between sociodemographic variables and neighborhood cohesion and disorder. For a continuous cohesion construct, we used a standard normal distribution.

To examine the association between health status and QoL and neighborhood cohesion and disorder, we utilized multivariate logistic regression models to control for potential confounding factors. To account for potential neighborhood cluster, we used a random-effect model where neighborhood is the random effect. First, we calculated neighborhood means based on zip code clusters. Then, participants were assigned their neighborhood mean, and all models were adjusted for this random effect on a continuous scale. Model A was adjusted for age and sex. Model B added additional socioeconomic variables, including education and income. In Model C, we added marital status, living arrangement, and number of children. In Model D, we added an acculturation proxy: years in community, years in the United States, country of origin as China, and

Cantonese/Toisanese language preference. Lastly, we added living in Chinatown for Model E. Odds ratios (ORs), 95% confidence intervals (CIs), and significance levels were reported for multivariate analyses. Fair and poor health status or QoL was used as a reference group. Statistical analyses were conducted using SAS, Version 9.2 (SAS Institute, Cary, NC).

Results

Sample Characteristics

Among 3,158 participants enrolled in the PINE study, 58.0% were women and 85.1% had an annual income below \$10,000. The majority (92.3%) of participants reported any neighborhood cohesion, and 69.8% reported any neighborhood disorder as shown in Table 1. Compared with those who reported no cohesion, participants reporting any cohesion were more likely to have at least 7 years of education (56.5% vs 54.7%, $p < .01$), have an annual income of at least \$5,000 (67.8% vs 53.7%, $p < .001$), live with fewer than three people (73.3% vs 46.7%, $p < .001$), have lived at least 11 years in the United States (74.2% vs 61.1%, $p < .001$), have lived at least 11 years in their community (43.5% vs 30.1%, $p < .001$), prefer Cantonese or Toisanese as their primary language (77.1% vs 68.6%, $p < .01$), and live in Chinatown (60.2% vs 47.9%, $p < .001$). These participants are also more likely to have very good or good overall health status (39.6% vs 35.6%, $p < .001$), very good or good QoL (50.9% vs 50.3%, $p < .001$), and improved or consistent health over the past year (58.6% vs 44.6%, $p < .001$).

Compared with those who reported no disorder, participants reporting any disorder were more likely to be between the ages of 60–69 years (44.3% vs 37.4%, $p < .001$), have less than 7 years of education (43.5% vs 39.6%, $p < .001$), have an annual income of at least \$5,000 (70.4% vs 57.9%, $p < .001$), have lived at least 11 years in the United States (75.4% vs 67.6%, $p < .001$), have lived at least 11 years in their community (46.3% vs 33.4%, $p < .001$), were born in China, Hong Kong, or Macau (96.6% vs 94.9%, $p < .001$), prefer Cantonese or Toisanese as their primary language (82.2% vs 63.2%, $p < .001$), and live in Chinatown (66.4% vs 42.4%, $p < .001$). These participants are also more likely to have fair or poor QoL (52.3% vs 41.8%, $p < .001$).

Neighborhood Cohesion and Disorder Items

The frequency of neighborhood cohesion and neighborhood disorder is presented in Table 2. Endorsement of each cohesion item ranged from 47.6% to 88.1%. Regarding the first three items, “sometimes” was the most reported frequency of cohesion per item. Seeing neighbors and friends talking with each other outside at least rarely was the most commonly endorsed item (88.1%). About three fourths (74.0%) of participants know at least one neighbor

by name. More than two fifths (42.6%) of participants do not have any neighbors that they have a friendly talk with at least once a week. In addition, more than half (52.4%) of participants did not have any neighbors they could call on for assistance for a small favor.

Endorsement of each disorder item ranged from 23.8% to 47.8%. Over three fourths (76.2%) of participants never see low or inadequate lighting at night; similarly, 72.9% of participants reported never seeing vandalism in their neighborhood. Not always recognizing people walking around the neighborhood was endorsed by 47.8% of participants, and 43.9% of participants reported loud noise from neighbors, traffic, or other sources.

Information about item correlation is detailed in Table 3. All items were significantly correlated at $p < .001$. For cohesion items, correlation coefficients (r) ranged from $r = .26$ to $r = .76$. Frequently seeing neighbors and friends talking outside and having more neighbors to call on for small favors were correlated at $r = .26$. Having more neighbors with whom the participant could have a friendly talk with at least once a week was correlated with having more neighbors to call on for small favors at $r = .76$. For disorder items, correlation coefficients ranged from $r = .23$ to $r = .45$. Hearing loud noises and seeing vandalism were correlated at $r = .23$. Seeing trash/litter and seeing vandalism were correlated at $r = .45$. Similarly, seeing poorly maintained sidewalks or broken curbs and seeing unsafe traffic conditions were also correlated at $r = .45$.

Sociodemographic and Health Characteristics Correlations With Cohesion and Disorder

Sociodemographic, health characteristics, cohesion, and disorder correlations are presented in Table 4. Neighborhood cohesion and disorder are presented as continuous variables; a positive correlation indicates higher levels of either cohesion or disorder. Neighborhood cohesion is positively correlated with age ($r = .07$, $p < .001$), being female ($r = .07$, $p < .001$), years of education ($r = .13$, $p < .001$), annual personal income ($r = .07$, $p < .001$), years in the United States ($r = .04$, $p < .05$), years in their community ($r = .05$, $p < .01$), and living in Chinatown ($r = .05$, $p < .01$). Cohesion is negatively correlated with living arrangement ($r = -.25$, $p < .001$) and a language preference of Cantonese or Toisanese ($r = -.11$, $p < .001$). Disorder is positively correlated with annual income ($r = .13$, $p < .001$), years in the United States ($r = .10$, $p < .001$), years in their community ($r = .15$, $p < .001$), a language preference of Cantonese or Toisanese ($r = .22$, $p < .001$), and living in Chinatown ($r = .21$, $p < .001$). Disorder is negatively correlated with age ($r = -.08$, $p < .001$) and years of education ($r = -.08$, $p < .001$).

Greater neighborhood cohesion is correlated with higher overall health status ($r = .05$, $p < .01$), higher QoL ($r = .10$, $p < .001$), and improved health over the past year

Table 1. Characteristics of Participants by Neighborhood Cohesion and Neighborhood Disorder

| | Neighborhood cohesion | | | Neighborhood disorder | | | | | | |
|--|-------------------------------------|----------------------------------|----------|-----------------------|----------------|-------------------------------------|----------------------------------|----------|-----------|----------------|
| | Any cohesion (<i>n</i> = 2,893) | No cohesion (<i>n</i> = 242) | χ^2 | <i>df</i> | <i>p</i> Value | Any disorder (<i>n</i> = 2,177) | No disorder (<i>n</i> = 941) | χ^2 | <i>df</i> | <i>p</i> Value |
| Age (years), <i>n</i> (%) | | | | | | | | | | |
| 60–64 | 618 (21.4) | 61 (25.2) | | | | 522 (24.0) | 154 (16.4) | | | |
| 65–69 | 591 (20.4) | 48 (19.8) | | | | 441 (20.3) | 198 (21.0) | | | |
| 70–74 | 565 (19.5) | 38 (15.7) | | | | 421 (19.3) | 180 (19.1) | | | |
| 75–79 | 516 (19.5) | 35 (14.5) | | | | 359 (16.5) | 191 (20.3) | | | |
| 80–84 | 367 (12.7) | 26 (10.7) | | | | 271 (12.5) | 117 (12.4) | | | |
| 85** | 236 (8.2) | 34 (14.1) | 14.4 | 5 | .01 | 434 (19.9) | 218 (23.2) | 31.0 | 5 | <.001 |
| Sex, <i>n</i> (%) | | | | | | | | | | |
| Female | 1,691 (58.5) | 130 (53.7) | | | | 1,247 (57.3) | 562 (59.7) | | | |
| Male | 1,202 (41.6) | 112 (46.3) | 2.05 | 1 | .15 | 930 (42.7) | 379 (40.3) | 1.6 | 1 | .20 |
| Education (years), <i>n</i> (%) | | | | | | | | | | |
| 0 | 166 (5.8) | 25 (10.4) | | | | 129 (4.1) | 57 (6.1) | | | |
| 1–6 | 1,092 (37.8) | 84 (34.9) | | | | 857 (39.4) | 315 (33.5) | | | |
| 7–12 | 1,033 (35.8) | 69 (28.6) | | | | 794 (36.5) | 303 (32.2) | | | |
| 13–16 | 520 (18.0) | 54 (22.4) | | | | 346 (15.9) | 229 (24.4) | | | |
| 17+ | 77 (2.7) | 9 (3.7) | 14.8 | 4 | .005 | 48 (2.2) | 36 (3.8) | 41.3 | 4 | <.001 |
| Income, <i>n</i> (%) | | | | | | | | | | |
| \$0–\$4,999 | 925 (32.2) | 111 (46.3) | | | | 639 (29.5) | 394 (42.1) | | | |
| \$5,000–\$9,999 | 1,517 (52.8) | 95 (39.6) | | | | 1,168 (54.0) | 436 (46.6) | | | |
| \$10,000–\$14,999 | 283 (9.9) | 26 (10.8) | | | | 238 (11.0) | 70 (7.5) | | | |
| \$15,000–\$19,999 | 67 (2.3) | 1 (0.4) | | | | 55 (2.5) | 12 (1.3) | | | |
| \$20,000 and more | 80 (2.8) | 7 (2.9) | 24.6 | 4 | <.001 | 63 (2.9) | 23 (2.5) | 51.3 | 4 | <.001 |
| Marital status, <i>n</i> (%) | | | | | | | | | | |
| Married | 2,051 (71.4) | 172 (71.1) | | | | 1,545 (71.6) | 669 (71.4) | | | |
| Separated | 53 (1.9) | 2 (0.8) | | | | 42 (2.0) | 13 (1.4) | | | |
| Divorced | 68 (2.4) | 5 (2.1) | | | | 54 (2.5) | 19 (2.0) | | | |
| Widowed | 699 (24.4) | 63 (26.0) | 1.66 | 3 | .65 | 518 (24.0) | 236 (25.2) | 2.2 | 3 | .54 |
| Living arrangement, <i>n</i> (%) | | | | | | | | | | |
| Living alone | 649 (22.4) | 20 (8.3) | | | | 478 (22.0) | 184 (19.6) | | | |
| 1–2 | 1,471 (50.9) | 93 (38.4) | | | | 1,109 (50.9) | 449 (47.8) | | | |
| 3–4 | 418 (14.5) | 65 (26.9) | | | | 310 (14.2) | 170 (18.1) | | | |
| 5 or more | 354 (12.2) | 64 (26.5) | 84.0 | 3 | <.001 | 280 (12.9) | 137 (14.6) | 10.8 | 3 | .01 |
| Number of children, <i>n</i> (%) | | | | | | | | | | |
| 0 | 115 (4.0) | 12 (5.0) | | | | 88 (4.1) | 38 (4.0) | | | |
| 1–2 | 1,167 (40.4) | 99 (41.1) | | | | 871 (40.1) | 388 (41.3) | | | |
| 3 or more | 1,608 (55.6) | 130 (53.9) | 0.7 | 2 | .71 | 1,215 (55.9) | 514 (54.7) | 0.41 | 2 | .81 |
| Years in the United States, <i>n</i> (%) | | | | | | | | | | |
| 0–10 | 745 (25.9) | 94 (38.8) | | | | 534 (24.6) | 303 (32.4) | | | |
| 11–20 | 895 (31.1) | 63 (26.0) | | | | 664 (30.6) | 287 (30.7) | | | |
| 21–30 | 708 (24.6) | 52 (21.5) | | | | 548 (25.2) | 211 (22.6) | | | |
| 31 or more | 533 (18.5) | 33 (13.6) | 19.6 | 3 | <.001 | 426 (19.6) | 134 (14.3) | 26.9 | 3 | <.001 |
| Years in the community, <i>n</i> (%) | | | | | | | | | | |
| 0–10 | 1,631 (56.5) | 168 (70.0) | | | | 1,166 (53.7) | 626 (66.7) | | | |
| 11–20 | 694 (24.1) | 39 (16.3) | | | | 557 (25.6) | 174 (18.5) | | | |
| 21–30 | 362 (12.5) | 23 (9.6) | | | | 282 (13.0) | 100 (10.7) | | | |
| 31 or more | 199 (6.9) | 10 (4.2) | 16.8 | 3 | <.001 | 167 (7.7) | 39 (4.2) | 48.6 | 3 | <.001 |
| Country of origin, <i>n</i> (%) | | | | | | | | | | |
| China | 2,682 (92.7) | 226 (93.4) | | | | 2,023 (92.9) | 871 (92.6) | | | |
| Hong Kong/Macau | 95 (3.3) | 8 (2.1) | | | | 80 (3.7) | 22 (2.3) | | | |
| Taiwan | 39 (1.4) | 3 (1.2) | | | | 19 (0.9) | 23 (2.4) | | | |
| United States/Canada | 11 (0.4) | 0 (0.0) | | | | 11 (0.5) | 0 (0.0) | | | |

Table 1. Continued

| | Neighborhood cohesion | | | | | Neighborhood disorder | | | | |
|---|-------------------------------------|----------------------------------|----------|-----------|----------------|-------------------------------------|----------------------------------|----------|-----------|----------------|
| | Any cohesion (<i>n</i> = 2,893) | No cohesion (<i>n</i> = 242) | χ^2 | <i>df</i> | <i>p</i> Value | Any disorder (<i>n</i> = 2,177) | No disorder (<i>n</i> = 941) | χ^2 | <i>df</i> | <i>p</i> Value |
| Other | 66 (2.3) | 5 (2.1) | 1.0 | 4 | .91 | 44 (2.0) | 25 (2.7) | 21.6 | 4 | <.001 |
| Language preference, <i>n</i> (%) | | | | | | | | | | |
| Cantonese | 1,540 (53.2) | 118 (48.8) | | | | 1,263 (58.0) | 391 (41.6) | | | |
| Toisanese | 692 (23.9) | 48 (19.8) | | | | 527 (24.2) | 203 (21.6) | | | |
| Mandarin | 630 (21.8) | 75 (31.0) | | | | 359 (16.5) | 244 (36.6) | | | |
| English | 31 (1.1) | 1 (0.4) | 11.8 | 3 | .008 | 28 (1.3) | 3 (0.3) | 159.0 | 3 | <.001 |
| Location, <i>n</i> (%) | | | | | | | | | | |
| Chinatown | 1,741 (60.2) | 116 (47.9) | | | | 1,445 (66.4) | 399 (42.4) | | | |
| Chicago, non-Chinatown | 802 (27.7) | 76 (31.4) | | | | 594 (27.3) | 280 (29.8) | | | |
| Suburbs | 351 (12.1) | 50 (20.7) | 19.4 | 2 | <.001 | 139 (6.38) | 262 (27.8) | 300.6 | 2 | <.001 |
| Overall health status, <i>n</i> (%) | | | | | | | | | | |
| Very good | 127 (4.4) | 12 (5.0) | | | | 91 (4.2) | 47 (5.0) | | | |
| Good | 1,017 (35.2) | 74 (30.6) | | | | 737 (33.9) | 349 (37.1) | | | |
| Fair | 1,232 (42.6) | 82 (33.9) | | | | 926 (42.5) | 386 (41.0) | | | |
| Poor | 517 (17.9) | 74 (30.6) | 24.7 | 3 | <.001 | 423 (19.4) | 159 (16.9) | 5.6 | 3 | .13 |
| Quality of life, <i>n</i> (%) | | | | | | | | | | |
| Very good | 198 (6.9) | 17 (7.1) | | | | 116 (5.3) | 99 (10.5) | | | |
| Good | 1,272 (44.0) | 104 (43.2) | | | | 922 (42.3) | 449 (47.7) | | | |
| Fair | 1,337 (46.2) | 106 (44.0) | | | | 1,069 (49.1) | 364 (38.7) | | | |
| Poor | 85 (2.9) | 14 (5.8) | 17.9 | 2 | <.001 | 69 (3.2) | 29 (3.1) | 45.5 | 3 | <.001 |
| Health changes over the last year, <i>n</i> (%) | | | | | | | | | | |
| Improved | 258 (8.9) | 18 (7.4) | | | | 202 (9.3) | 73 (7.8) | | | |
| Same | 1,436 (49.7) | 90 (37.2) | | | | 1,071 (49.2) | 449 (47.7) | | | |
| Worsened | 1,198 (41.4) | 134 (55.4) | 17.9 | 2 | <.001 | 903 (41.5) | 419 (44.5) | 3.5 | 2 | .18 |

($r = .06$, $p < .001$). Also, greater neighborhood disorder is correlated with lower overall health status ($r = -.04$, $p < .05$) and lower QoL ($r = -.12$, $p < .001$). Cohesion and disorder are also positively correlated with each other ($r = .07$, $p < .001$).

Multivariate Regression Analysis Between Cohesion and Disorder and Self-reported Health

The associations between overall health status and QoL and neighborhood cohesion disorder are presented in Table 5. A higher level of neighborhood cohesion was correlated with higher overall health status in a bivariate analysis, but was not associated with very good and good overall health status after controlling for confounding factors. In contrast, a higher level of cohesion is associated with very good and good QoL. Higher cohesion score was associated with higher QoL (OR: 1.25, 95% CI: 1.13, 1.39), and participants who reported medium and high levels of neighborhood cohesion were more likely to report very good or good QoL (OR: 1.48 [1.23, 1.78] and OR: 1.53 [1.27, 1.85], respectively).

A higher level of neighborhood disorder was associated with very good or good overall health status; every 1 point higher of neighborhood disorder (range: 0–22) was

associated with lower overall health status (OR: 0.97 [0.95, 0.99]). Further, every 1 point higher of neighborhood disorder was associated with 4% lower QoL (OR: 0.96 [0.95, 0.98]). Individuals with medium and high disorder scores were 0.79 (CI: 0.66, 0.95) and 0.73 (CI: 0.61, 0.88) times less likely to report very good or good QoL.

Discussion

As the first population-based study of U.S. Chinese older adults to examine neighborhood cohesion and disorder, this study indicates that both cohesion and disorder are commonly experienced by the Chinese aging population in the greater Chicago area. Both neighborhood cohesion and disorder are positively correlated with each other, income, and years lived in their community. Higher levels of cohesion and lower levels of disorder are associated with higher overall health status and higher QoL. However, once we controlled for sociodemographic characteristics, overall health status was no longer associated with neighborhood cohesion.

Although our study indicates adequate reliability of neighborhood cohesion and disorder instruments and supports the associations of cohesion and health and disorder and health from Cagney and colleagues (2009), our findings

Table 2. Endorsement of Neighborhood Cohesion and Neighborhood Disorder Items

| | Never | | Rarely | Sometimes | | Often |
|---|--------------|--------------|-------------|--------------|--------------|------------|
| Neighborhood cohesion | | | | | | |
| 1. How often do you see neighbors and friends talking outside in the yard or on the street? | 370 (11.9) | | 742 (23.8) | 1,188 (38.2) | | 813 (26.1) |
| 2. How often do you see neighbors taking care of each other such as doing yard work or watching children? | 782 (25.5) | | 914 (29.8) | 921 (30.0) | | 450 (14.7) |
| 3. How often do you see neighbors watching out for each other such as calling if they see a problem? | 892 (29.1) | | 843 (27.5) | 903 (29.5) | | 423 (13.8) |
| | None | 1–5 | 6–10 | 11–15 | 16–20 | 21+ |
| 4. How many neighbors do you know by name? | 804 (26.0) | 1,351(43.7) | 620 (20.0) | 93 (3.0) | 12 (0.4) | 204 (6.6) |
| 5. How many neighbors do you have a friendly talk with at least once a week? | 1,328 (42.6) | 1,371 (44.0) | 272 (8.7) | 34 (1.1) | 10 (0.3) | 100 (3.2) |
| 6. How many neighbors could you call on for assistance in doing something around your home or yard or to “borrow a cup of sugar” or some other small favor? | 1,630 (52.4) | 1,225 (39.4) | 163 (5.2) | 22 (0.7) | 5 (0.2) | 65 (2.1) |
| Neighborhood disorder | | | | | | |
| 1. How often in your neighborhood do you see trash and litter? | 1,959 (62.4) | | 730 (23.3) | 273 (8.7) | | 158 (5.0) |
| 2. How often in your neighborhood do you see vandalism, such as damaging property or graffiti? | 2,289 (72.9) | | 566 (18.0) | 205 (6.5) | | 43 (1.4) |
| 3. How often in your neighborhood do you see people walking around you do not recognize? | 1,638 (52.2) | | 699 (22.3) | 515 (16.4) | | 246 (7.8) |
| 4. How often in your neighborhood is there loud noise from neighbors, traffic, or other sources? | 1,761 (56.1) | | 694 (22.1) | 397 (12.7) | | 275 (8.8) |
| 5. How often in your neighborhood do you see unsafe traffic conditions, such as speeding cars or cars that run stop signs? | 2,186 (69.7) | | 678 (21.6) | 186 (5.9) | | 44 (1.4) |
| 6. How often do you feel it is unsafe to walk around in your neighborhood? | 2,035 (64.9) | | 706 (22.5) | 295 (9.4) | | 71 (2.3) |
| 7. How often in your neighborhood do you see poorly maintained sidewalks or broken curbs? | 2,159 (68.8) | | 673 (21.5) | 207 (6.6) | | 69 (2.2) |
| 8. How often in your neighborhood do you see low or inadequate lighting at night? | 2,392 (76.2) | | 558 (17.8) | 114 (3.6) | | 48 (1.5) |

also obfuscate this understanding. To summarize, Cagney and colleagues argue that social exchange is facilitated and hindered, respectively, by cohesion and disorder, and contributes to health outcomes. Our findings show a positive correlation between neighborhood cohesion and neighborhood disorder, which suggests that these two constructs

may not have opposing relationships with social network exchanges. This correlation reflects that participants who live in disorganized spaces still experience high levels of neighborhood social cohesion. In their analysis of neighborhood cohesion and disorder measurements, Cagney and colleagues found that neighborhood cohesion and disorder

Table 3. Correlations Between Neighborhood Cohesion Items and Correlations Between Neighborhood Disorder Items

| Neighborhood cohesion | | | | | | | | |
|--|---------|---------|---------|---------|---------|---------|---------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | | |
| 1. How often in your neighborhood do you see neighbors and friends talking outside in the yard or in the street? | 1.0 | | | | | | | |
| 2. Do you see neighbors taking care of each other such as doing yard work or watching children? | 0.63*** | 1.0 | | | | | | |
| 3. Do you see neighbors watching out for each other such as calling if they see a problem? | 0.60*** | 0.83*** | 1.0 | | | | | |
| 4. How many neighbors do you know by name? | 0.41*** | 0.40*** | 0.42*** | 1.0 | | | | |
| 5. How many neighbors do you have a friendly talk with at least once a week? | 0.37*** | 0.38*** | 0.41*** | 0.72*** | 1.0 | | | |
| 6. How many neighbors could you call on for assistance in doing something around your home or yard to "borrow a cup of sugar" or some other small favor? | 0.26*** | 0.33*** | 0.39*** | 0.63*** | 0.76*** | 1.0 | | |
| Neighborhood disorder | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. How often in your neighborhood do you see trash and litter? | 1.0 | | | | | | | |
| 2. How often in your neighborhood do you see vandalism, such as damaging property or graffiti? | 0.45*** | 1.0 | | | | | | |
| 3. How often in your neighborhood do you see people walking around you do not recognize? | 0.39*** | 0.39*** | 1.0 | | | | | |
| 4. How often in your neighborhood is there loud noise from neighbors, traffic, or other sources? | 0.25*** | 0.23*** | 0.29*** | 1.0 | | | | |
| 5. How often in your neighborhood do you see unsafe traffic conditions, such as speeding cars or cars that run stop signs? | 0.35*** | 0.38*** | 0.39*** | 0.34*** | 1.0 | | | |
| 6. How often do you feel it is unsafe to walk around in your neighborhood? | 0.31*** | 0.34*** | 0.35*** | 0.26*** | 0.44*** | 1.0 | | |
| 7. How often in your neighborhood do you see poorly maintained sidewalks or broken curbs? | 0.40*** | 0.42*** | 0.37*** | 0.28*** | 0.45*** | 0.40*** | 1.0 | |
| 8. How often in your neighborhood do you see low or inadequate lighting at night? | 0.29*** | 0.36*** | 0.29*** | 0.24*** | 0.37*** | 0.37*** | 0.44*** | 1.0 |

Note. *** $p < 0.001$.

are significantly negatively correlated among two populations of older adults in Chicago and Baltimore. There are a few reasons which may elucidate our findings. First, both cohesion and disorder instruments may be influenced by population density. Participants may be able to name more neighbors with whom they are friendly if more neighbors exist. Furthermore, many densely populated urban areas experience structural and safety problems. A nationally representative study of older adults showed that neighborhood problems increase with population density (Cornwell & Cagney, 2014). However, there may be some unique characteristics of Chinese older adult urban populations which are not evident among other older adult populations.

For Chinese older adults in Chicago in particular, the desirability of living around other Chinese individuals may

be a strong influence on neighborhood cohesion, disorder, and their common correlates. Indeed, our study shows that Chinese older adults living in Chinatown experience significantly more neighborhood cohesion and disorder. Historically, in an attempt to not only escape racial discrimination and build a community, Chinese in Chicago tended to live around each other, which can also be seen in residential patterns today (Ling, 2012). These ethnic enclaves usually exist within working-class urban neighborhoods (Lan, 2006), which may not necessarily be safe, clean, or organized. In the present day, there are several senior housing buildings which are tailored toward Chinese individuals, and these are located in these same ethnic enclave areas. A majority of Chinese older adults in the greater Chicago area live within Chinatown (Dong, Chen, & Simon, 2014b).

Table 4. Sociodemographic Variables and Health Variables Associated With Neighborhood Cohesion and Neighborhood Disorder

| | Age | Sex | Edu | Income | MS | Living | Child | Yrs in U.S. | Yrs in com | Origin | Lang pref | CT | OHS | QOL | HC | NC | ND |
|-------------|----------|----------|----------|----------|----------|----------|---------|-------------|------------|---------|-----------|---------|---------|----------|---------|---------|-----|
| Age | 1.0 | | | | | | | | | | | | | | | | |
| Sex | 0.01 | 1.0 | | | | | | | | | | | | | | | |
| Edu | -0.12*** | -0.21*** | 1.0 | | | | | | | | | | | | | | |
| Income | 0.05** | 0.00 | 0.01 | 1.0 | | | | | | | | | | | | | |
| MS | -0.33*** | -0.32*** | 0.22 | -0.03 | 1.0 | | | | | | | | | | | | |
| Living | -0.35*** | -0.07*** | 0.02 | 0.16*** | 0.24*** | 1.0 | | | | | | | | | | | |
| Child | 0.32*** | 0.09*** | -0.38*** | 0.00 | -0.13*** | -0.07*** | 1.0 | | | | | | | | | | |
| Yrs in U.S. | 0.35*** | 0.03 | -0.10*** | 0.35*** | -0.2*** | -0.31*** | 0.15*** | 1.0 | | | | | | | | | |
| Yrs in com | 0.23*** | 0.02 | -0.11*** | 0.24*** | -0.13*** | -0.18*** | 0.10*** | 0.66*** | 1.0 | | | | | | | | |
| Origin | 0.04* | -0.01 | -0.08*** | -0.20 | 0.03* | 0.05** | 0.04* | -0.2*** | -0.15*** | 1.0 | | | | | | | |
| Lang pref | -0.02 | -0.01 | -0.56*** | -0.03 | -0.06*** | 0.06*** | 0.27*** | 0.18*** | 0.20*** | 0.06** | 1.0 | | | | | | |
| CT | 0.11*** | 0.01 | -0.33*** | 0.09*** | -0.09*** | -0.20*** | 0.19*** | 0.12*** | 0.15*** | 0.09*** | 0.42*** | 1.0 | | | | | |
| OHS | 0.08*** | 0.06** | -0.06*** | -0.12*** | -0.05** | 0.00 | 0.00 | 0.01 | -0.05* | 0.03 | 0.01 | -0.01 | 1.0 | | | | |
| QOL | -0.06*** | -0.05** | -0.09*** | -0.08*** | 0.03 | 0.01 | -0.04* | 0.00 | 0.02 | 0.04* | -0.12*** | 0.09*** | 0.32*** | 1.0 | | | |
| HC | 0.11*** | 0.03 | -0.02 | -0.05** | -0.07*** | -0.01 | 0.02 | 0.04* | -0.03 | 0.00 | 0.03 | -0.02 | 0.35*** | 0.15*** | 1.0 | | |
| NC | 0.07*** | 0.07*** | 0.13*** | 0.07*** | 0.01 | -0.25*** | -0.02 | 0.04* | 0.05** | 0.02 | -0.11*** | 0.05** | 0.05** | 0.10*** | 0.06*** | 1.0 | |
| ND | -0.08*** | -0.03 | -0.08*** | 0.13*** | 0.00 | -0.02 | 0.02 | 0.10*** | 0.15*** | -0.01 | 0.22*** | 0.21*** | -0.04* | -0.12*** | 0.03 | 0.07*** | 1.0 |

Notes. Child = number of children; CT = living in Chinatown; Edu = education; HC = health changes over the past year; Income = annual individual income; Lang pref = language preference; Living = living arrangement; MS = marital status; NC = neighborhood cohesion; ND = neighborhood disorder; OHS = overall health status; Origin = country of origin; QOL = quality of life; Yrs in com = years spent living in their community; Yrs in U.S. = years spent living in the United States.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5. Association Between Neighborhood Cohesion, Disorder, and Self-Reported Health Outcome Variables

| | Model A | Model B | Model C | Model D | Model E |
|---|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) |
| Outcome: Self-reported health (OHS range: 1–4, QoL range: 1–4) | | | | | |
| Neighborhood Cohesion | | | | | |
| Outcome: OHS—Very good and good | | | | | |
| Continuous | | | | | |
| Age | 0.98 (0.98, 0.99)*** | 0.98 (0.98, 0.99)** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** |
| Female | 0.84 (0.73, 0.97)* | 0.83 (0.71, 0.97)* | 0.82 (0.70, 0.97)* | 0.84 (0.71, 0.99)* | 0.84 (0.71, 0.99)* |
| Education | | 1.00 (0.99, 1.02) | 1.00 (0.99, 1.02) | 1.01 (0.99, 1.03) | 1.01 (0.99, 1.03) |
| Income | | 1.20 (1.12, 1.28)*** | 1.20 (1.12, 1.28)*** | 1.16 (1.08, 1.25)*** | 1.17 (1.08, 1.25)*** |
| Married | | 0.98 (0.81, 1.18) | 0.98 (0.81, 1.18) | 0.99 (0.81, 1.19) | 0.99 (0.81, 1.20) |
| Living arrangement | | 0.99 (0.95, 1.04) | 0.99 (0.95, 1.04) | 0.99 (0.95, 1.04) | 1.00 (0.95, 1.04) |
| Children | | 1.04 (0.98, 1.10) | 1.04 (0.98, 1.10) | 1.04 (0.98, 1.10) | 1.04 (0.98, 1.10) |
| Years in community | | | | 1.02 (1.01, 1.03)*** | 1.02 (1.01, 1.03)*** |
| Years in United States | | | | 0.99 (0.98, 1.00) | 0.99 (0.98, 1.00) |
| Born in China | | | | 0.68 (0.51, 0.89)* | 0.68 (0.50, 0.91)** |
| Cantonese/Toisanese | | | | 1.25 (0.98, 1.58) | 1.22 (0.94, 1.59) |
| Chinatown | | | | 1.04 (0.71, 1.53) | 1.04 (0.71, 1.53) |
| Community cohesion | 1.57 (0.74, 3.35) | 1.59 (0.69, 3.67) | 1.61 (0.71, 3.64) | 1.89 (0.89, 4.00) | 1.83 (0.66, 5.08) |
| Cohesion | 1.06 (0.96, 1.16) | 1.05 (0.95, 1.16) | 1.04 (0.94, 1.15) | 1.05 (0.95, 1.16) | 1.05 (0.95, 1.16) |
| Tertiles (Reference group: low cohesion) | | | | | |
| Age | 0.98 (0.98, 0.99)*** | 0.98 (0.98, 0.99)** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)** |
| Female | 0.84 (0.72, 0.97)* | 0.83 (0.72, 0.97)* | 0.82 (0.70, 0.97)* | 0.84 (0.71, 0.99)** | 0.84 (0.71, 0.99)*** |
| Education | | 1.00 (0.98, 1.02) | 1.00 (0.99, 1.02) | 1.01 (0.99, 1.03) | 1.02 (1.00, 1.04) |
| Income | | 1.19 (1.11, 1.28)*** | 1.19 (1.11, 1.28)*** | 1.16 (1.08, 1.25)*** | 1.16 (1.08, 1.25)*** |
| Married | | 0.98 (0.81, 1.18) | 0.98 (0.81, 1.18) | 0.99 (0.81, 1.19) | 0.99 (0.81, 1.19) |
| Living arrangement | | 0.99 (0.95, 1.04) | 0.99 (0.95, 1.04) | 0.99 (0.95, 1.04) | 0.99 (0.98, 1.04) |
| Children | | 1.04 (0.98, 1.10) | 1.04 (0.98, 1.10) | 1.04 (0.98, 1.10) | 1.04 (0.98, 1.10) |
| Years in community | | | | 1.02 (1.01, 1.03)*** | 1.02 (1.01, 1.03)*** |
| Years in United States | | | | 0.99 (0.98, 1.00) | 0.99 (0.98, 1.00) |
| Born in China | | | | 0.68 (0.51, 0.92)** | 0.68 (0.51, 0.91)* |
| Cantonese/Toisanese | | | | 1.23 (0.97, 1.56) | 1.21 (0.93, 1.57) |
| Chinatown | | | | 1.04 (0.72, 1.51) | 1.04 (0.72, 1.51) |
| Community cohesion | 1.66 (0.80, 3.45) | 1.67 (0.74, 3.76) | 1.68 (0.76, 3.71) | 1.96 (0.92, 4.14) | 1.89 (0.69, 5.20) |
| Cohesion—Medium | 1.21 (1.01, 1.45)* | 1.17 (0.98, 1.40) | 1.17 (0.97, 1.40) | 1.15 (0.96, 1.38) | 1.15 (0.95, 1.38) |
| Cohesion—High | 1.09 (0.91, 1.31) | 1.07 (0.89, 1.28) | 1.06 (0.88, 1.28) | 1.06 (0.88, 1.28) | 1.06 (0.88, 1.28) |

Table 5. Continued

| Outcome: Self-reported health (OHS range: 1-4, QoL range: 1-4) | Model A | Model B | Model C | Model D | Model E |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) |
| Outcome: QoL—Very good and good | | | | | |
| Continuous | | | | | |
| Age | 1.02 (1.01, 1.02)** | 1.02 (1.01, 1.03)*** | 1.02 (1.00, 1.03)** | 1.01 (1.00, 1.03)* | 1.01 (1.00, 1.03)* |
| Female | 1.27 (1.09, 1.47)** | 1.29 (1.11, 1.51)** | 1.27 (1.08, 1.50)** | 1.26 (1.07, 1.48)** | 1.25 (1.07, 1.48)** |
| Education | | 1.01 (1.00, 1.03) | 1.02 (1.01, 1.04)* | 1.02 (1.00, 1.04)* | 1.02 (1.00, 1.04)* |
| Income | | 1.15 (1.07, 1.23)*** | 1.16 (1.08, 1.25)*** | 1.14 (1.06, 1.23)*** | 1.14 (1.06, 1.23)*** |
| Married | | | 0.89 (0.74, 1.08) | 0.90 (0.74, 1.08) | 0.90 (0.74, 1.08) |
| Living arrangement | | | 1.06 (1.02, 1.11)** | 1.06 (1.02, 1.11)** | 1.06 (1.02, 1.11)** |
| Children | | | 1.06 (1.00, 1.12)* | 1.06 (1.01, 1.13)* | 1.06 (1.01, 1.13)* |
| Years in community | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Years in United States | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Born in China | | | | 0.75 (0.56, 1.02) | 0.76 (0.56, 1.03) |
| Cantonese/Toisanese | | | | 0.88 (0.68, 1.13) | 0.90 (0.70, 1.17) |
| Chinatown | | | | 0.76 (0.43, 1.35) | 0.76 (0.43, 1.35) |
| Community cohesion | 3.31 (0.76, 14.37) | 2.99 (0.75, 11.87) | 3.25 (0.89, 11.86) | 2.85 (0.82, 9.89) | 3.18 (0.91, 11.78) |
| Cohesion | 1.23 (1.12, 1.36)*** | 1.23 (1.10, 1.34)*** | 1.24 (1.12, 1.37)*** | 1.25 (1.13, 1.38)*** | 1.25 (1.13, 1.39)*** |
| Tertiles (Reference group: low cohesion) | | | | | |
| Age | 1.02 (1.01, 1.02)** | 1.02 (1.01, 1.03)*** | 1.02 (1.00, 1.03)** | 1.01 (1.00, 1.03)* | 1.01 (1.00, 1.03)* |
| Female | 1.26 (1.09, 1.46)** | 1.29 (1.11, 1.50)** | 1.27 (1.08, 1.49)** | 1.25 (1.07, 1.48)** | 1.25 (1.06, 1.47)** |
| Education | | 1.01 (1.00, 1.03) | 1.02 (1.01, 1.04)** | 1.02 (1.00, 1.04)* | 1.02 (1.00, 1.04)* |
| Income | | 1.15 (1.07, 1.23)*** | 1.16 (1.08, 1.24)*** | 1.14 (1.06, 1.23)*** | 1.14 (1.06, 1.23)*** |
| Married | | | 0.89 (0.74, 1.07) | 0.89 (0.74, 1.08) | 0.89 (0.74, 1.08) |
| Living arrangement | | | 1.06 (1.01, 1.11)** | 1.06 (1.02, 1.11)** | 1.06 (1.02, 1.11)** |
| Children | | | 1.06 (1.00, 1.12)* | 1.06 (1.01, 1.13)* | 1.06 (1.01, 1.13)* |
| Years in community | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Years in United States | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Born in China | | | | 0.76 (0.56, 1.03) | 0.77 (0.57, 1.04) |
| Cantonese/Toisanese | | | | 0.87 (0.67, 1.12) | 0.89 (0.69, 1.15) |
| Chinatown | | | | 0.75 (0.41, 1.40) | 0.75 (0.41, 1.40) |
| Community cohesion | 3.57 (0.77, 16.49) | 3.20 (0.77, 13.38) | 3.48 (0.90, 13.43) | 3.02 (0.83, 10.99) | 3.48 (0.91, 13.34) |
| Cohesion—Medium | 1.48 (1.24, 1.77)*** | 1.44 (1.20, 1.72)*** | 1.47 (1.22, 1.76)*** | 1.48 (1.23, 1.77)*** | 1.48 (1.23, 1.78)*** |
| Cohesion—High | 1.51 (1.26, 1.81)*** | 1.45 (1.21, 1.74)*** | 1.51 (1.26, 1.83)*** | 1.53 (1.27, 1.84)*** | 1.53 (1.27, 1.85)*** |

Table 5. Continued

| | Model A | Model B | Model C | Model D | Model E |
|---|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|
| | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) |
| Outcome: Self-reported health (OHS range: 1-4, QoL range: 1-4) | | | | | |
| Neighborhood Disorder | | | | | |
| Outcome: OHS—Very good and good | | | | | |
| Continuous | | | | | |
| Age | 0.98 (0.87, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** |
| Female | 0.83 (0.72, 0.96)* | 0.83 (0.71, 0.97)* | 0.82 (0.70, 0.97)* | 0.84 (0.71, 0.98)* | 0.84 (0.71, 0.98)* |
| Education | | 1.01 (0.99, 1.02) | 1.01 (0.99, 1.03) | 1.02 (1.00, 1.04) | 1.02 (1.00, 1.04) |
| Income | | 1.19 (1.12, 1.28)*** | 1.19 (1.11, 1.28)*** | 1.16 (1.08, 1.25)*** | 1.16 (1.08, 1.25)*** |
| Married | | | 0.99 (0.82, 1.20) | 1.00 (0.83, 1.21) | 1.00 (0.83, 1.21) |
| Living arrangement | | | 0.99 (0.95, 1.03) | 0.99 (0.95, 1.03) | 0.99 (0.95, 1.03) |
| Children | | | 1.04 (0.99, 1.10) | 1.05 (0.99, 1.11) | 1.05 (0.99, 1.011) |
| Years in community | | | | 1.02 (1.01, 1.03)*** | 1.02 (1.01, 1.03)*** |
| Years in United States | | | | 0.99 (0.98, 1.00) | 0.99 (0.98, 1.00) |
| Born in China | | | | 0.66 (0.49, 0.89)** | 0.66 (0.49, 0.89)** |
| Cantonese/Toisanese | | | | 1.29 (1.00, 1.68) | 1.29 (1.00, 1.68) |
| Chinatown | | | | 1.28 (0.68, 2.44) | 1.28 (0.68, 2.44) |
| Community disorder | 0.98 (0.83, 1.16) | 0.99 (0.82, 1.19) | 0.99 (0.82, 1.19) | 0.94 (0.77, 1.14) | 0.90 (0.72, 1.14) |
| Disorder | 0.98 (0.96, 1.00)* | 0.98 (0.96, 0.99)* | 0.98 (0.96, 1.00)* | 0.97 (0.95, 0.99)** | 0.97 (0.95, 0.99)** |
| Tertiles (Reference group: low disorder) | | | | | |
| Age | 0.98 (0.98, 0.99)*** | 0.98 (0.98, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** | 0.98 (0.97, 0.99)*** |
| Female | 0.84 (0.72, 0.97)* | 0.83 (0.72, 0.97)* | 0.83 (0.70, 0.97)* | 0.84 (0.71, 0.99)* | 0.84 (0.71, 0.99)* |
| Education | | 1.00 (0.99, 1.02) | 1.01 (0.99, 1.03) | 1.02 (1.00, 1.04) | 1.02 (1.00, 1.04) |
| Income | | 1.19 (1.11, 1.27)*** | 1.19 (1.11, 1.27)*** | 1.16 (1.08, 1.24)*** | 1.16 (1.08, 1.24)*** |
| Married | | | 1.00 (0.83, 1.20) | 1.00 (0.83, 1.21) | 1.00 (0.83, 1.21) |
| Living arrangement | | | 0.99 (0.95, 1.03) | 0.99 (0.94, 1.03) | 0.99 (0.95, 1.03) |
| Children | | | 1.04 (0.99, 1.10) | 1.05 (0.99, 1.11) | 1.05 (0.99, 1.11) |
| Years in community | | | | 1.02 (1.01, 1.03)*** | 1.02 (1.01, 1.03)*** |
| Years in United States | | | | 0.99 (0.98, 1.00) | 0.99 (0.98, 1.00) |
| Born in China | | | | 0.66 (0.49, 0.89)** | 0.66 (0.49, 0.89)** |
| Cantonese/Toisanese | | | | 1.27 (0.98, 1.65) | 1.27 (0.98, 1.64) |
| Chinatown | | | | 0.93 (0.77, 1.13) | 0.93 (0.77, 1.13) |
| Community disorder | 0.97 (0.92, 1.15) | 0.98 (0.81, 1.18) | 0.97 (0.81, 1.17) | 0.93 (0.77, 1.13) | 0.90 (0.71, 1.13) |
| Disorder—Medium | 0.88 (0.73, 1.06) | 0.87 (0.72, 1.04) | 0.87 (0.72, 1.04) | 0.86, 0.71, 1.03) | 0.85 (0.71, 1.03) |
| Disorder—High | 0.93 (0.78, 1.12) | 0.91 (0.76, 1.10) | 0.91 (0.76, 1.10) | 0.88 (0.73, 1.06) | 0.88 (0.73, 1.06) |

Table 5. Continued

| Outcome: Self-reported health (OHS range: 1-4, QoL range: 1-4) | Model A | Model B | Model C | Model D | Model E |
|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) |
| Outcome: QoL—Very good and good | | | | | |
| Continuous | | | | | |
| Age | 1.01 (1.01, 1.02)** | 1.02 (1.01, 1.02)*** | 1.01 (1.00, 1.02)* | 1.01 (1.00, 1.02)* | 1.01 (1.00, 1.02)* |
| Female | 1.30 (1.12, 1.50)*** | 1.32 (1.14, 1.54)*** | 1.30 (1.11, 1.53)** | 1.30 (1.10, 1.52)** | 1.30 (1.10, 1.52)** |
| Education | | 1.02 (1.00, 1.03) | 1.03 (1.01, 1.04)** | 1.03 (1.01, 1.05)** | 1.03 (1.01, 1.05)** |
| Income | | 1.16 (1.08, 1.24)*** | 1.16 (1.08, 1.25)*** | 1.15 (1.07, 1.24)*** | 1.15 (1.07, 1.24)*** |
| Married | | | 0.91 (0.75, 1.09) | 0.91 (0.75, 1.09) | 0.91 (0.75, 1.09) |
| Living arrangement | | | 1.04 (1.00, 1.08) | 1.04 (1.00, 1.09) | 1.04 (1.00, 1.09) |
| Children | | | 1.07 (1.01, 1.13)* | 1.07 (1.01, 1.13)* | 1.07 (1.01, 1.13)* |
| Years in community | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Years in United States | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Born in China | | | | 0.75 (0.56, 1.02) | 0.75 (0.56, 1.01) |
| Cantonese/Toisanese | | | | 0.98 (0.76, 1.27) | 0.98 (0.76, 1.27) |
| Chinatown | | | | 1.13 (0.62, 2.09) | 1.13 (0.62, 2.09) |
| Community disorder | 0.81 (0.71, 0.91)** | 0.83 (0.72, 0.96)* | 0.83 (0.72, 0.96)* | 0.84 (0.71, 0.98)* | 0.82 (0.66, 1.03) |
| Disorder | 0.97 (0.95, 0.98)*** | 0.96 (0.95, 0.98)*** | 0.96 (0.95, 0.98)*** | 0.96 (0.95, 0.98)*** | 0.96 (0.95, 0.98)*** |
| Tertiles (Reference group: low disorder) | | | | | |
| Age | 1.01 (1.01, 1.02)** | 1.02 (1.01, 1.02)*** | 1.01 (1.00, 1.02)* | 1.01 (1.00, 1.02)* | 1.01 (1.00, 1.02)* |
| Female | 1.30 (1.13, 1.50)*** | 1.32 (1.14, 1.54)*** | 1.30 (1.11, 1.53)** | 1.30 (1.10, 1.52)** | 1.30 (1.10, 1.52)** |
| Education | | 1.02 (1.00, 1.03) | 1.02 (1.01, 1.04)** | 1.03 (1.01, 1.05)* | 1.03 (1.01, 1.05)** |
| Income | | 1.16 (1.08, 1.24)*** | 1.16 (1.08, 1.25)*** | 1.15 (1.07, 1.24)** | 1.15 (1.07, 1.24)** |
| Married | | | 0.91 (0.75, 1.09) | 0.91 (0.75, 1.09) | 0.90 (0.75, 1.09) |
| Living arrangement | | | 1.04 (0.99, 1.08) | 1.04 (1.00, 1.08) | 1.04 (1.00, 1.09) |
| Children | | | 1.07 (1.01, 1.13)* | 1.07 (1.02, 1.13)* | 1.07 (1.01, 1.13)* |
| Years in community | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Years in United States | | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Born in China | | | | 0.75 (0.56, 1.02) | 0.75 (0.56, 1.01) |
| Cantonese/Toisanese | | | | 0.97 (0.75, 1.25) | 0.97 (0.75, 1.25) |
| Chinatown | | | | 1.14 (0.63, 2.06) | 1.14 (0.63, 2.06) |
| Community disorder | 0.80 (0.72, 0.90)** | 0.83 (0.73, 0.95)* | 0.83 (0.72, 0.96)* | 0.84 (0.72, 0.98)* | 0.82 (0.66, 1.02) |
| Disorder—Medium | 0.80 (0.67, 0.96)* | 0.79 (0.66, 0.94)** | 0.79 (0.66, 0.95)* | 0.79 (0.66, 0.95)* | 0.79 (0.66, 0.95)* |
| Disorder—High | 0.75 (0.63, 0.90)** | 0.73 (0.61, 0.88)*** | 0.73 (0.61, 0.88)*** | 0.73 (0.61, 0.88)*** | 0.73 (0.61, 0.88)*** |

Notes: CI = confidence interval; OHS = overall health status; OR = odds ratio; QoL = quality of life.

p* < .05. *p* < .01. ****p* < .001.

If ethnic makeup of a neighborhood is an important factor in deciding where to live in the Chicago area, Chinese older adults may choose to live and stay in the same area, given limited options due to Chicago's ethnically and racially bordered neighborhoods (Rankin, 2010). Indeed, years in community is strongly and positively associated with neighborhood cohesion and disorder in our study population. Further, Chinese older adults in Chicago have low levels of acculturation, which may increase the desirability of neighborhoods with a greater percentage of ethnic Chinese individuals (Dong, Bergren, & Chang, 2015) and also experience a strong sense of community (Dong, Chang, & Simon, 2014b). In short, Chinese older adults in Chicago likely live in neighborhoods that are compositionally more Chinese, which may influence the report of neighborhood cohesion, and the location of these enclaves in working-class neighborhood may influence reports of neighborhood disorder. On the other hand, research in Latino communities have found that ethnic concentration may not necessarily lead to a greater sense of cohesion (Almeida, Kawachi, Molnar, & Subramanian, 2009) and may not be a moderator between cohesion and health (Bjornstrom & Kuhl, 2014). Therefore, future longitudinal research should be conducted to examine the influence of population density and neighborhood ethnic makeup on neighborhood cohesion and disorder to determine whether this facet of immigrant life influences Chinese older adults' health.

Another interesting finding from our study is that income is positively correlated with both cohesion and disorder. In contrast, a study of two Caucasian and African American populations of older adults in Chicago and Baltimore revealed that higher income was correlated with greater cohesion and less disorder (Cagney et al., 2009). First, income may not be a significant factor in settling patterns after immigration for Chinese older adults. Ethnographic research shows that many Chinese are willing to pay higher prices in Chicago's Bridgeport area in order to be closer to other Chinese families, which has led to a large number of Chinese settling in and around Chicago's Near Southside (Lan, 2006). Income is not the sole determinant of immigration patterns; constraints such as housing, language, and culture have traditionally influenced where immigrants settle (Wen, Lauderdale, & Kandula, 2009). Though many Asian immigrants have some ability for social and economic mobility (Wen et al., 2009), this opportunity may be more limited for older adults. In other words, Chinese older adults may opt for ethnic support, in terms of neighbors and available services, more than neighborhood order.

Second, the report of individual income among our study population may not be fully representative of socioeconomic status. Many of our suburban participants are supported by their children and did not report an individual income. This could help to explain the correlation between lower income, lower cohesion, and lower disorder. In the suburbs, there are fewer Chinese families, but the neighborhoods may also be more organized and clean. We

did not record household income nor neighborhood ethnic makeup; future research should examine these characteristics in relationship to neighborhood cohesion and disorder across urban and suburban areas.

Our study shows a positive correlation between neighborhood cohesion and health status among Chinese older adults in the greater Chicago area, which is also reflected in existing literature. In a study of Korean older adults aged 60 and older in central Texas, higher levels of cohesion, as part of a construct of community-level social capital, were correlated with lower depressive symptoms (Y. Jang et al., 2015). In study of Asian American adults in California, higher levels of perceived neighborhood social cohesion were associated with lower odds of smoking among men (Kandula, Wen, Jacobs, & Lauderdale, 2009). As neighborhood cohesion examines social cohesion related to proximity (Cagney et al., 2009), neighborhood cohesion may have a positive influence on health similar to the effects of social cohesion, which has been emphasized in a large body of literature (White, Philogene, Fine, & Sinha, 2009). This component of proximity may be especially important for older adults, because they are generally less mobile as they age. Chinese older adults' independent mobility may be especially diminished due to high instances of functional impairments (Dong, Chang, & Simon, 2014a). However, after controlling for confounding factors, higher cohesion was no longer associated with higher health status, but was still associated with higher QoL. In our field experience, Chinese older adults are more likely to evaluate overall health status based on their physical health and include psychological well-being in their evaluation of QoL. This may account for the discrepancy between overall health status and QoL in their relationship to neighborhood cohesion. Further longitudinal research should be conducted to examine the effects of neighborhood cohesion and health in relationship to possible mechanisms like social interaction, as well as specific psychological health outcomes.

Neighborhood disorder is also associated with poorer health status, though the mechanisms remain unclear. After controlling for an extensive list of possible confounding factors, lower overall health status and QoL are still significantly associated with higher disorder. This finding is corroborated by existing literature, though measurements vary considerably. In a study of community-dwelling older adults aged 55 or older in California, participants rated the seriousness of neighborhood problems, which were positively associated with risk of functional loss (Balfour & Kaplan, 2002). Further, a study of Caucasian and African American older adults aged 65 and older in three Chicago neighborhoods found that neighborhood social disorder, the same instrument used in our study, has a strong negative effect on cognitive function over time (Boardman, Barnes, Wilson, Evans, & de Leon, 2012). Neighborhood disorder's inverse relationship to health status may be partially explained by subsequent exercise behavior. In a study of urban older adults, researchers found that walking

behavior was influenced by neighborhood disorder (de Leon et al., 2009); older adults are less likely to exercise if their immediate environment is not well maintained. The specific effects of neighborhood disorder should be examined longitudinally in order to determine any possible interventions or policy directions to improve health and QoL. Nonetheless, our study provides important and novel information regarding the simultaneous experiences of neighborhood cohesion and disorder and its possible relationship to health and QoL among Chinese older adults.

Our study has a few limitations. First, due its cross-sectional nature, we are unable to determine how neighborhood cohesion and disorder transpire over time in relationship to self-reported health status or QoL. Second, our data are not generalizable to national or international Chinese populations due to location specificity and inter-ethnic variation. Third, our study does not collect data on household income, which may be important because many older adults rely on their children for support. Last, the measurements for cohesion and disorder are based on subjective assessments, which may or may not accurately reflect the social cohesion or disorder of the overall neighborhood. We call for additional research to examine neighborhood characteristics temporally in relationship to older adult health. Further, neighborhood assessments including things like racial composition, structural, crime, and socio-economic characteristics would further elucidate the effect of neighborhood on older adult health, beyond individual perceptions.

Despite these limitations, our study has wide implications for future research and policy directions. First, there is limited current research regarding the health of the Chinese population, which is the largest Asian group in the United States. Given the historical and contemporary settling patterns of Chinese immigrants (Li, 2005), the neighborhoods which Chinese people inhabit warrant further investigation. Our study presents novel information that both cohesion and disorder are correlated with living in the ethnic enclave of Chinatown; however, the mechanisms need to be examined further. Longitudinal research should be conducted in specific areas with large Chinese populations, like Chicago, to determine any causal relationship. Future qualitative research should examine why these neighborhoods are desirable from the perspective on Chinese older adults.

Second, because our study shows a connection between neighborhood-level cohesion and disorder and health, policy should focus on decreasing the disorder of neighborhood areas in Chicago to promote healthy behaviors and diminish mortality. High levels of disorder relating to safety may diminish healthy behaviors such as exercise (de Leon et al., 2009), which may be helpful in diminishing health disparities among Chinese older adults (Parikh, Fahs, Shelley, & Yerneni, 2009). Ross and Jang (2000) show that informal ties, like neighborhood cohesion, may provide a buffer against the psychological effects of neighborhood disorder; however, formal social organization does not.

As a result, the most effective form of formal intervention regarding health related to neighborhood social characteristics may be cleaning up neighborhood areas or improving structural quality, rather than trying to build social cohesion. This makes particular sense for our study population. Although many Chinese older adults live in ethnic enclaves within neighborhoods, these enclaves are situated within and near other racial groups (Lan, 2006). In other words, Chinese older adults may seek these areas for their ethnic similarities, but interactions within individuals from other racial, ethnic, or cultural groups are not eliminated. Given racial issues and discrimination within these multiethnic communities (Dong, Chen, & Simon, 2014b; Lan, 2006), it may not be plausible for wide social networks to exist, and according to Ross and Jang (2000), it may be more effective to have form interventions which specifically target neighborhood disorder, like the safety and cleanliness of the neighborhood environment.

In conclusion, Chinese older adults in the greater Chicago area experience neighborhood cohesion and disorder. Individuals are more likely to experience cohesion and less likely to experience disorder if they have a higher overall health status and higher QoL. However, neighborhood cohesion and disorder are also strongly correlated with each other, and this may be mediated by the existence of ethnic boundaries in and around Chicago. Future longitudinal research should examine the impact of cohesion and disorder on health outcomes.

Funding

X. Dong was supported by the National Institute on Aging grants (R01 AG042318, R01 MD006173, R01 CA163830, R34MH100443, R34MH100393, and RC4 AG039085), Paul B. Beeson Award in Aging, The Starr Foundation, American Federation for Aging Research, John A. Hartford Foundation, and The Atlantic Philanthropies.

Acknowledgments

We are grateful to Community Advisory Board members for their continued effort in this project. Particular thanks are extended to Bernie Wong, Vivian Xu, and Yicklun Mo with the Chinese American Service League (CASL); Dr. David Lee with the Illinois College of Optometry; David Wu with the Pui Tak Center; Dr. Hong Liu with the Midwest Asian Health Association; Dr. Margaret Dolan with John H. Stroger Jr. Hospital; Mary Jane Welch with the Rush University Medical Center; Florence Lei with the CASL Pine Tree Council; Julia Wong with CASL Senior Housing; Dr. Jing Zhang with Asian Human Services; Marta Pereya with the Coalition of Limited English Speaking Elderly; and Mona El-Shamaa with the Asian Health Coalition.

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