Community intervention to increase neighborhood social network among Japanese older adults

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(Citation)
Geriatrics & Gerontology International,18(3):462-469

(Issue Date)
2018-03

(Resource Type)
journal article

(Version)
Accepted Manuscript

Title: Community intervention to increase neighborhood social network among Japanese older adults.

Running head: Intervention to increase social network.

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Abstract

Aims: Strengthening neighborhood social networks are important to promoting health among older adults. However effective intervention strategies aimed at increasing older adults' social networks have not yet been established. This study examined whether a university-led community intervention that provided communication opportunities could increase older Japanese adults' neighborhood social networks.

Methods: The present study employed a quasi-experimental design. Before the intervention, using portal mail, we conducted a baseline questionnaire survey that was sent to all people living in the Tsurukabuto community aged 60 years or more (n = 1769), of whom 1068 responded. For the community intervention, 18 event-based programs were provided over the course of one year at Kobe University. Academic staff at Kobe University organized all the programs. During the program, social interactions among participants were promoted. A follow-up survey was distributed to those who responded to the baseline survey, and 710 individuals answered the question about their participation in the intervention programs (138 respondents were participants, 572 were non-participants). The neighborhood social network was measured in both the baseline and follow-up surveys.

Results: Analysis of covariance showed that the changes in neighborhood social network among participants in the program was significantly higher than the changes among non-participants ($p = 0.046$) after adjusting for the baseline score of social network.

Conclusions: This study found that participants of the intervention expanded their neighborhood social network, but non-participants did not. This finding indicates that community interventions using university resources could increase older adults' neighborhood social networks.

Key Words: Aged; Neighborhoods; Public Health; Social Network; Universities

Introduction

Limited social networks (a person's social relationships) are a risk factor for older adults' various health problems. Meta-analyses have shown that a lack of social relationships is a major risk factor for mortality,[1] contacts with friends are associated with higher subjective well-being,[2] poor social relationships are a risk factor for cognitive decline,[3] strokes, and coronary heart disease,[4] and frequent social contacts can reduce the risk of developing dementia.[5] Moreover, some studies have indicated that social networks with friends/neighbors have more influence on depressive symptoms than social networks with families,[6] basic and instrumental activities of daily living,[7] and mortality risks.[8] However, compared with family members, the frequency of contacts with friends decreases significantly with aging.[9] Thus, strengthening social networks with friends and neighbors is important for promoting health among older adults.

Nonetheless, effective interventions aimed at increasing older adults' social networks have not yet been established. Since older adults spend more time in their local communities, establishing community-based interventions targeting networks within a community are required. Previous studies aimed at increasing social networks in certain communities[10, 11] have targeted adults in general. Focusing on older populations, Coll-Planas et al.[12] showed that group-based support programs can significantly increase social networks with friends, and decrease loneliness among socially inactive older adults at baseline. Fujiwara et al.[13] also revealed that intergenerational volunteering programs gave older adults more frequent contact with young children and older friends. Although Kurechi et al.[14] provided health promotion programs to older adults living on an isolated island for five years, they failed to increase their social networking. Consequently, there is limited evidence of effective ways of increasing neighborhood social networking among older adults, and further study is needed.

Creating many opportunities to meet and talk with neighbors would be beneficial for

strengthening older adults' neighborhood social networks. For example in Japan, in 2014 the percentage of older Japanese adults who friendly interacted with their neighbors was 31.9%, which was a decrease from 47.6% in 2009.[15] Thus, many older adults would be losing opportunities to communicate with their neighbors, and neighborhood social networks could be strengthened by providing these opportunities. Universities could use their resources to provide these opportunities. The university includes academic staff in the fields of gerontology, social psychology, public health, and health promotion; their expertise is suitable for providing such opportunities. Furthermore, in Japan, the Ministry of Education, Culture, Sports, Science and Technology[16] expects universities to contribute proactively to local communities. Providing these opportunities would correspond to the Ministry's expectations.

The purpose of this study was to examine whether a university-led community intervention that provided communication opportunities could strengthen older Japanese adults' neighborhood social networks.

Methods

Participants and Procedures

The present study, called the "Tsurukabuto Active Aging Project," conducted an intervention in the Tsurukabuto community, Nada ward, Kobe city, Japan. There are about five thousand people in this community (0.6 km^2), about 130 thousand people in Nada ward (32.7 km^2), and about 1.5 million people in Kobe city (552.3 km^2). This community was developed as a new residential area from the 1960s to the 1970s, and most of the buildings were housing complexes. Those who were the first to live in this community are now older adults, and the population aging rate is 31%. The Graduate School of Human Development and Environment, Kobe University (all authors belong to this school), is located in the center of this community.

This project employed a quasi-experimental design. In November 2013, using postal mail, a baseline questionnaire was sent to all people in the Tsurukabuto community aged ≥ 60 years (n = 1769). Of these, 1068 (61.6%) returned the questionnaire. After a baseline survey, we launched a community intervention. A follow-up survey was distributed to respondents of the baseline survey in January 2015, by postal mail, and 768 (71.9%) surveys were returned. In the follow-up survey, respondents were asked to answer a question asking whether they had participated in any of the project's programs with "yes" or "no." Of the respondents, 710 answered this question, and 138 said "yes," and 572 chose "no." We therefore regarded 138 individuals as participants of the intervention (Figure 1).

The informed consent of all participants was obtained for this project. The Tsurukabuto Active Aging Project received prior approval from the Ethical Committee in the Graduate School of Human Development and Environment, Kobe University. All procedures were carried out in accordance with the Helsinki Declaration.

Community Intervention

Before developing intervention programs, we held three community meetings to identify the community's characteristics, and set the direction for this project. Residents, officers of Nada ward, and academic staff of Kobe University attended the meetings. As the results of community meetings, the importance of strengthening social networks in Tsurukabuto community were identified among the participants of the meetings.

Based on discussions during the meetings, this project offered eighteen event-based programs until December 2014. The topics and dates for each of the programs were as follows: opening ceremony (Sunday, November 17, 2013); health check-up and health goods event (Sunday, December 8, 2013); lecture about Higgs boson (Sunday, December 15, 2013); musical entertainment (Sunday, February 16, 2014); lecture on preventing grandparent scams (Sunday, March 2, 2014); lecture about sleep and health promotion (Sunday, March 16, 2014);

a gardening class (3 series: Saturday, May 24 to Saturday, July 5, 2014); a lecture about raising grandchildren (Sunday, May 25, 2014); a recreational exercise class (Sunday, June 22, 2014); an intergenerational recreational event (Sunday, June 29, 2014); a lecture about radio calisthenics (Sunday, July 6, 2014); a radio calisthenics event (Sunday, July 20, 2014); a recreational exercise class (Saturday, July 26, 2014); a lecture about walking and health (Sunday, August 3, 2014); a moon viewing academic festival (Monday, September 8, 2014); a gardening class (4 series: Saturday, September 27 to Saturday, December 13, 2014); a recreational exercise class (4 series: Saturday, October 11 to Saturday, November 15, 2014); and an emergency drill (Sunday, November 30, 2014).

Flyers advertising each program were posted to all houses in Tsurukabuto community. We also advertised each program via the residents' association, and the university's homepage. Kobe University staff members organized all the programs. Kobe University facilities were utilized as venues for the programs. We obtained external funds to coordinate the programs. Because we intended to accept as many participants as possible, any special inclusion/exclusion criteria of each program was not employed. In order to involve current workers, most programs were offered on weekends. Social interactions among participants were encouraged in various ways. For example, at the beginning of each program, we told participants that the main purpose of our programs was to increase social networks in the Tsurukabuto community and asked them to get to know one another. In most our programs, we asked participants to wear nametags, took long breaks, and used a face-to-face seating style. Furthermore, as far as possible, our programs included interactive activities such as group work, games, and discussions. A previous study[17] had confirmed that our program could increase communications among the participants.

The logic model of the intervention effects is presented in Appendix Figure 1. Our event-based programs intended to provide the opportunities to communicate with people in

the neighborhood. The present study expected that providing such opportunities would lead to the formation and strengthening of social relationships with neighbors, thereby increasing the neighborhood social network among the participants.

Measures

Neighborhood social network.

The neighborhood social network was measured using a single question in both the baseline and follow-up surveys. This question asked individuals to indicate the specific number of people in the Tsurukabuto community who could help each other if they were having problems. This single question was newly developed, based on a single scale[18] for social support network size. This scale[18] asks the number of all helpful people—including families and friends—and has been used in Japanese populations[19–21] to measure social networks. Because the present study focused on a neighborhood social network, a new item specific to social networks in a neighborhood was developed. This scale represents relatively strong social ties (c.f. weaker social ties represent the number of people one can talk to).

Demographic factors.

Demographic factors were measured in the baseline survey. They included gender (male, female), age, educational level (≤ high school, > high school), living alone (yes, no), current smoking status (yes, no), and declines in instrumental activities of daily living. Declines in instrumental activities of daily living were measured with a 5-item subscale of TMIG Index of Competence.[22] This index has sufficient reliability and validity.[23] The subscale consists of the following: 1) Can you use public transportation (bus or train) by yourself? 2) Are you able to shop for daily necessities? 3) Are you able to prepare meals by yourself? 4) Are you able to pay bills? and 5) Can you handle your own banking? The respondents answered each question with “yes” or “no.” Individuals who chose “no” for at least one item were regarded as having a decline in their instrumental activities of daily living,

and individuals who chose “yes” for all items were those without declines.

Reasons for non-participation in the intervention.

In the follow-up survey, non-participants of the intervention were asked to choose their reasons for non-participation from the following: 1) it was not of interest; 2) schedules did not match; 3) I was not able to go outdoors because of health problems; 4) I would feel lonely if I participated alone; 5) accessibility to the location was not good; 6) I was busy at work and/or in my household; 7) I did not have sufficient information; 8) reputations were not good; 9) other reasons; and 10) there were no specific reasons.

Participation times in the intervention programs.

In the follow-up survey, we listed all our 18 programs, and participants in the intervention programs were asked to provide their total participation times in the programs.

Analysis

To examine the associations between demographic factors and the baseline social network, multiple regression analysis was conducted using demographic factors as independent variables, and the baseline social network as a dependent variable. Next, a logistic regression analysis was performed to identify demographic predictors of participation in the intervention. Independent variables were demographic factors, and the dependent variable was participation in the intervention (non-participants = 0, participants = 1).

Because the present study was not a randomized controlled trial, propensity score matching was used to examine the effects of participation in the interventions on social networks. Using the logistic regression model, a propensity score was calculated from demographic factors. If the *P*-values for the relationships between demographic factors and participation in the program were higher than 0.5, the factors were excluded from the calculation of the propensity score. The nearest neighbor matching method (caliper width, 0.2 of the standard deviation of the logit of the propensity score[24]) was employed. The present

study matched 1-to-1: when there were 2 or more non-participants with the same propensity score, one individual was randomly selected. Then, a one-way analysis of covariance (ANCOVA) was conducted with changes in social network as the dependent variable. The baseline score of social networks was treated as a covariate because the baseline size of social networks could result in further expansion of the social networks.

The present study conducted sensitivity analyses among the participants in the intervention. Paired t-tests stratified by multiple participation in the program (once vs. twice or more) and the baseline social network (lower [< 3] vs. higher [≥3], split by the median) were investigated. Pearson's correlation coefficients between participation time, the baseline social network, and changes in social network were calculated. Then, to identify predictors of changes in neighborhood social networks, the present study also conducted multiple regression analyses among the participants. The dependent variable was changes in social network. Gender, education level, whether or not the participants were living alone, current working status, age, participation in programs, and the baseline value of neighborhood social networks were included as independent variables. The participation in programs and baseline value of neighborhood social networks variables were entered in two ways: as continuous variables (model 1) and as dichotomized variables (model 2). Decline in instrumental activities of daily living was excluded from the analysis because of the smaller sample size of the group in which members experienced such a decline.

Missing data in the dataset were treated using the pairwise deletion method. Statistical significance was set at $p < 0.05$. All statistical analyses were conducted using SPSS (version 21.0) software packages.

Results

Characteristics of Respondents

Table 1 summarizes the baseline characteristics of respondents. The mean age was 72.8 years, and 57.1% were women. The multiple regression analysis showed that no demographic factors were significantly associated with the neighborhood social network (Appendix Table 1).

Predictor of Participation in Intervention

The logistic regression analysis revealed that those who were currently employed and those who had had a decline in their instrumental activities of daily living were less likely to participate in the intervention (Table 2). Among non-participants, the most common reason for non-participation was, "schedules did not match" (38.4%), and the second most-common reason was, "I was busy for my work and/or household" (20.3%). For other reasons, 16.7% of non-participants indicated that, "I would feel lonely if I participated alone," 11.6% indicated that, "I was not able to go outdoors because of health problems," 8.9% indicated that, "it was not of interest," 1.0% indicated that, "accessibility to the place was not good," 5.6% indicated "other reasons," and 25.4% indicated that, "there were no specific reasons."

Effect of Participation in Intervention on Neighborhood Social Network

The propensity score was calculated using gender, current working status, decline in IADL, and age. Education level and whether or not the participants were living alone were excluded from the calculation of the propensity score because their *P*-values in table 3 were higher than 0.5. All the participants (n = 90) were successfully matched to non-participants (n = 90). The ANCOVA showed that the changes in neighborhood social network among participants in the program was significantly higher than the changes among non-participants ($p = 0.046$) after adjusting for the baseline score of social network (Figure 2).

Among the participants in the intervention programs, the average participation time was 3.9 times (standard deviation, 4.1: range, 1–18), and the average participation rate for each of the 18 programs was 17.2% (standard deviation, 7.5, range, 5.7–30.9). Stratified by

the multiple participation, the social network significantly increased among those who participated in the program twice or more (n = 56, meanΔ = 0.70, t = 2.04, p = 0.046), but not among those who participated in the program only once (n = 25, meanΔ = 0.00, t = 0.00, p = 0.999). Stratified by the baseline social network, a significant increase was observed in the social network of those with a lower social network at the baseline (n = 48, meanΔ = 0.50, t = 2.32, p = 0.025), but not among those with a higher social network at the baseline (n = 46, meanΔ = 0.63, t = 1.39, p = 0.173). Participation time (Pearson's r = 0.05, p = 0.650) and baseline social network (Pearson's r = 0.03, p = 0.804) were not significantly associated with changes in neighborhood social network. The multiple regression analyses in both models (Table 3) revealed that current workers significantly increased their social networks compared to current non-workers by participating in the intervention programs. Although the *P*-value did not reach a significant level (p=0.056 in model 1, p = 0.060 in model 2), men tended to increase their social networks more than women. While the number of participation time did not significantly predict changes in social network (model 1), multiple participation (twice or more) predicted the changes at marginal significant revel (p = 0.078). The baseline social network was not significantly associated with its changes in both models.

Discussions

The major finding of the present study was that participants of the intervention expanded their neighborhood social network, but non-participants did not. This indicates that community interventions using the resources of a university could strengthen older adults' neighborhood social networks. Numerous studies[1–8] have emphasized the importance of social networks for promoting the health of older adults. However, only a few[12–14] have tried to strengthen older adults' social networks in community settings. Their approaches (group-based support programs,[12] volunteer programs,[13] and health promotion programs[14]) are

considerably different from the present study (event-based program using the resources of a university). Thus, the present study demonstrated a new approach, and would contribute to establish effective intervention strategies and increase older adults' social networks. Moreover, Japanese universities are expected to play more predominant roles in supporting local communities,[16] and this study exemplifies how a university can contribute to local activities.

As for a potential mechanism, it can be speculated that the intervention would increase neighborhood social networks by providing opportunities to meet new people in neighborhoods. As explained in the methods section, in each program the present study facilitated social interactions among participants in various ways. A previous study[17] has revealed that the participants in our program can facilitate social interactions. According to national Japanese statistics[15], more than two thirds of older adults do not have close relationships with their neighbors. Thus, many older adults would not have sufficient opportunities to communicate with their neighbors, and the intervention would offset the lack of such opportunities. Especially, the present study found that current workers and men gained greater increases in social network than non-workers and women. Workers and men would have fewer opportunities to meet new people in their neighborhoods, and participation in the programs would provide remarkable and powerful opportunities especially for them to meet new neighbors. A dose-response relationship between participation time and increase in social network was not observed. However, multiple participation in programs was associated with the increase in the neighborhood social network among the participants with a marginal significance level of the regression. This result implies that participation in programs at least 2 times might be important to gain the benefits, but participation for many times may not necessarily lead to greater gains of the benefits. In other words, there is a possibility that the participants could gain the benefits even if they only participated in the program just a few times. Although the univariate analysis indicated the intervention effect would differ by the

level of the baseline social network, it was not supported by the multivariate analysis. Thus, the effects of the baseline social network on its further changes would be limited after adjusted for potential confounding factors.

This study revealed that employment negatively influences participation in interventions, and that the most common reasons for non-participation were a mismatch of schedules and busyness, though most programs were offered on weekends and older working adults could more significantly increase their social networks by participating in the programs than non-workers. The results imply that older working adults might not be attracted to the programs, and they might even be busy on weekends, and/or they might not have enough efforts to participate in the programs. The present study also found that those with declines in the instrumental activities of daily living were less likely to participate in the program. Greater efforts might be needed to for them to participate in the programs. On the other hand, gender was not a significant predictor of participation. In Japan, it is well known that older Japanese men are less likely to participate in community programs. For example, the Japan Ministry of Health, Labour and Welefare[25] estimated that women made up 80.3% of the participants in the community-based health promotion programs. The program in this study succeeded in recruiting both men and women, possibly because programs coordinated by a university would be attractive for both men and women.

Regarding the generalizability of the findings, although the program contents covered a wide variety of topics, there would be a sufficient number of knowledgeable academic staff to organize them in common universities. The present study assumed that any types of topics would be adaptable if older adults were interested in them and if the programs on the topics contained elements for facilitating social interactions. Thus, if there are enough funds to provide the program, similar intervention programs could be provided by other universities. Tsurukabuto is a typical community, mainly comprised of housing complexes

built in the 1960s and 1970s—the peak of building housing complexes in Japanese communities. Our findings might be generalizable to other such communities. However, their generalizability to other types of communities, such as more traditional communities or newly developed communities, is unsure.

The present study's strength is targeting all older people living in one community. However, the present study has some limitations. Firstly, this study measured participation in the intervention using self-reporting. Second, other aspects of the neighborhood social network (frequencies of contacts with neighbors and satisfaction with relationships with neighbors) were not measured. Third, although the response rate of the baseline survey (61.6%) was similar to rates in previous studies using the same methods and targeting older adults (e.g., 66% in Harada et al.[26]), those who did not feel close to the university would be less likely to respond to the questionnaire. Fourth, as a dose-response relationship between participation time and increase in social network was not revealed, the present study failed to clearly show how the programs increased social networks among participants. Thus, further studies should measure participation objectively, evaluate various aspects of the neighborhood social network, employ face-to-face surveys, and explain the mechanisms by which intervention effects are achieved. Despite its limitations, the present study contributes to the establishment of effective strategies for increasing social networks among older adults.

In conclusion, the present study found that, unlike non-participants, participants of the intervention significantly increased their neighborhood social network. This finding indicates that, using university resources, community interventions could strengthen neighborhood social networks among older adults. Further studies are warranted to identify more effective strategies for strengthening social networks.

Acknowledgments

This work was supported by a Grant-in-Aid for Scientific Research A (24240093), Japan Society for the Promotion of Science; a Grant-in-Aid for Scientific Research B (15KT0006), Japan Society for the Promotion of Science; a Grant from a Community Development Partnership between Kobe University and Nada ward, Kobe city; and Graduate School of Human Development and Environment Grant-in-Aid for Young Scientists, Kobe University.

Disclosure statement

There are no potential conflicts of interest to disclose.

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Table 1. Baseline characteristics of respondents

	N (%) † or mean (SD)‡
Gender, n (%)	
Male	291 (42.9)
Female	388 (57.1)
Educational level, n (%)	
≤ high school	373 (55.3)
> high school	302 (44.7)
Living alone, n (%)	
No	542 (79.5)
Yes	140 (20.5)
Current working status, n (%)	
No	512 (75.2)
Yes	169 (24.8)
Decline in IADLs,§ n (%)	
Not declined	596 (89.5)
Declined	70 (10.5)
Age, mean (SD) ¶	72.8 (7.3)
Neighborhood social network, mean (SD)	2.3 (2.7)

† Sample sizes vary because of missing values.

‡ Each value represents a number (%) or a mean (SD).

§ IADLs, instrumental activities of daily living

¶ SD, standard deviation

Table 2. Logistic regression analysis for predictors of participation in the programs†

	AOR‡ (95% CI)§	*P*-value
Gender		
Male	1.00	
Female	1.32 (0.85–2.06)	0.223
Educational level		
≤ high school	1.00	
> high school	1.02 (0.67–1.54)	0.942
Living alone		
No	1.00	
Yes	1.05 (0.64–1.73)	0.852
Current working status		
No	1.00	
Yes	0.57 (0.33–0.99)	0.047
Decline in IADLs¶		
Not declined	1.00	
Declined	0.17 (0.05–0.57)	0.004
Age	1.02 (0.99–1.05)	0.274

† The dependent variable was participation in the programs.

‡ AOR, adjusted odds ratio

§ 95% CI, 95% confidence interval

¶ IADLs, instrumental activities of daily living

Table 3. Multiple regression analysis of the predictors of increase in neighborhood social network among participants in the programs†

	Model 1		Model 2	
	Standardized β	*P*-value	Standardized β	*P*-value
Gender (female)	-0.26	0.056	-0.25	0.060
Educational level (> high school)	-0.18	0.158	-0.26	0.180
Living alone (yes)	-0.01	0.909	-0.07	0.545
Current working status (yes)	0.34	0.006	0.38	0.002
Age	0.04	0.730	0.05	0.662
Number of participation time (continuous variable)	0.04	0.754	—	
Multiple participation (twice or more)	—		2.03	0.078
Baseline data of the neighborhood social network (continuous variable)	-0.01	0.967	—	
Baseline data of the neighborhood social network (dichotomized by median: higher)	—		0.02	0.875

†The dependent variable was change in the neighborhood social network (follow-up - baseline).

Decline in instrumental activities of daily living was excluded from the analysis because of the smaller sample size of the group in which members experienced such a decline.

Figure legends

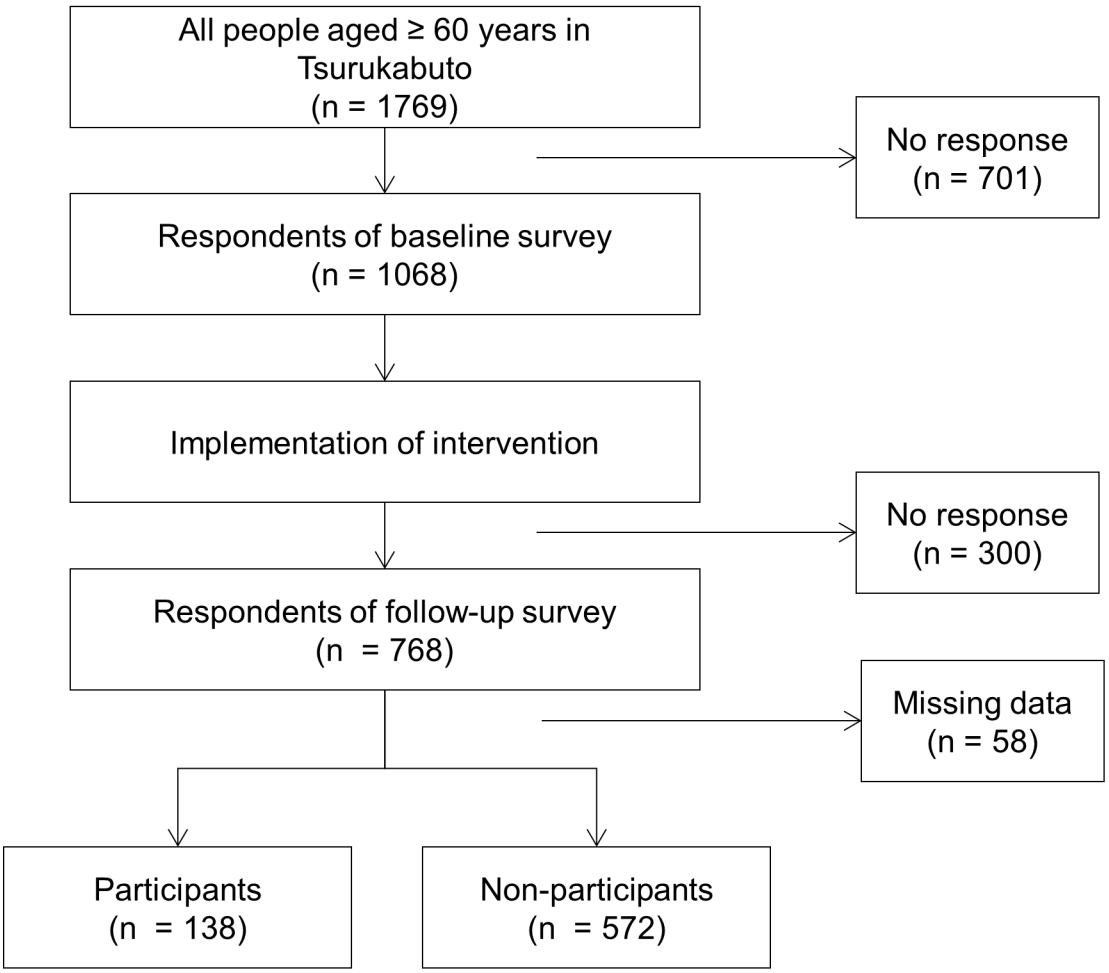
Figure 1. Flow diagram for the Tsurukabuto Active Aging Project.

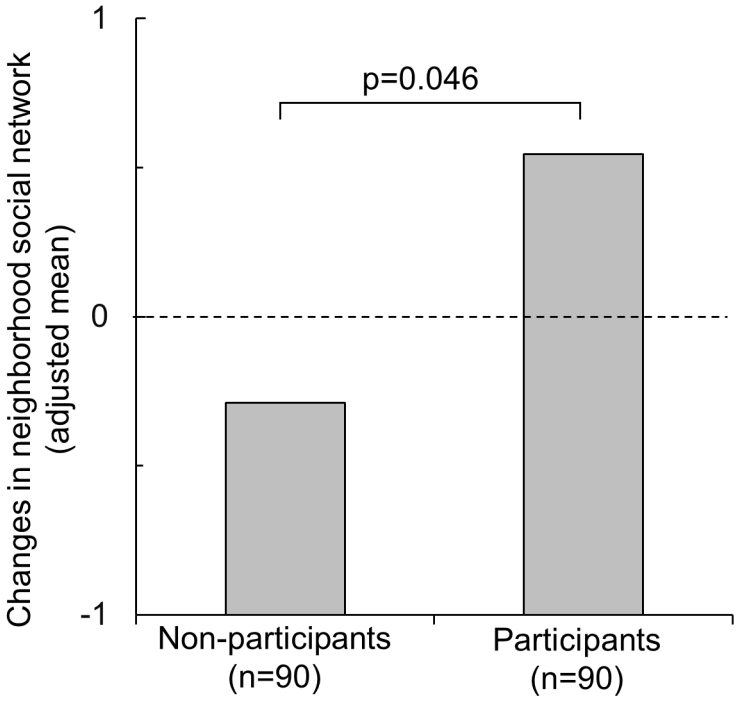
This project targeted all older people living in the Tsurukabuto community.

Figure 2. Effects of participation in the program on changes in the neighborhood's social network from baseline to follow-up.

Changes in social network were adjusted for baseline values.

Non-participants were selected by propensity score matching (1-to-1 pair). The propensity score was calculated by gender, current working status, decline in IADL, and age.

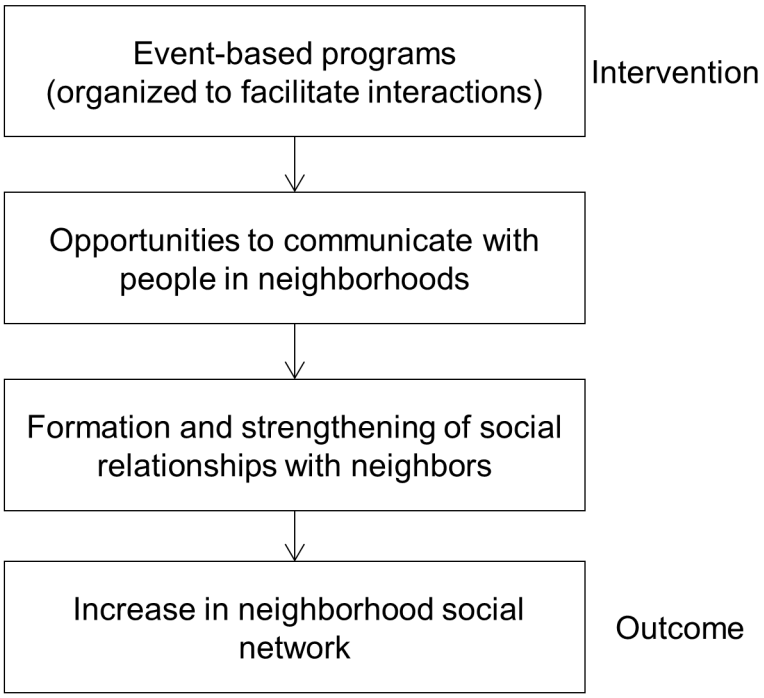

All people aged ≥ 60 years in Tsurukabuto
(n = 1769)
No response
(n = 701)
Respondents of baseline survey
(n = 1068)
Implementation of intervention
No response
(n = 300)
Respondents of follow-up survey
(n = 768)
Missing data
(n = 58)
Participants
(n = 138)
Non-participants
(n = 572)


1
0
-1
p=0.046
Changes in neighborhood social network
(adjusted mean)
Non-participants
(n=90)
Participants
(n=90)

Supporting Information

Appendix Figure 1. Logic model of the intervention effects on neighborhood social network.

Appendix Table 1. Multiple regression analysis of the associations between demographic factors and the neighborhood social network.


Event-based programs
(organized to facilitate interactions)
Intervention
Opportunities to communicate with
people in neighborhoods
Formation and strengthening of social
relationships with neighbors
Increase in neighborhood social
network
Outcome

Appendix Table 1. Multiple regression analysis of the associations between demographic factors and the neighborhood social network†

	Standardized β	*P*-value
Gender (female)	0.06	0.179
Educational level (> high school)	-0.07	0.147
Living alone (yes)	-0.05	0.284
Current working status (yes)	-0.02	0.722
Decline in IADLs‡ (yes)	-0.04	0.372
Age	0.01	0.917

† The dependent variable was the baseline data of the neighborhood social network.

‡ IADLs, instrumental activities of daily living