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Association Between Neighborhood Cohesion and Cancer Screening Utilization in Chinese American Older Adults

Ailian Hei[1] · Melissa A. Simon[2] · XinQi Dong[1,3]

Abstract
This study aims to examine the association between neighborhood cohesion and cancer screening utilization in a community-dwelling Chinese American older population. Data were drawn from the Population Study of Chinese Elderly including 3159 Chinese American older adults aged 60 and above in the greater Chicago area. Cancer screening utilization was assessed by asking whether participants had undergone colon, breast, cervical, or prostate cancer screening. Neighborhood cohesion was measured through six questions. Logistic regression analysis showed that greater neighborhood cohesion was associated with higher likelihood of utilizing a mammogram (OR 1.32, 95% CI 1.14–1.52), a Pap test (OR 1.22, 95% CI 1.06–1.41), but not of a blood stool test (OR 1.10, 95% CI 0.98–1.23), a colonoscopy (OR 1.05, 95% CI 0.94–1.17), and a PSA test (OR 1.13, 95% CI 0.95–1.34). This study suggests positive associations between neighborhood cohesion and breast and cervical cancer screening utilization among a Chinese American older population.

Keywords Neighborhood cohesion · Cancer screening · Association · Chinese American · Older adults

Introduction

Routine screenings for specific cancers such as for breast, colon, cervical, and prostate cancer have been recommended as important in reducing the burden of morbidity and mortality from cancers [1]. However, cancer screening services are underutilized among minority populations [2, 3]. Chinese community is the largest and rapidly aging Asian American minority subgroup. The underuse of cancer screening services among Chinese American older adults remains an issue [4]. Promoting cancer screening utilization warrants a comprehensive understanding of influential factors for cancer screening seeking behaviors within this specific population.

In the general population, low cancer screening utilization has been mainly linked with individual factors such as older age, low income, less educated, low health literacy, lack of health insurance, lack of social support, and culture-related health belief [5–8]. Furthermore, a few studies highlight the importance of neighborhood-level factors on cancer screening behaviors [9, 10]. Neighborhood features characterize the entire community contexts and impact the whole neighborhood. Neighborhood cohesion is a key indicator to assess positive neighborhood contexts and refers to degree of trust, solidarity, connectedness, shared values, and support between neighbors. Kim and Kawachi's study has shown that higher neighborhood cohesion is associated with increased use of mammograms and Pap tests in a nationally representative sample of American adults aged 50 years and over [11].

Theoretically, exploring the influences of neighborhood-level factors on individuals' health is informed by ecologic models. These models emphasize integrating and conceptualizing the environment amid other influences on health behaviors [12]. Neighborhood environments play important roles in a wide range of health behaviors, especially among older adults [13]. Neighborhood cohesion may increase a community's engagement for a common goal and better severing for health knowledge distribution and sharing among

✉ XinQi Dong
xinqi.dong@rutgers.edu

[1] The Chinese Health, Aging and Policy Program, Rush Institute for Healthy Aging, Rush University Medical Center, Chicago, IL, USA

[2] Department of Obstetrics and Gynecology, Northwestern University, Feinberg School of Medicine, Chicago, IL, USA

[3] Institute for Health, Health Care Policy and Aging Research, Rutgers University, The State University of New Jersey, New Brunswick, NJ, USA

neighbors. Previous studies have demonstrated that neighborhood cohesion is associated with positive healthy behaviors and outcomes such as health consciousness, information seeking, attitudes, preventive healthcare utilization, and low prevalence of chronic diseases in the general American population [14–16].

However, Chinese neighborhoods have unique characteristics from the general American population neighborhoods. Among the American population, it has been shown that neighborhood cohesion and disorder are negatively correlated [17]. By contrast, in Chinese immigrant ethnic enclaves in the greater Chicago area, neighborhood cohesion is not opposed to neighborhood disorder, which means neighborhoods with high cohesion may not necessarily be clean, organized, or safe [18]. Therefore, it is important to expand the understanding of how neighborhood cohesion may affect health behaviors among this specific immigrant population.

Despite few studies have identified neighborhood cohesion is associated with higher quality of life among Chinese American older adults [18], little is still known about the relationship between neighborhood cohesion and cancer screening utilization. Additionally, it is also unknown about whether neighborhood cohesion factors in differently with different cancer screening modalities among this cohort. To fill the gaps in knowledge, we hypothesized that a higher level of neighborhood cohesion could be associated with higher likelihood of utilizing breast, cervical, colorectal, and prostate cancer screening among the Chinese American older population. The purpose of this study was to examine the association between neighborhood cohesion and cancer screening utilization, thus provide insight into the ways in which neighborhood environments may shape cancer related behaviors among Chinese immigrant communities.

Methods

Study Setting and Participants

Data for this study was derived from the Population Study of Chinese Elderly (PINE), a cross-sectional epidemiological study of Chinese American older adults in the greater Chicago area. This study was conducted from 2011 to 2013. Older adults who aged 60 and over and self-identified as Chinese were eligible to participate in this study. Using community-based participatory research approach, with more than 20 social services agencies, community centers, health advocacy agencies, senior apartments, and social organizations serving as the basis of study recruitment sites, 3159 eligible participants agreed to participate in the study. Face-to-face interviews were performed 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 [19–21]. This study was approved by the Institutional Review Board of the Rush University Medical Center.

Measures

Cancer Screening Utilization

Cancer screening utilization was assessed by asking participants whether they had ever utilized a blood stool test and colonoscopy for colon cancer screening, a mammogram for breast cancer screening, a Pap test for cervical cancer screening, or a PSA test for prostate cancer screening. In this study, cancer screening utilization was categorized dichotomously as either "Yes" or "No".

Neighborhood Cohesion

Neighborhood cohesion was assessed using a six-item scale [18]. The six items addressed how often in the neighborhood participants see neighbors talking outside, taking care of each other, and watching out for each other; how many neighbors they know by names, how many neighbors they could have a talk at least once a week, and how many neighbors they could call on for assistance. 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. Standardized scores were calculated due to the different response scales. Higher scores indicated greater neighborhood cohesion. Reliability was assessed for neighborhood cohesion with Cronbach's alpha of 0.86. Using the tertile method, neighborhood cohesion levels were categorized into low, medium, and high level groups.

Covariates

The covariates were controlled in the regression analysis including age, gender, education, income, marital status, living arrangement (alone, with 1 person, with 2–3 persons, with ≥ 4 persons), number of children, years in the U.S., years in the community, country of origin, and language preference (Cantonese, Toisanese, Mandarin or English) and self-reported health status. Self-reported health status was measured by asking "In general, how would you rate your health?"

Statistical Analyses

Using descriptive statistics, we first compared the differences of prevalence of cancer screenings between participants reporting any and no cohesion. Multivariate logistic

regression analysis was used to examine the associations between neighborhood cohesion and cancer screening utilization. Model A was controlled for age and gender. Model B was additionally controlled 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 U.S., years in the community, country of origin and language preference were additionally controlled in model D. Finally, based on Model D, self-reported health status was controlled in Model E. In all the above models, the odds ratios (ORs) for cancer screening utilization 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

Of 3159 participants, the mean age was 72.8 (SD = 8.3) years old. 1833 (58%) participants were female and 1326 (42%) participants were male. About 85% had an annual income less than US$10,000. 27% had been in the U.S. for less than 10 years. 95% reported that they could not read or speak English [21]. Table 1 presents the prevalence of cancer screenings among older adults reporting any or no neighborhood cohesion. The data showed that Chinese older adults reporting any cohesion were significantly more likely to have undergone a blood stool test, a mammogram, and a PSA test than those reporting no cohesion, but not significantly to a colonoscopy and a Pap test.

Table 1 Cancer screening utilization by neighborhood cohesion

| | Neighborhood cohesion | | | |
	Any cohesion	No cohesion	χ^2	p value
Blood stool test				
Yes, n (%)	725 (25.2)	36 (14.9)	12.79	< 0.001
No, n (%)	2158 (74.8)	206 (85.1)		
Colonoscopy				
Yes, n (%)	825 (28.6)	67 (27.8)	0.07	0.79
No, n (%)	2057 (71.4)	174 (72.2)		
Mammogram				
Yes, n (%)	1010 (60.5)	63 (48.8)	6.79	0.01
No, n (%)	659 (39.5)	66 (51.2)		
Pap test				
Yes, n (%)	680 (40.7)	54 (41.5)	0.03	0.86
No, n (%)	989 (59.3)	76 (58.5)		
PSA test				
Yes, n (%)	327 (28.6)	20 (18.5)	4.99	0.03
No, n (%)	817 (71.4)	88 (81.5)		

Table 2 presents the associations between the continuous level of neighborhood cohesion and cancer screening utilization. After controlling for potential confounding factors, a higher level of neighborhood cohesion was significantly associated with a higher likelihood of utilizing a mammogram (OR 1.32; 95% CI 1.14–1.52), a Pap test (OR 1.22; 95% CI 1.06–1.41), but not significantly with a blood stool test (OR 1.10; 95% CI 0.98–1.23), a colonoscopy (OR 1.05; 95% CI 0.94–1.17), and a PSA test (OR 1.13; 95% CI 0.95–1.34).

Table 3 summaries the associations between the tertile levels of neighborhood cohesion and cancer screening utilization. In the fully controlled model (Model E), compared to those reporting low level of neighborhood cohesion, older adults reporting high level of cohesion were significantly more likely to have undergone a blood stool test (OR 1.30; 95% CI 1.05–1.61), a mammogram (OR 1.48; 95% CI 1.14–1.93), a Pap test (OR 1.37; 95% CI 1.05–1.78), but not significantly to a colonoscopy (OR 1.06; 95% CI 0.86–1.30). As for the PSA test, compared with those reporting low level of neighborhood cohesion, older adults reporting medium level of neighborhood cohesion were more likely to have undergone a PSA test (OR 1.60; 95% CI 1.14–2.24), those reporting high level of cohesion were not more likely to have undergone this screening (OR 1.38; 95% CI 0.98–1.95).

Discussion

Our study found that greater neighborhood cohesion was significantly associated with higher utilization of breast and cervical cancer screening among older Chinese women in the greater Chicago area. However, no significant associations were observed between neighborhood cohesion with prostate cancer and colon cancer screenings among this population.

Overall, the direction of our findings is consistent with previous studies that demonstrate a higher level of neighborhood cohesion is associated with positive healthy behaviors [10, 11, 14–16]. In particular, a prior study highlights the potential influences of neighborhood quality on cancer screening utilization in a cohort of women age 50 and older who self-reported White, Black/African American, or Hispanic heritage [10]. Another study demonstrated a positive association between neighborhood cohesion and mammogram and Pap test utilization in a nationally representative sample of American adults aged over 50 years [11]. Our results align with these studies and confirmed the cross-sectional positive associations between neighborhood cohesion and mammogram and Pap test utilization in a representative sample of Chinese American adults aged over 60 years.

In general, positive associations in this study between neighborhood cohesion and breast and cervical cancer

Table 2 Association between neighborhood cohesion (continuous) and cancer screening utilization

	OR(95% CI)				
	Model A	Model B	Model C	Model D	Model E
Outcome: blood stool test					
Age 72	1.01 (1.00–1.02)*	1.01 (1.00–1.02)*	1.01 (1.00–1.02)	1.01 (1.00–1.01)	1.00 (0.99–1.01)
Female	0.98 (0.83–1.15)	0.97 (0.81–1.15)	0.98 (0.82–1.17)	0.98 (0.81–1.18)	0.98 (0.81–1.18)
Education		1.00 (0.98–1.01)	1.00 (0.98–1.02)	1.01 (0.99–1.03)	1.01 (0.99–1.03)
Income		1.05 (0.97–1.12)	1.04 (0.97–1.12)	0.96 (0.89–1.04)	0.97 (0.90–1.05)
Marital status			1.04 (0.84–1.29)	1.05 (0.85–1.31)	1.05 (0.85–1.31)
Living arrangement			1.00 (0.95–1.05)	1.02 (0.97–1.07)	1.02 (0.97–1.07)
Number of children			1.08 (1.02–1.15)*	1.08 (1.01–1.15)*	1.08 (1.01–1.15)*
Years in the U.S				1.02 (1.01–1.03)***	1.02 (1.01–1.03)***
Years in the community				1.00 (0.99–1.01)	1.00 (0.99–1.01)
Born in China				0.91 (0.66–1.26)	0.91 (0.66–1.26)
Language preference				1.09 (0.98–1.22)	1.10 (0.85–1.42)
Self-reported health status					1.09 (0.98–1.21)
Neighborhood cohesion	**1.08 (0.97–1.20)**	**1.07 (0.96–1.20)**	**1.07 (0.96–1.20)**	**1.09 (0.98–1.22)**	**1.10 (0.98–1.23)**
Outcome: colonoscopy					
Age 72	1.01 (1.00–1.02)*	1.02 (1.01–1.03)***	1.01 (1.00–1.02)	1.00 (0.99–1.01)	1.00 (0.98–1.01)
Female	0.96 (0.82–1.13)	1.13 (0.96–1.34)	1.09 (0.91–1.30)	1.03 (0.86–1.24)	1.02 (0.85–1.22)
Education		1.07 (1.06–1.09)***	1.08 (1.06–1.10)***	1.06 (1.03–1.08)***	1.06 (1.04–1.08)***
Income		1.19 (1.11–1.28)***	1.18 (1.10–1.26)***	1.08 (1.00–1.16)	1.10 (1.01–1.18)*
Marital status			0.91 (0.74–1.12)	0.94 (0.76–1.16)	0.94 (0.76–1.16)
Living arrangement			0.93 (0.89–0.98)**	0.95 (0.90–1.00)	0.95 (0.90–1.00)
Number of children			1.03 (0.97–1.10)	1.04 (0.97–1.10)	1.04 (0.98–1.11)
Years in the U.S				1.02 (1.01–1.03)***	1.02 (1.01–1.03)***
Years in the community				1.00 (0.99–1.01)	1.00 (0.99–1.01)
Born in China				0.65 (0.48–0.89)**	0.64 (0.47–0.88)**
Language preference				0.62 (0.49–0.79)***	0.63 (0.49–0.80)***
Self-reported health status					1.28 (1.16–1.43)***
Neighborhood cohesion	**1.14 (1.03–1.26)****	**1.04 (0.94–1.16)**	**1.01 (0.91–1.13)**	**1.03 (0.93–1.15)**	**1.05 (0.94–1.17)**
Outcome: mammogram					
Age 72	0.96 (0.95–0.97)***	0.97 (0.96–0.98)***	0.96 (0.95–0.98)***	0.95 (0.93–0.96)***	0.95 (0.93–0.96)***
Education		1.09 (1.06–1.11)***	1.09 (1.06–1.11)***	1.06 (1.03–1.09)***	1.06 (1.04–1.09)***
Income		1.29 (1.14–1.46)***	1.27 (1.12–1.43)***	1.18 (1.03–1.35)*	1.19 (1.04–1.37)*
Marital status			0.87 (0.68–1.10)	0.89 (0.70–1.13)	0.89 (0.70–1.13)
Living arrangement			0.95 (0.90–1.00)	0.97 (0.91–1.03)	0.97 (0.91–1.03)
Number of children			1.00 (0.93–1.08)	1.01 (0.94–1.09)	1.02 (0.94–1.03)
Years in the U.S				1.03 (1.02–1.04)***	1.03 (1.02–1.04)***
Years in the community				0.99 (0.98–1.00)	0.99 (0.98–1.00)
Born in China				0.85 (0.54–1.33)	0.83 (0.53–1.30)
Language preference				0.54 (0.39–0.75)***	0.54 (0.39–0.76)***
Self-reported health status					1.15 (1.00–1.31)*
Neighborhood cohesion	**1.42 (1.25–1.63)*****	**1.31 (1.14–1.51)*****	**1.27 (1.10–1.47)*****	**1.30 (1.12–1.50)*****	**1.32 (1.14–1.52)*****
Outcome: pap test					
Age 72	0.94 (0.93–0.96)***	0.95 (0.94–0.96)***	0.95 (0.93–0.96)***	0.94 (0.92–0.95)***	0.93 (0.92–0.95)***
Education		1.10 (1.08–1.12)***	1.10 (1.07–1.12)***	1.07 (1.04–1.10)***	1.07 (1.04–1.10)***
Income		1.16 (1.05–1.29)**	1.17 (1.05–1.30)**	1.11 (0.99–1.24)	1.12 (1.00–1.25)
Marital status			0.81 (0.64–1.03)	0.83 (0.66–1.06)	0.83 (0.66–1.06)
Living arrangement			1.01 (0.95–1.07)	1.03 (0.97–1.09)	1.03 (0.97–1.09)
Number of children			0.94 (0.87–1.02)	0.96 (0.89–1.04)	0.97 (0.89–1.05)

Table 2 (continued)

	OR(95% CI)				
	Model A	Model B	Model C	Model D	Model E
Years in the U.S				1.02 (1.01–1.04)***	1.02 (1.01–1.04)***
Years in the community				0.99 (0.98–1.01)	1.00 (0.98–1.01)
Born in China				0.79 (0.52–1.19)	0.77 (0.51–1.17)
Language preference				0.53 (0.39–0.73)***	0.54 (0.39–0.74)***
Self-reported health status					1.12 (0.98–1.28)
Neighborhood cohesion	**1.31 (1.15–1.48)***	**1.18 (1.04–1.35)***	**1.19 (1.04–1.37)***	**1.21 (1.01–1.40)****	**1.22 (1.06–1.41)****
Outcome: PSA test					
Age 72	1.04 (1.02–1.05)***	1.04 (1.02–1.06)***	1.04 (1.02–1.06)***	1.02 (1.00–1.04)*	1.02 (1.00–1.04)*
Education		1.08 (1.05–1.11)***	1.07 (1.04–1.10)***	1.03 (0.99–1.07)	1.03 (1.00–1.07)
Income		1.13 (1.02–1.24)*	1.11 (1.01–1.23)*	1.01 (0.90–1.13)	1.03 (0.92–1.15)
Marital status			1.13 (0.73–1.75)	1.24 (0.79–1.94)	1.24 (0.79–1.96)
Living arrangement			0.87 (0.80–0.95)**	0.88 (0.81–0.97)**	0.89 (0.81–0.97)**
Number of children			0.92 (0.83–1.02)	0.94 (0.84–1.05)	0.94 (0.85–1.05)
Years in the U.S				1.02 (1.01–1.04)**	1.02 (1.00–1.03)*
Years in the community				1.00 (0.98–1.01)	1.00 (0.98–1.02)
Born in China				0.58 (0.35–0.96)*	0.59 (0.35–0.98)*
Language preference				0.43 (0.29–0.63)***	0.42 (0.29–0.62)***
Self-reported health status					1.24 (1.05–1.47)*
Neighborhood cohesion	**1.26 (1.08–1.49)***	**1.18 (1.04–1.35)***	**1.13 (0.96–1.34)**	**1.13 (0.95–1.34)**	**1.13 (0.95–1.34)**

Models A adjusted for age and gender. Model B adjusted for A + education and income. Model C adjusted for B + marital status, living arrangement and number of Children. Model D adjusted for C + years in the U.S., years in the community, born in China and language preference. Model E adjusted for D + self-reported health status

OR odds ratio, *95% CI* 95% confidence interval

Significance levels: *p < 0.05, **p < 0.01, ***p < 0.001

screenings among Chinese women could be explained by stronger community engagement and support under a cohesive neighborhood. High neighborhood cohesion may reflect high level of communities' capability of pursing a common goal, which allow for more available preventive care resources and better distribution and delivery of preventive care knowledge and services [14, 22]. In Chicago, Chinese women might be more likely to access to cancer screening services than Chinese men through the local Illinois Breast and Cervical Cancer Program (IBCCP) [23]. Furthermore, Chicago Chinatown as the largest Chinese community in the greater Chicago area has been long involved in improving the health of the Chinese residents which may also enhance the awareness and distribution of the cancer screenings [24].

However, in particular, we only observed the positive association between neighborhood cohesion with a mammogram or a Pap test, not with a blood stool test, a colonoscopy, or a PSA test in this study. The results were partly in line with the prior study, which reported similar observations in the general U.S. population [11]. Compared to the existing literature, our results may be explained by the following reasons. First, the five different screenings have different recommended screening ages and screening intervals. A

mammogram or a Pap test is commonly recommended to start at younger ages than other three screenings [1]. Therefore, older female adults may have more chances to receive a mammogram or a Pap test at relatively younger ages. Second, individuals may respond to neighborhood cohesion differently by gender. A prior study has found that men are more likely than women to report the lowest neighborhood cohesion among a large sample of American adults [25]. In our study, the potential gender differences in neighborhood cohesion levels may exist and may explain this lack of the association between neighborhood cohesion and PSA screening. Further analyses will be conducted in the future research. In addition, although the prior study indicates that women are more likely to utilize blood pressure check, cholesterol check and influenza vaccines than men in an American population [26], evidence is still required to fully understand the possible gender differences in cancer screenings among different populations.

Meanwhile, in order to evaluate the differences of odds ratios of cancer screenings in groups with different levels of neighborhood cohesion, we categorized the samples into low, medium, and high level groups by cohesion in this study. We found that, compared with those reporting low

Table 3 Association between neighborhood cohesion (tertiles) and cancer screening utilization

	OR (95% CI)				
	Model A	Model B	Model C	Model D	Model E
Outcome: blood stool test					
Neighborhood cohesion-low	1.00	1.00	1.00	1.00	1.00
Neighborhood cohesion-medium	1.22 (0.99–1.50)	1.22 (1.00–1.50)	1.23 (1.00–1.51)*	1.20 (0.97–1.48)	1.21 (0.98–1.49)
Neighborhood cohesion-high	1.28 (1.04–1.57)*	1.27 (1.03–1.56)*	1.28 (1.03–1.58)*	1.28 (1.04–1.60)*	1.30 (1.05–1.61)*
Outcome: colonoscopy					
Neighborhood cohesion-low	1.00	1.00	1.00	1.00	1.00
Neighborhood cohesion-medium	1.01 (0.83–1.23)	0.95 (0.78–1.16)	0.94 (0.76–1.15)	0.95 (0.77–1.16)	0.97 (0.79–1.19)
Neighborhood cohesion-high	1.26 (1.04–1.52)*	1.08 (0.88–1.32)	1.02 (0.83–1.25)	1.04 (0.84–1.27)	1.06 (0.86–1.30)
Outcome: mammogram					
Neighborhood cohesion-low	1.00	1.00	1.00	1.00	1.00
Neighborhood cohesion-medium	1.23 (0.97–1.56)	1.16 (0.91–1.48)	1.15 (0.90–1.47)	1.15 (0.90–1.48)	1.18 (0.91–1.51)
Neighborhood cohesion-high	1.78 (1.40–2.27)***	1.53 (1.19–1.96)***	1.43 (1.11–1.85)**	1.44 (1.11–1.88)**	1.48 (1.14–1.93)**
Outcome: pap test					
Neighborhood cohesion-low	1.00	1.00	1.00	1.00	1.00
Neighborhood cohesion-medium	1.16 (0.91–1.48)	1.10 (0.86–1.42)	1.12 (0.87–1.44)	1.14 (0.88–1.47)	1.15 (0.89–1.50)
Neighborhood cohesion-high	1.55 (1.22–1.97)***	1.32 (1.02–1.69)*	1.34 (1.03–1.74)*	1.35 (1.04–1.75)*	1.37 (1.05–1.78)*
Outcome: PSA test					
Neighborhood cohesion-low	1.00	1.00	1.00	1.00	1.00
Neighborhood cohesion-medium	1.58 (1.15–2.17)**	1.59 (1.15–2.21)**	1.49 (1.07–2.08)*	1.57 (1.12–2.21)**	1.60 (1.14–2.24)**
Neighborhood cohesion-high	1.70 (1.24–2.34)**	1.52 (1.10–2.11)*	1.40 (1.00–1.95)*	1.39 (0.99–1.95)	1.38 (0.98–1.95)

Models A adjusted for age and gender. Model B adjusted for A + education and income. Model C adjusted for B + marital status, living arrangement and number of Children. Model D adjusted for C + years in the U.S., years in the community, born in China and language preference. Model E adjusted for D + self-reported health status

OR odds ratio, *95% CI* 95% confidence interval

Significance levels: *p < 0.05, **p < 0.01, ***p < 0.001

neighborhood cohesion, older adults reporting high cohesion were more likely to have undergone a blood stool test, a mammogram and a Pap test, but not a colonoscopy and a PSA test. The results could be interpreted that older adults who reported high neighborhood cohesion were more likely to be driven by a desire to maintain a high quality of life and a good health status, thus more likely to seek health-related information and preventive tools including cancer screening resources [17, 19, 24]. Regarding the association between high neighborhood cohesion and a blood stool test utilization, the reason may be because that a blood stool test is more affordable than other screenings, and some home-based blood stool test kits are easy to use and prevalent among older adults especially among low socioeconomic status group [27]. Older adults reporting high neighborhood cohesion may be more likely to use these advantages to satisfy the desire to pursue a good health status.

Our study has a few limitations. First, our study was cross-sectional. Future longitudinal studies are needed to verify the temporary associations. Second, all the data in present study were self-reported, thus the possibility of bias could be introduced. Third, the findings from this study may not be generalizable to other Chinese populations residing other countries or regions due to different social and economic characteristics.

Despite these limitations, this study has important practical implications for researchers, health care providers, and policymakers. This analysis synthesized new evidence to present the positive association between neighborhood cohesion and cancer screening utilization among the Chinese American older population. An important area for future research will continue to verify the relationship in longitudinal studies and investigate if gender differences exist in neighborhood cohesion within this cohort. Since place-based strategies for health promotion have been considered by policymakers, increasing social connections among neighbors through community engagement such as community initiatives and neighborhood meetings can improve neighborhood cohesion [28–30]. Our findings in this study would support policymakers and community organizations for shaping future cancer screening promotion strategies through strengthening neighborhood cohesion approaches.

In conclusion, this study found that greater neighborhood cohesion was significantly associated with higher utilization

of breast and cervical cancer screening, but not significantly with the utilization of colon and prostate cancer screening among a community-dwelling Chinese American older population in the greater Chicago area. Findings from this study may inform the development of new strategies for promoting cancer screening utilization through enhancing neighborhood cohesion among this population.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no competing interests.

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