


Neighborhood Disorder Is Associated With Greater Risk for Self-Neglect Among Chinese American Older Adults: Findings From PINE Study

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Abstract

Objective: This study aims to examine the association between neighborhood disorder with self-neglect among a community-dwelling Chinese American older population. **Method:** Data were extracted from the Population Study of Chinese Elderly (PINE), a cross-sectional study of 3,157 participants living in the greater Chicago area. Self-neglect was assessed with systematic observations of participants' personal and home environment. Neighborhood disorder was measured through eight questions. Logistic regression was used to examine the association between neighborhood disorder and self-neglect. **Results:** After adjusting for potential confounding factors, every one point higher in neighborhood disorder score was significantly associated with greater risk for overall self-neglect (odds ratio [OR] = 1.13, [1.11, 1.16]), mild self-neglect (OR = 1.14, [1.11, 1.17]), and moderate/severe self-neglect (OR = 1.12, [1.09, 1.16]). Regarding the phenotypes of self-neglect, every one point higher in neighborhood disorder score was significantly associated with greater risk for hoarding (OR = 1.17, [1.14, 1.20]), personal hygiene (OR = 1.15, [1.12, 1.19]), house in need of repair (OR = 1.12, [1.10, 1.15]), unsanitary conditions (OR = 1.12, [1.09, 1.15]), and inadequate utilities (OR = 1.10, [1.05, 1.15]). **Discussion:** This study underscores the significant association between disordered neighborhood and greater risk of self-neglect among Chinese American older adults. Improving neighborhood disorder problems could benefit for elder self-neglect prevention.

Keywords

neighborhood disorder, self-neglect, older adults, Chinese American

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Introduction

Self-neglect is the most common form of elder abuse (Dong, 2017) and is a public health issue that threatens older people's health and safety. Self-neglect was defined as an adult's inability to perform essential self-care tasks for food, clothing, shelter, medical care, personal hygiene, safety precautions, and financial management (Teaster, Dugar, Mendiondo, Abner, & Cecil, 2006). Self-neglect is associated with increased risk of mortality among older adults (Dong, 2017; Dong, Simon, et al., 2009). In the United States, the self-neglect problem is exacerbated because of the rapidly aging population. Along with the general trend, Chinese Americans, as a large and fast-growing immigrant subgroup, is increasingly aging as well. A prior study revealed that Chinese American older adults have a higher prevalence of self-neglect as compared with Black and White older adults in the greater Chicago area (Dong, 2014). It is vital to have extensive knowledge about self-neglect-associated risk factors to appropriately implement prevention and intervention efforts for this population.

Regarding the risk factors of self-neglect, a majority of research has focused on individual-level factors such as cognitive and functional impairments, mental disorders, and physical illnesses (Burnett, Coverdale, Pickens, & Dyer, 2006; Dong, Mendes de Leon, et al., 2009; Dong, Simon, Beck, & Evans, 2010). Despite the individual factors, previous studies have demonstrated that environments to which individuals are exposed also largely contribute to the onset of self-neglect (Choi, Kim, & Asseff, 2009; Hei & Dong, 2017). In fact, these findings are in line with the conceptualization about the intersection of place, people, and their health (Cummins, Curtis, Diez-Roux, & Macintyre, 2007; Macintyre, Ellaway, & Cummins, 2002). Neighborhood features characterize the

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place where people live and are particularly important for older individuals' health (Yen, Michael, & Perdue, 2009). Researchers have developed measures of two distinct aspects of neighborhood social processes: social cohesion and physical disorder (Cagney et al., 2009). Within this framework, from the point of view of positive neighborhood characteristics, our recent findings indicate that greater neighborhood cohesion is associated with lower risk of overall self-neglect in Chinese American older adults (Hei & Dong, 2017). However, there is still a dearth of research investigating the relationship between neighborhood disorder and self-neglect through the lens of negative neighborhood characteristics.

Neighborhood disorder is a key measure which represents an understanding of negative neighborhood social processes. Neighborhood disorder assesses visible signs of community decay and unsafe conditions and reflects the physical disorganization of the neighborhood (Cagney et al., 2009). It refers to a lack of order and social control within the neighborhood and correlates to low neighborhood socioeconomic status and poor public service conditions (Feldman & Steptoe, 2004). Neighborhood disorder is associated with adverse health outcomes such as cognitive and functional impairments, depression, sleep problems, and poor quality of life (Bierman, Lee, & Schieman, 2017; Diez Roux & Mair, 2010; Dong & Bergren, 2016; Latkin & Curry, 2003), all of which have been reported as the potential risk factors for self-neglect among older adults (Dong, 2017). In addition, older adults living in a disordered neighborhood are more likely to be exposed to poor health resources and access (Kirby & Kaneda, 2005). Taken together, it is of great importance for understanding if neighborhood disorder may be a potential risk for self-neglect among older adults as an environmental-level factor.

Prior studies have shown that Chinese American older adults are not only vulnerable to self-neglect but also chronically exposed to the disordered neighborhood (Dong, 2014; Dong & Bergren, 2016). In this study, selecting Chinese American older adults as a study population, we hypothesized that a higher level of neighborhood disorder would be related to increased risk of self-neglect. The purpose of this study was to examine the association between neighborhood disorder and self-neglect among community-dwelling Chinese American older adults, thus to expand the knowledge of understanding risk factors associated with self-neglect through an environment-level lens.

Method

Study Population

Data for this study were extracted from the Population Study of Chinese Elderly (PINE) study which was a population-based study conducted from 2011 to 2013 in the greater Chicago area. Eligible participants were older adults aged 60 and above who self-identified as

Chinese. The study was initiated by a synergistic community-academic collaboration among the Rush University Medical Center, Northwestern University Medical Center, and many community-based social service agencies and organizations throughout the greater Chicago area (Dong, Wong, & Simon, 2014).

Based on a community-based participatory research approach, a total of 3,157 participants enrolled in this study (Dong, Chang, Simon, & Wong, 2011). Face-to-face interviews were conducted by trained multilingual interviewers in participants' preferred language and dialect. The PINE Study is representative of the aging Chinese population in the greater Chicago area with respect to important demographic attributes (Simon, Chang, Rajan, Welch, & Dong, 2014). The study was approved by the Institutional Review Board of the Rush University Medical Center.

Dependent Variable

Self-neglect. Self-neglect was assessed using a 27-item instrument and classified into five phenotypes: hoarding, personal hygiene, house in need of repair, unsanitary conditions, and inadequate utility (Dong, 2014). All interviewers who conduct the survey went through standardized training on these items. A 4-point scale was used to assess each item ranging from 0 = *none*, 1 = *mild*, 2 = *moderate*, and 3 = *severe*. Participants with any response other than "none" in one or more of the 27-item questions were identified as self-neglect victims. In terms of the severity of self-neglect, mild, moderate, or severe self-neglect was defined as the corresponding response in any single item in a domain. Reliability was assessed for overall self-neglect with a Cronbach's alpha of .79.

Independent Variable

Neighborhood disorder. Neighborhood disorder was assessed through eight questions (Dong & Bergren, 2016). The eight items addressed how often participants observed the presence of physical and potentially threatening conditions, including trash, loud noise, strangers, unsafe traffic conditions, vandalism, and unsafety of walking around the neighborhood. They were also asked about the state of disrepair or neglect of the physical environment such as poorly maintained sidewalks or broken curbs, or inadequate lighting at night. All eight questions were measured on a 4-point scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*). Higher scores indicated more negative disorganizations in the neighborhood. Reliability was assessed for neighborhood disorder with a Cronbach's alpha of .80.

Covariates

Basic sociodemographic and socioeconomic factors including age, gender, education, annual income, marital status, living arrangement, number of children, years

Table 1. Prevalence of Self-Neglect by Neighborhood Disorder.

	Neighborhood disorder				
	Any disorder <i>n</i> = 2,610	No disorder <i>n</i> = 223	χ^2	<i>df</i>	<i>p</i> value
Self-neglect severity					
No, <i>n</i> (%)	1,296 (65.8)	709 (83.6)			
Mild, <i>n</i> (%)	421 (21.4)	90 (10.6)			
Moderate/severe, <i>n</i> (%)	252 (12.8)	49 (5.8)	91.6	2	<.0001
Self-neglect phenotype					
Hoarding					
No, <i>n</i> (%)	1,594 (81.0)	805 (94.9)			
Yes, <i>n</i> (%)	374 (19.0)	43 (5.1)	91.20	1	<.0001
Personal hygiene					
No, <i>n</i> (%)	1,846 (86.0)	878 (96.1)			
Yes, <i>n</i> (%)	301 (14.0)	36 (3.9)	66.50	1	<.0001
House need repair					
No, <i>n</i> (%)	1,579 (80.5)	774 (91.6)			
Yes, <i>n</i> (%)	383 (19.5)	71 (8.4)	53.85	1	<.0001
Unsanitary conditions					
No, <i>n</i> (%)	1,563 (80.0)	761 (89.9)			
Yes, <i>n</i> (%)	390 (20.0)	86 (10.1)	40.34	1	<.0001
Inadequate utilities					
No, <i>n</i> (%)	1,831 (94.7)	825 (97.8)			
Yes, <i>n</i> (%)	102 (5.3)	19 (2.2)	12.90	1	.0003

in the United States, years in the community, country of origin, and language preference were controlled in the models. Annual income was categorized into five groups: (a) US\$0 to US\$4,999 per year, (b) US\$5,000 to US\$9,999 per year, (c) US\$10,000 to US\$14,999 per year, (d) US\$15,000 to US\$19,999 per year, and (e) US\$20,000 and over per year. Living arrangement was assessed by asking participants how many people lived in their household in addition to themselves.

Cognitive function was measured using the Mini-Mental State Examination (MMSE). Physical function was assessed using the Katz Index of activities of daily living (ADL) and instrumental activities of daily living (IADL) (Dong & Simon, 2016). The Patient Health Questionnaire (PHQ-9) was used to assess depressive symptoms (Dong, Chen, Li, & Simon, 2014). Social support was measured by asking the frequency of receipt of support from spouse, family members, and friends (Chen, Simon, Chang, Zhen, & Dong, 2014).

Analytical Approach

Descriptive statistics were used to describe the prevalence of self-neglect with different severities and phenotypes among participants who reported any or no neighborhood disorder. Chi-square tests were performed to examine the differences between the groups. Then, logistical regression was employed to examine the associations between neighborhood disorder and self-neglect. A series of logistic regressions was conducted with adjusting for blocks of covariates. Model A was

adjusted for age and gender. Model B was additionally adjusted for education and income. Based on Model B, marital status, living arrangement, and number of children were added into Model C. Then, years in the United States, years in the community, country of origin, and language preference were added into Model D. Cognitive function, physical function, and depressive symptoms were added into Model E. Finally, based on the previous models, social support was controlled in Model F. In all the above models, the odds ratios (ORs) for self-neglect and the corresponding 95% confidence intervals (CIs) and significance levels were reported in each model. All statistical analyses were conducted using SAS, Version 9.2 (SAS Institute Inc., Cary, NC).

Results

The mean age of the 3,157 participants was 72.8 ± 8.3 years old. In all, 58.9% were female, 21% lived alone, and 26.7% had been in the United States for less than 10 years. Also, 85.1% had an annual income less than US\$10,000; 95% reported that they could not read or speak English. Table 1 presents the prevalence of self-neglect among older adults reporting any or no neighborhood disorder. Compared with those reporting no neighborhood disorder, older adults reporting any disorder were more likely to have the onset of both mild and moderate/severe self-neglect. Meanwhile, compared with those reporting no neighborhood disorder, older adults reporting any disorder were more likely to report all the five phenotypes of self-neglect.

The associations between neighborhood disorder and different severities of self-neglect are summarized in Table 2. In the fully adjusted model (Model F), every one point higher in neighborhood disorder score was significantly associated with greater risk for overall self-neglect (OR = 1.13, [1.11, 1.16]), mild self-neglect (OR = 1.14, [1.11, 1.17]), and moderate/severe self-neglect (OR = 1.12, [1.09, 1.16]).

Table 3 shows the associations between neighborhood disorder and self-neglect phenotypes. In the fully adjusted model (Model F), every point higher in neighborhood disorder score was significantly associated with greater risk for hoarding (OR = 1.17, [1.14, 1.20]), personal hygiene (OR = 1.15, [1.12, 1.19]), house need repair (OR = 1.12, [1.10, 1.15]), unsanitary conditions (OR = 1.12, [1.09, 1.15]), and inadequate utilities (OR = 1.10, [1.05, 1.15]).

Discussion

To the best of our knowledge, this is the first population-based epidemiological study to examine the association between neighborhood disorder and self-neglect among Chinese older adults. Our results indicated that a higher level of neighborhood disorder was significantly associated with greater risk for self-neglect across the different severities and phenotypes among a community-dwelling Chinese American older population in the greater Chicago area.

Overall, our findings supported our hypothesis. Our results showed that older adults who reported any neighborhood disorder were more likely to present the onset of self-neglect. Furthermore, logistic regression analysis data indicated that higher levels of neighborhood disorder were significantly associated with greater risk of both mild and moderate/severe self-neglect, and also associated with greater risk of all the five phenotypes of self-neglect. These findings comply with previous studies which have linked neighborhood disorder to negative health outcomes among older adults (Dong & Bergren, 2016; Yen et al., 2009). Also, our findings are in line with the researchers' perspective which proposes that the quality of the neighborhood such as safety and crimes of the neighborhood may create risks for self-neglect (Paveza, Vandeweerd, & Laumann, 2008). In general, our study suggests that neighborhood disorder may be an important neighborhood-level risk factor for self-neglect among older adults.

Currently, the exact mechanism through which neighborhood disorder is associated with adverse health outcomes is still unclear. However, the association found in this study could be explained through a conceptual framework addressing environmental health promotion by improving neighborhood social processes (Schulz & Northridge, 2004). In addition, three levels of health determinants (fundamental, intermediate, and proximate) were identified by researchers within a model linking upstream determinants to downstream interventions (Gehlert et al.,

2008). Neighborhood contexts were included in the intermediate level which is thought to create health-promoting opportunities down the stream at the proximate and individual level.

Built upon the above model, first, we suggest that neighborhood disorder may increase the risk of elder self-neglect through influencing the downstream social factors such as social support, integration, and participations. For example, evidence shows that presence of neighborhood disorder is associated with decreased odds of visiting friends and family, participating in organizations, going out for enjoyment, and other social engagement activities, and consequently reduces the level of social support among the older adults (Hand, Law, Hanna, Elliott, & McColl, 2012; Latham & Clarke, 2018). As Mosqueda and Dong's (2011) study suggested, older adults with low social support are more prone to the development of self-neglecting behaviors. In this study, we observed the significant association between social support and self-neglect. Moreover, after we controlled for social support, the neighborhood disorder was still independently associated with self-neglect. Therefore, neighborhood disorder may affect self-neglect through other downstream proximate level factors such as increasing stressors or shaping health behaviors. Future studies are needed to further explore the relations.

Second, neighborhood disorder may affect self-neglect through individual-level factors such as mental disorders and functional impairments which are commonly described in elders with severe self-neglect (Dong, 2017; Dong, Simon, Beck, & Evans, 2010; Papaioannou, Räihä, & Kivelä, 2012). Neighborhood disorder has been associated with psychological distress and depression which are related to increased risks for elder self-neglect (Dong & Simon, 2016; Hill, Ross, & Angel, 2005). Meanwhile, neighborhood disorder is also linked to functional limitation and decline by influencing health enhancing activities such as walking, outdoor exercise, and other physical activities (Schafer & Upenieks, 2015; Yen et al., 2009). In this study, our data showed that after adjusting for cognitive and physical function and depressive symptoms, neighborhood disorder is still consistently associated with self-neglect across the different severities and phenotypes.

Third, neighborhood disorder may influence elder self-neglect through the same intermediate-level factors such as neighborhood socioeconomic status and resource conditions. The prior study demonstrated that high neighborhood disorder is more likely to correlate with low neighborhood socioeconomic status and poor public service conditions in the community (Feldman & Steptoe, 2004). As mentioned in the introduction, self-neglect is largely attributable to frail older adults' and their families' lack of resources to pay for essential goods and services and the inadequate health care support programs for the older adults (Choi et al., 2009). Therefore, the correlation between them may interpret

Table 2. Association of Neighborhood Disorder With Self-Neglect Severity.

Outcome: Self-neglect	Self-neglect OR (95% CI)					
	Model A	Model B	Model C	Model D	Model E	Model F
Overall self-neglect						
Age	1.02 [1.01, 1.03] ^{***}	1.02 [1.01, 1.03] ^{***}	1.01 [1.00, 1.02]	1.01 [1.00, 1.03] [*]	1.00 [0.99, 1.02]	1.00 [0.99, 1.02]
Female	0.94 [0.79, 1.11]	0.83 [0.70, 0.99] [*]	0.80 [0.66, 0.96] [*]	0.86 [0.71, 1.04]	0.80 [0.66, 0.97] [*]	0.84 [0.69, 1.02]
Education		0.95 [0.93, 0.96] ^{***}	0.96 [0.94, 0.98] ^{***}	0.98 [0.96, 1.01]	1.01 [0.98, 1.03]	1.02 [0.99, 1.04]
Income		1.03 [0.94, 1.12]	1.03 [0.95, 1.12]	1.03 [0.94, 1.12]	1.05 [0.96, 1.15]	1.05 [0.95, 1.15]
Marital status			0.86 [0.69, 1.07]	0.86 [0.69, 1.08]	0.89 [0.71, 1.11]	1.45 [1.08, 1.94] [*]
Living arrangement			1.02 [0.97, 1.07]	1.02 [0.97, 1.07]	1.02 [0.97, 1.07]	1.01 [0.96, 1.06]
Number of children			1.12 [1.06, 1.20] ^{***}	1.10 [1.03, 1.17] ^{**}	1.09 [1.02, 1.16] ^{**}	1.09 [1.02, 1.16] [*]
Years in the United States				1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.02]
Years in the community				0.98 [0.97, 0.99] ^{**}	0.99 [0.98, 1.00] ^{**}	0.99 [0.98, 1.00] [*]
Born in China				0.91 [0.63, 1.32]	0.95 [0.65, 1.37]	0.98 [0.67, 1.43]
Language preference				1.99 [1.48, 2.68] ^{***}	2.14 [1.58, 2.89] ^{***}	2.14 [1.58, 2.90] ^{***}
Cognitive function					0.96 [0.94, 0.98] ^{***}	0.97 [0.95, 0.99] ^{**}
Physical function					0.98 [0.94, 1.03]	0.97 [0.93, 1.02]
Depressive symptoms					1.06 [1.03, 1.08] ^{***}	1.04 [1.02, 1.06] ^{***}
Social support						0.95 [0.93, 0.97] ^{***}
Neighborhood disorder	1.15 [1.13, 1.18] ^{***}	1.15 [1.12, 1.17] ^{***}	1.14 [1.12, 1.17] ^{***}	1.14 [1.11, 1.16] ^{***}	1.13 [1.11, 1.16] ^{***}	1.13 [1.11, 1.16] ^{***}
Mild self-neglect						
Age	1.03 [1.01, 1.04] ^{***}	1.02 [1.01, 1.03] ^{***}	1.02 [1.00, 1.03] [*]	1.02 [1.00, 1.04] [*]	1.01 [0.99, 1.03]	1.01 [0.99, 1.03]
Female	1.10 [0.90, 1.35]	1.00 [0.81, 1.24]	1.02 [0.81, 1.27]	1.09 [0.87, 1.37]	1.03 [0.82, 1.30]	1.06 [0.84, 1.34]
Education		0.96 [0.94, 0.98] ^{***}	0.97 [0.95, 1.00] [*]	1.00 [0.97, 1.03]	1.02 [0.99, 1.05]	1.02 [0.99, 1.05]
Income		1.07 [0.97, 1.17]	1.08 [0.98, 1.19]	1.07 [0.97, 1.19]	1.10 [0.99, 1.22]	1.10 [0.99, 1.22]
Marital status			1.02 [0.79, 1.33]	1.02 [0.78, 1.32]	1.03 [0.79, 1.35]	1.44 [1.02, 2.03] [*]
Living arrangement			1.03 [0.97, 1.09]	1.03 [0.97, 1.09]	1.03 [0.97, 1.09]	1.02 [0.97, 1.09]
Number of children			1.17 [1.09, 1.26] ^{***}	1.15 [1.06, 1.23] ^{***}	1.14 [1.06, 1.23] ^{***}	1.14 [1.05, 1.23] ^{***}
Years in the United States				1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.02]
Years in the community				0.99 [0.97, 1.00] [*]	0.99 [0.98, 1.00] [*]	0.99 [0.98, 1.00]
Born in China				1.04 [0.67, 1.63]	1.09 [0.69, 1.72]	1.12 [0.71, 1.77]
Language preference				1.86 [1.31, 2.66] ^{***}	1.96 [1.37, 2.80] ^{***}	2.00 [1.39, 2.86] ^{***}
Cognitive function					0.96 [0.94, 0.98] ^{**}	0.96 [0.94, 0.99] ^{**}
Physical function					0.95 [0.90, 1.01]	0.95 [0.89, 1.01]
Depressive symptoms					1.04 [1.02, 1.07] ^{**}	1.03 [1.01, 1.06] [*]
Social support						0.97 [0.94, 0.99] ^{**}
Neighborhood disorder	1.16 [1.13, 1.19] ^{***}	1.15 [1.12, 1.18] ^{***}	1.15 [1.12, 1.18] ^{***}	1.14 [1.11, 1.17] ^{***}	1.14 [1.11, 1.17] ^{***}	1.14 [1.11, 1.17] ^{***}

(continued)

Table 2. (continued)

Outcome: Self-neglect	Self-neglect OR (95% CI)					
	Model A	Model B	Model C	Model D	Model E	Model F
Moderate/severe self-neglect						
Age	1.02 [1.00, 1.03]*	1.02 [1.00, 1.03]	1.00 [0.99, 1.02]	1.01 [0.99, 1.03]	1.00 [0.98, 1.02]	0.99 [0.97, 1.01]
Female	0.73 [0.57, 0.93]*	0.62 [0.48, 0.80]***	0.54 [0.41, 0.71]***	0.58 [0.44, 0.77]***	0.52 [0.39, 0.69]***	0.57 [0.42, 0.77]***
Education		0.93 [0.91, 0.96]***	0.94 [0.92, 0.97]***	0.97 [0.94, 1.00]	1.00 [0.96, 1.03]	1.00 [0.96, 1.04]
Income		0.93 [0.81, 1.08]	0.92 [0.80, 1.07]	0.91 [0.78, 1.07]	0.94 [0.80, 1.10]	0.95 [0.81, 1.11]
Marital status			0.65 [0.47, 0.89]**	0.67 [0.48, 0.92]*	0.69 [0.49, 0.96]*	1.54 [0.95, 2.20]**
Living arrangement			0.99 [0.92, 1.06]	0.99 [0.92, 1.06]	0.98 [0.91, 1.06]	0.97 [0.90, 1.05]
Number of children			1.05 [0.96, 1.15]	1.01 [0.92, 1.11]	1.00 [0.91, 1.10]	1.00 [0.91, 1.10]
Years in the United States				1.01 [0.99, 1.02]	1.01 [0.99, 1.02]	1.00 [0.99, 1.02]
Years in the community				0.98 [0.97, 1.00]*	0.98 [0.97, 1.00]*	0.99 [0.97, 1.00]
Born in China				0.76 [0.45, 1.28]	0.77 [0.45, 1.30]	0.84 [0.49, 1.43]
Language preference				2.31 [1.44, 3.71]***	2.60 [1.61, 4.20]***	2.75 [1.69, 4.45]***
Cognitive function					0.96 [0.93, 0.99]**	0.97 [0.94, 1.00]*
Physical function					1.02 [0.96, 1.07]	1.01 [0.95, 1.06]
Depressive symptoms					1.08 [1.05, 1.11]***	1.06 [1.03, 1.09]***
Social support						0.92 [0.89, 0.94]***
Neighborhood disorder	1.14 [1.11, 1.18]***	1.14 [1.11, 1.17]***	1.14 [1.10, 1.17]***	1.13 [1.09, 1.16]***	1.13 [1.09, 1.16]***	1.12 [1.09, 1.16]***

Note. Model A: adjusted for age and gender; Model B: adjusted for Model A + education and income; Model C: adjusted for Model B + marital status, living arrangement, and number of children; Model D: adjusted for Model C + years in the United States, years in the community, born in China, and language preference; Model E: adjusted for Model D + cognitive function, physical function, and depressive symptoms; Model F: adjusted for Model E + social support and social engagement. OR = odds ratio; CI = confidence interval.

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

Table 3. Association of Neighborhood Disorder With Self-Neglect Phenotypes.

Outcome: Self-neglect phenotypes	Self-neglect OR (95% CI)					
	Model A	Model B	Model C	Model D	Model E	Model F
Hoarding						
Age	1.02 [1.01, 1.04] ^{***}	1.02 [1.01, 1.04] ^{***}	1.01 [1.00, 1.03]	1.02 [1.00, 1.03]	1.01 [0.99, 1.02]	1.00 [0.98, 1.02]
Female	0.99 [0.79, 1.23]	0.94 [0.75, 1.18]	0.88 [0.69, 1.13]	0.96 [0.75, 1.22]	0.90 [0.70, 1.16]	0.96 [0.75, 1.24]
Education		0.98 [0.96, 1.00]	0.99 [0.97, 1.02]	1.02 [0.99, 1.05]	1.05 [1.01, 1.08] ^{**}	1.05 [1.02, 1.09] ^{**}
Income		1.08 [0.98, 1.20]	1.09 [0.98, 1.21]	1.08 [0.96, 1.21]	1.10 [0.98, 1.23]	1.11 [0.99, 1.24]
Marital status			0.82 [0.62, 1.08]	0.83 [0.63, 1.11]	0.85 [0.64, 1.14]	1.40 [0.97, 2.02]
Living arrangement			1.03 [0.97, 1.09]	1.03 [0.97, 1.10]	1.02 [0.96, 1.09]	1.02 [0.96, 1.09]
Number of children			1.13 [1.05, 1.23] ^{**}	1.10 [1.01, 1.19] [*]	1.09 [1.00, 1.18] [*]	1.09 [1.00, 1.18] [*]
Years in the United States				1.02 [1.00, 1.03] [*]	1.02 [1.00, 1.03] [*]	1.01 [1.00, 1.03] [*]
Years in the community				0.97 [0.96, 0.99] ^{***}	0.98 [0.96, 0.99] ^{***}	0.98 [0.97, 0.99] ^{***}
Born in China				0.94 [0.59, 1.50]	0.98 [0.61, 1.58]	1.03 [0.64, 1.67]
Language preference				2.12 [1.41, 3.16] ^{***}	2.19 [1.46, 3.28] ^{***}	2.25 [1.50, 3.38] ^{***}
Cognitive function					0.95 [0.93, 0.97] ^{***}	0.95 [0.93, 0.98] ^{***}
Physical function					0.97 [0.91, 1.02]	0.96 [0.91, 1.02]
Depressive symptoms					1.04 [1.01, 1.07] ^{**}	1.03 [1.01, 1.06]
Social support						0.95 [0.93, 0.97] ^{***}
Neighborhood disorder	1.18 [1.15, 1.21] ^{***}	1.18 [1.15, 1.21] ^{***}	1.18 [1.15, 1.21] ^{***}	1.17 [1.14, 1.20] ^{***}	1.17 [1.14, 1.20] ^{***}	1.17 [1.14, 1.20] ^{***}
Personal hygiene						
Age	1.05 [1.03, 1.06] ^{***}	1.04 [1.03, 1.06] ^{***}	1.03 [1.02, 1.05] ^{***}	1.04 [1.02, 1.06] ^{***}	1.01 [0.99, 1.03]	1.01 [0.99, 1.03]
Female	0.86 [0.68, 1.09]	0.71 [0.56, 0.91] ^{**}	0.71 [0.55, 0.93] [*]	0.75 [0.57, 0.99] [*]	0.67 [0.50, 0.89] ^{**}	0.73 [0.53, 0.97] [*]
Education		0.93 [0.91, 0.95] ^{***}	0.95 [0.92, 0.97] ^{***}	0.97 [0.94, 1.00] [*]	1.02 [0.98, 1.06]	1.02 [0.99, 1.06]
Income		0.98 [0.86, 1.12]	1.00 [0.88, 1.14]	0.98 [0.85, 1.13]	1.03 [0.89, 1.19]	1.04 [0.90, 1.20]
Marital status			0.96 [0.71, 1.29]	0.96 [0.71, 1.31]	1.05 [0.76, 1.45]	2.06 [1.38, 3.08] ^{***}
Living arrangement			1.04 [0.98, 1.11]	1.05 [0.99, 1.13]	1.04 [0.97, 1.12]	1.04 [0.97, 1.11]
Number of children			1.17 [1.08, 1.27] ^{***}	1.13 [1.04, 1.23] ^{**}	1.13 [1.04, 1.24] ^{**}	1.13 [1.03, 1.23] ^{**}
Years in the United States				1.03 [1.02, 1.04] ^{***}	1.03 [1.02, 1.05] ^{***}	1.03 [1.02, 1.04] ^{***}
Years in the community				0.95 [0.93, 0.96] ^{***}	0.95 [0.94, 0.96] ^{***}	0.95 [0.94, 0.97] ^{***}
Born in China				1.31 [0.75, 2.31]	1.44 [0.80, 2.60]	1.54 [0.85, 2.79]
Language preference				2.22 [1.37, 3.62] ^{**}	2.37 [1.45, 3.89] ^{***}	2.44 [1.49, 4.01] ^{***}
Cognitive function					0.91 [0.88, 0.93] ^{***}	0.91 [0.89, 0.94] ^{***}
Physical function					0.99 [0.94, 1.04]	0.98 [0.93, 1.04]
Depressive symptoms					1.07 [1.04, 1.10] ^{***}	1.06 [1.03, 1.08] ^{***}
Social support						0.93 [0.91, 0.96] ^{***}
Neighborhood disorder	1.16 [1.13, 1.19] ^{***}	1.16 [1.13, 1.19] ^{***}	1.16 [1.13, 1.19] ^{***}	1.16 [1.13, 1.19] ^{***}	1.16 [1.13, 1.19] ^{***}	1.15 [1.12, 1.19] ^{***}

(continued)

Table 3. (continued)

Outcome: Self-neglect phenotypes	Self-neglect OR (95% CI)					
	Model A	Model B	Model C	Model D	Model E	Model F
House need repair						
Age	1.00 [0.99, 1.01]	1.00 [0.99, 1.01]	1.00 [0.98, 1.01]	1.01 [0.99, 1.02]	1.00 [0.98, 1.01]	0.99 [0.98, 1.01]
Female	0.85 [0.69, 1.05]	0.77 [0.63, 0.96]*	0.74 [0.59, 0.93]*	0.79 [0.62, 0.99]*	0.72 [0.57, 0.91]**	0.78 [0.61, 0.99]*
Education		0.96 [0.94, 0.98]**	0.96 [0.94, 0.99]**	0.98 [0.96, 1.01]	1.00 [0.97, 1.03]	1.01 [0.98, 1.04]
Income		0.90 [0.80, 1.02]	0.91 [0.81, 1.03]	0.92 [0.81, 1.04]	0.95 [0.84, 1.08]	0.95 [0.84, 1.08]
Marital status			0.85 [0.65, 1.11]	0.86 [0.65, 1.13]	0.90 [0.68, 1.18]	1.71 [1.21, 2.43]**
Living arrangement			1.04 [0.99, 1.10]	1.03 [0.98, 1.10]	1.03 [0.97, 1.09]	1.02 [0.96, 1.08]
Number of children			1.05 [0.98, 1.14]	1.03 [0.96, 1.12]	1.03 [0.95, 1.11]	1.02 [0.95, 1.11]
Years in the United States				0.99 [0.98, 1.01]	0.99 [0.98, 1.01]	0.99 [0.98, 1.00]
Years in the community				0.99 [0.98, 1.00]	0.99 [0.98, 1.01]	1.00 [0.98, 1.01]
Born in China				0.73 [0.47, 1.13]	0.75 [0.48, 1.17]	0.81 [0.51, 1.27]
Language preference				1.90 [1.30, 2.78]**	2.05 [1.40, 3.01]**	2.14 [1.46, 3.14]**
Cognitive function					0.97 [0.94, 0.99]**	0.97 [0.95, 1.00]*
Physical function					0.97 [0.92, 1.03]	0.96 [0.91, 1.02]
Depressive symptoms					1.06 [1.04, 1.09]**	1.05 [1.02, 1.07]**
Social support						0.93 [0.91, 0.96]**
Neighborhood disorder					1.13 [1.10, 1.15]**	1.12 [1.10, 1.15]**
Unsanitary conditions				1.14 [1.11, 1.16]**	1.13 [1.10, 1.16]**	
Age	1.14 [1.11, 1.17]**	1.14 [1.11, 1.16]**	1.14 [1.11, 1.16]**	1.13 [1.10, 1.16]**	1.01 [1.00, 1.03]	1.01 [0.99, 1.03]
Female	1.02 [1.01, 1.03]**	1.02 [1.00, 1.03]*	1.01 [1.00, 1.03]	1.02 [1.01, 1.04]*	0.83 [0.65, 1.04]	0.87 [0.69, 1.10]
Education	0.97 [0.79, 1.20]	0.88 [0.71, 1.09]	0.83 [0.66, 1.04]	0.88 [0.70, 1.11]	1.01 [0.98, 1.04]	1.01 [0.98, 1.04]
Income		0.96 [0.94, 0.98]**	0.96 [0.94, 0.99]**	0.99 [0.96, 1.02]	1.06 [0.95, 1.18]	1.06 [0.95, 1.19]
Marital status		1.04 [0.94, 1.15]	1.05 [0.95, 1.16]	1.03 [0.93, 1.15]	0.80 [0.61, 1.05]	1.22 [0.87, 1.71]
Living arrangement			0.78 [0.60, 1.02]	0.78 [0.60, 1.01]	1.05 [0.99, 1.11]	1.04 [0.98, 1.10]
Number of children			1.05 [0.99, 1.10]	1.05 [0.99, 1.11]	0.99 [0.99, 1.07]	0.98 [0.91, 1.06]
Years in the United States			1.02 [0.95, 1.10]	0.99 [0.92, 1.07]	1.00 [0.99, 1.01]	1.00 [0.99, 1.01]
Years in the community				1.00 [0.99, 1.01]	1.00 [0.99, 1.01]	1.00 [0.99, 1.01]
Born in China				1.00 [0.98, 1.01]	1.00 [0.99, 1.01]	1.00 [0.99, 1.01]
Language preference				0.70 [0.47, 1.06]	0.72 [0.48, 1.10]	0.75 [0.49, 1.15]
Cognitive function				2.21 [1.52, 3.22]**	2.35 [1.61, 3.44]**	2.41 [1.65, 3.52]**
Physical function					0.97 [0.94, 0.99]**	0.97 [0.95, 0.99]*
Depressive symptoms					0.98 [0.93, 1.03]	0.98 [0.93, 1.03]
Social support					1.05 [1.03, 1.08]**	1.04 [1.02, 1.07]**
Neighborhood disorder	1.14 [1.11, 1.16]**	1.13 [1.11, 1.16]**	1.13 [1.11, 1.16]**	1.12 [1.10, 1.15]**	1.12 [1.09, 1.15]**	0.96 [0.94, 0.98]**

(continued)

Table 3. (continued)

Outcome: Self-neglect phenotypes	Self-neglect OR (95% CI)					
	Model A	Model B	Model C	Model D	Model E	Model F
Inadequate utilities						
Age	1.03 [1.01, 1.05]**	1.03 [1.01, 1.05]**	1.02 [0.99, 1.05]	1.04 [1.01, 1.06]*	1.04 [1.01, 1.07]*	1.03 [1.00, 1.07]*
Female	1.09 [0.75, 1.58]	0.99 [0.67, 1.46]	0.89 [0.59, 1.35]	0.93 [0.61, 1.42]	0.91 [0.59, 1.40]	0.96 [0.62, 1.49]
Education		0.97 [0.93, 1.01]	0.97 [0.93, 1.01]	0.98 [0.93, 1.03]	0.98 [0.93, 1.03]	0.98 [0.93, 1.04]
Income		0.92 [0.73, 1.15]	0.89 [0.70, 1.12]	0.95 [0.74, 1.21]	0.97 [0.76, 1.24]	0.97 [0.76, 1.24]
Marital status			0.90 [0.57, 1.44]	0.92 [0.57, 1.47]	0.90 [0.56, 1.47]	1.46 [0.79, 2.68]
Living arrangement			0.86 [0.77, 0.97]*	0.84 [0.74, 0.96]**	0.85 [0.75, 0.97]*	0.85 [0.75, 0.97]*
Number of children			0.99 [0.87, 1.13]	0.97 [0.85, 1.11]	0.98 [0.85, 1.13]	0.98 [0.85, 1.12]
Years in the United States				0.99 [0.97, 1.01]	0.98 [0.96, 1.01]	0.98 [0.96, 1.00]
Years in the community				0.99 [0.97, 1.01]	1.00 [0.97, 1.02]	1.00 [0.97, 1.02]
Born in China				1.04 [0.44, 2.47]	1.01 [0.42, 2.40]	1.06 [0.44, 2.54]
Language preference				1.51 [0.78, 2.91]	1.66 [0.86, 3.21]	1.73 [0.89, 3.33]
Cognitive function					1.02 [0.98, 1.07]	1.03 [0.98, 1.08]
Physical function					0.98 [0.89, 1.09]	0.97 [0.88, 1.08]
Depressive symptoms					1.06 [1.02, 1.10]**	1.05 [1.01, 1.09]*
Social support						0.95 [0.91, 0.99]**
Neighborhood disorder	1.11 [1.07, 1.15]**	1.11 [1.06, 1.15]**	1.10 [1.06, 1.15]**	1.10 [1.06, 1.15]**	1.10 [1.05, 1.15]**	1.10 [1.05, 1.15]**

Note. Model A: adjusted for age and gender; Model B: adjusted for Model A + education and income; Model C: adjusted for Model B + marital status, living arrangement, and number of children; Model D: adjusted for Model C + years in the United States, years in the community, born in China, and language preference; Model E: adjusted for Model D + cognitive function, physical function, and depressive symptoms; Model F: adjusted for Model E + social support and social engagement. OR = odds ratio; CI = confidence interval.

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

the significant association between neighborhood disorder and self-neglect as well. It requires future studies to elucidate the mechanism.

The present study has limitations. First, this study is cross-sectional. Future longitudinal studies are needed to validate the temporal associations. Second, the findings from this study may not be generalizable to other Chinese populations residing in other countries or regions due to different social and economic characteristics. Third, regarding the measurement of self-neglect, the data collected in this study was based on interviewers' observation. Some detailed information from participants' perceptions of personal and environmental hazards was not included. In future studies, some perceived measurements from participants should be considered and incorporated.

Despite these limitations, this study has notable strengths. The improved knowledge from this study provided new evidence of understanding the influences of neighborhood environmental disorder on self-neglect among the Chinese American older population. This study has important practical implications for researchers, social services agency, and policy makers. Based on the results of the present study, we recommend that future research should continue to investigate how neighborhood disorder might increase the risk of self-neglect. As place-based strategies to improve health have been considered by policy makers (Michael & Yen, 2014), these findings suggest that targeting at improving neighborhood disorder may be an effective approach for self-neglect prevention among the Chinese American older population. It would be helpful for policy makers to shape future strategies to reduce the onset of self-neglect.

Conclusion

In conclusion, this study expands our knowledge about understanding the direct association between neighborhood disorder and self-neglect in older Chinese Americans. Our findings indicate higher levels of neighborhood disorder were significantly associated greater risk of self-neglect across different severities and phenotypes in a community-dwelling older Chinese American population. Targeting at solving neighborhood disorder problems may have a great potential importance of preventing self-neglect among Chinese American older adults.

Declaration of Conflicting Interests

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