

ORIGINAL ARTICLE

EPIDEMIOLOGY CLINICAL PRACTICE AND HEALTH

Effect of participating in *Kayoi-no-ba* during the COVID-19 pandemic on frailty 1 year later in older adults

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Aim: This study examined the short-term effects of participation in *Kayoi-no-ba* – community gathering places for residents to contribute to care prevention with the support of volunteers in Japan – on frailty status during the coronavirus disease 2019 (COVID-19) pandemic, based on a 1-year longitudinal study of older adults.

Methods: Participants ($n = 3899$) were aged ≥ 65 years. At baseline, they were classified into four groups, based on their frequency of participation in *Kayoi-no-ba* before and after the COVID-19 pandemic: the nonparticipation group, the continued participation group, the interrupted participation group and the new participation group. Frailty status, assessed using the modified Kihon Checklist, was the dependent variable. A generalized linear mixed-effects model was used to compare frailty status changes after a 1-year follow up in the four groups.

Results: The frailty prevalence at baseline was 30.8% in the nonparticipation group, and 37.2% in the participation group. The frailty prevalence in the participation group was significantly reduced at the 1-year follow up (−3.9 percentage points [95% CI −7.4, −0.5]), compared with that of the nonparticipation group. In subgroup analyses, the frailty prevalence was reduced at the 1-year follow up in the order of continued participation group (−4.5 percentage points [95% CI −8.9, −0.2]), new participation group (−4.0 percentage points [95% CI −12.9, 5.0]), and interrupted participation group (−2.4 percentage points [95% CI −9.1, 4.3]), compared with the nonparticipation group ($P = 0.024$ for trend).

Conclusions: Even during the COVID-19 pandemic, participation in *Kayoi-no-ba* was effective in preventing/reducing frailty. Thus, avoiding prolonged nonparticipation in *Kayoi-no-ba* might be important. *Geriatr Gerontol Int* 2025; 25: 598–605.

Keywords: continued participation, COVID-19 pandemic, frailty prevention, *Kayoi-no-ba*.

Introduction

Frailty is a state of antagonistic vulnerability to stress due to a decline in physiological reserves associated with aging, and is a

precursor to the recognition of the need for long-term care.¹ Previous studies have estimated that 8.7%² to 11.3%³ of individuals aged ≥ 65 years in Japan are frail, and 40.8%² to 48.1%⁴ are pre-frail, which is the stage before frailty. In particular, the frailty

prevalence is expected to increase by approximately 1.3-fold over the next 20 years among individuals aged ≥ 75 years.⁵ Another characteristic of frailty is that appropriate interventions are expected to improve the frail population to a healthy state.^{1,6} Therefore, the prevention and improvement of frailty are important for extending the healthy life expectancy of older adults.

Kayoi-no-ba is community gathering places where older residents, with the help of volunteers, can engage in health-promoting activities, such as physical activities and cognitive exercises, to contribute to care prevention in Japan.^{7,8} In fact, evidence from Japan has shown that participation in *Kayoi-no-ba* is effective in preventing subsequent long-term frailty,⁹ reducing the risk of needing long-term care,¹⁰ and preventing cognitive decline.¹¹ For example, a longitudinal study of older adults in Yabu City (Hyogo Prefecture) reported that participants involved in *Kayoi-no-ba* had a significantly reduced 5-year frailty prevalence¹² and 6.8-year risk of disability,¹³ compared with the prevalence of the nonparticipants.

However, since December 2019, many community activities aimed at preventing frailty among older adults, including *Kayoi-no-ba*, have been forced to curtail or suspend their activities because of the coronavirus disease 2019 (COVID-19) pandemic.^{14,15} A previous study carried out in August 2020 that compared exercise duration and physical activity in older adults reported that both parameters decreased after the COVID-19 pandemic.¹⁶ Additionally, the more frail older adults were during the COVID-19 pandemic, the more they experienced a decline in physical function.¹⁷ Therefore, clarifying the association between changes in *Kayoi-no-ba* participation before and after the COVID-19 pandemic, and the subsequent health status of *Kayoi-no-ba* participants is important to prevent the subsequent disabilities.

A previous Japanese study,¹⁸ carried out in fall 2019 before the COVID-19 pandemic and fall 2020 after the pandemic, surveyed older adults who participated in *Kayoi-no-ba*, and reported changes in physical and mental functioning at both time points. Based on the findings of the aforementioned study, the number of participants in *Kayoi-no-ba* did not significantly decrease after the pandemic, and the frequency of participation did not change. Furthermore, even after the spread of the infection, the participants involved in *Kayoi-no-ba* did not experience a decline in physical and mental function, and the proportion of participants with frailty actually decreased. However, four emergency declarations owing to the COVID-19 pandemic were issued between spring 2020 and fall 2021, and, until fall 2022, new cases of COVID-19 were reported intermittently thereafter.¹⁹ During the prolonged COVID-19 pandemic, no subsequent studies were found that clarified the effect of participation in *Kayoi-no-ba* in a passive setting on the subsequent frailty status of older adults.

This study examined the short-term effects of participation in *Kayoi-no-ba* on frailty status in a 1-year longitudinal study of older adults living in a large city at two time points, fall of 2021 and fall of 2022, when the COVID-19 pandemic was going on.

Methods

Participants

This longitudinal study used survey data from 2021 to 2022. The participants were people aged ≥ 65 years living in Tokyo's Ward A. Individuals certified as having long-term care insurance were excluded. Figure 1 shows a flowchart of the selection of participants for the analysis. At baseline, 15 000 individuals were selected in September 2021 from the Basic Resident Registration System using a random sampling method, and a self-administered mail survey was carried out in October 2021. Among 8372

individuals who were capable of completing the survey, 5576 individuals were selected for analysis, after obtaining valid responses and written informed consent. A follow-up mail survey was carried out in November 2022, targeting 5395 persons who were eligible for analysis at the baseline survey. Individuals who had been transferred or who were certified as needing long-term care insurance were excluded. Among 4179 people who were able to retrieve the survey forms, 3899 individuals who provided valid responses were included in the analysis (Fig. 1). This study was approved by the Ethics Committee of Tokyo Metropolitan Institute for Geriatrics and Gerontology (Tokyo, Japan).

Outcome

The primary outcome was the frailty status. The modified Kihon Checklist (KCL), consisting of 25 questions, was used to determine frailty status. Each question item was answered as "yes" or "no," and a score of ≥ 8 was defined as "frailty."^{20,21}

Exposures

This study focused on the frequency of participation in *Kayoi-no-ba* before and after the COVID-19 pandemic at the time of the baseline survey. This variable was measured using the following question: "How often do you participate in *Kayoi-no-ba* for care prevention (e.g. gymnastics groups, salons)?" Participants answered about their frequency of participation in the past 12 months (i.e. October 2020 to September 2021) and for the year before the COVID-19 pandemic (i.e. 2019). Individuals who participated at least once a month were defined as "participating." Individuals who participated less than once a month were defined as "nonparticipating," and individuals who were nonparticipating both before and after the COVID-19 pandemic were defined as the "nonparticipation group" (NG). Individuals who continued to participate before and after the COVID-19 pandemic were classified as the "continued participation group" (CPG). Individuals who changed from participation to nonparticipation were classified as the interrupted participation group (IPG). Individuals who changed from nonparticipation to participation were classified as the "new participation group" (NPG).

Covariates

Covariates were collected on individual attributes, socioeconomic status and health status at baseline. Individual attributes included age, sex and living situation (e.g. living alone). Socioeconomic status included marital status (i.e. married, widowed, divorced or never married); education years (≥ 13 years), equivalent income (< 2.0 million yen, 2.0–3.99 million yen, ≥ 4.0 million yen, or unknown) and employment. Health status included alcohol drinking and smoking status (i.e. current, never or former); body mass index (< 18.5 kg/m², 18.5–24.9 kg/m² or ≥ 25 kg/m²); hypertension; heart disease; stroke; diabetes mellitus; cancer; arthritis; exercise habits (≥ 1 times/week); dietary variety score²²; going outdoors (≥ 1 times/day); participation in a volunteer group, sports group, hobby group, learning/culture group, senior citizen club and neighborhood group (≥ 1 times/week); World Health Organization-5 Well-being Index^{23,24}; and frailty status.

Statistical analysis

Descriptive statistics were used to characterize the participants. One-way analyses of variance or χ^2 -tests were used to compare characteristics between groups.

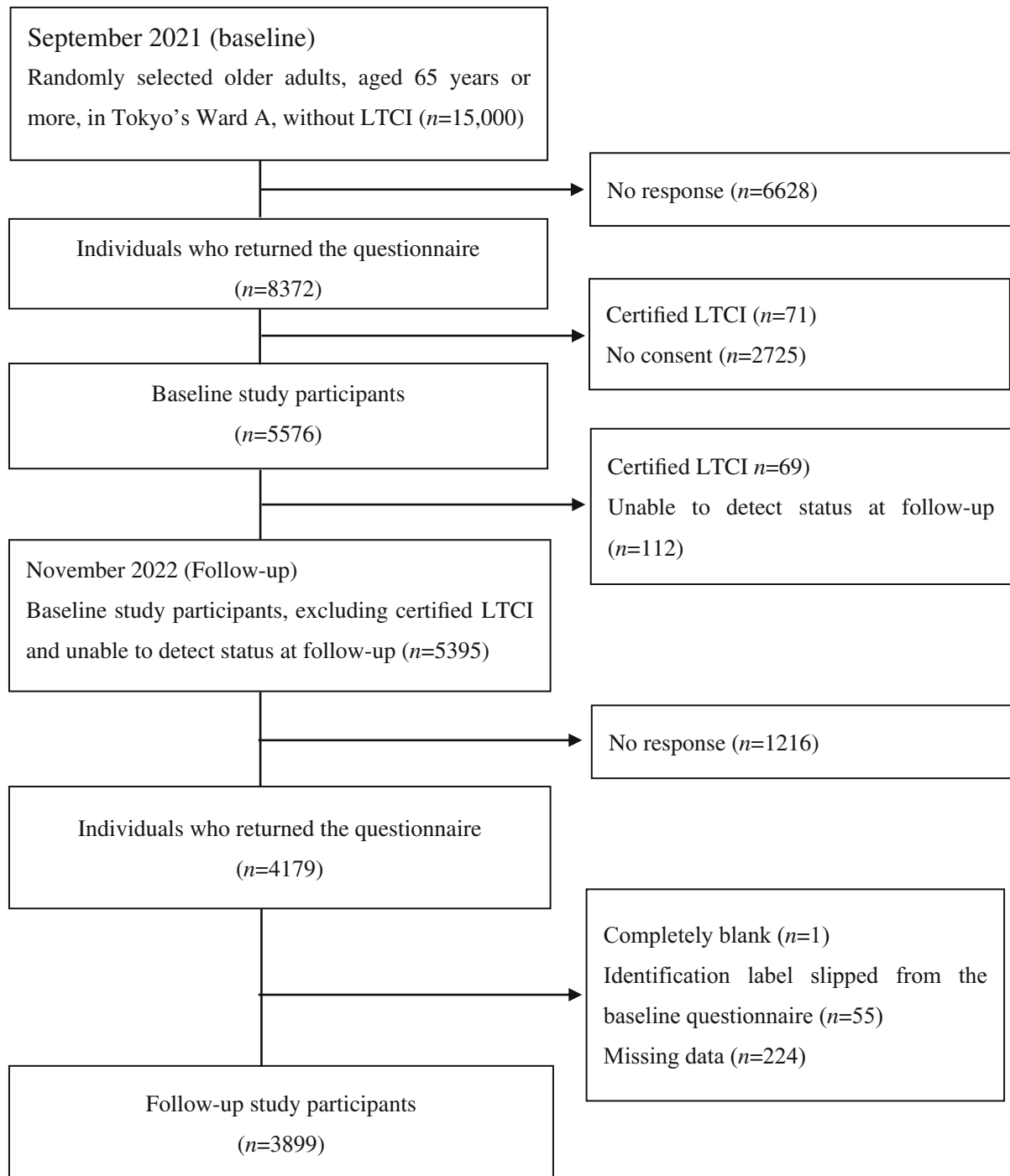


Figure 1 Participants flow chart for the analytic sample.

For the primary analyses, we used generalized linear mixed-effects models to compare changes in the frailty status between the nonparticipation and participation groups. Frailty was the dependent variable. Group (i.e. nonparticipation or participation), time (i.e. baseline and 1-year follow up) and their interactions were defined as the fixed factors, whereas individuals were defined as a random factor. Analyses were adjusted for baseline individual attributes, socioeconomic status and health status. The impact of participation on frailty and its 95% confidence interval (CI) were calculated as an estimate of multivariate-adjusted differences in change between groups.

For subgroup analysis, we used the generalized linear mixed-effects model to compare the IPG, NPG and CPG with the NG, in the same manner. An α of 0.05 showed a statistical significance. All statistical analyses were carried out by using Stata 18.0 (StataCorp, College Station, TX, USA).

Results

The number of participants at baseline was 296 (7.6%), of whom 69 (23.3%) participants were in the IPG; 38 (12.8%) participants

in the NPG and 189 (63.9%) participants in the CPG. The frailty prevalence at baseline was 30.8% in the NG group, and 37.2% in the participation groups (40.6%, 34.2% and 36.5% in the IPG, NPG and CPG, respectively).

Table 1 shows the baseline characteristics of the study population. Compared with the NG, the CPG had a significantly older age, and higher proportions of women, single residents and individuals with an exercise habit. Furthermore, the proportion of respondents who participated in volunteer groups, sports groups, hobby groups, learning/culture groups, senior citizen clubs and neighborhood groups as social activities, other than *Kayoi-no-ba*, was significantly higher than that of the NG. However, the proportions of married couples, individuals with equivalent incomes of ≥ 4 million yen, individuals who were employed, and individuals who drank and smoked were significantly lower.

Table 2 shows the multivariate-adjusted change in frailty status and the KCL score from the baseline to the 1-year follow up. In the primary analyses, the frailty prevalence in the participation group was significantly reduced at the 1-year follow up (-3.9 percentage points [95% CI $-7.4, -0.5$]), compared with that of the NG. In subgroup analyses, the frailty prevalence was significantly reduced at the 1-year follow up in the order of CPG (-4.5 percentage points [95% CI $-8.9, -0.2$]), NPG (-4.0 percentage points [95% CI $-12.9, 5.0$]) and IPG (-2.4 percentage points [95% CI $-9.1, 4.3$]), compared with the NG ($P = 0.024$ for trend).

Discussion

To our knowledge, this study is the first to examine participation in *Kayoi-no-ba* during the COVID-19 pandemic, and its impact on frailty over a 1-year period. This study's findings revealed that, compared with nonparticipants, individuals who participated in *Kayoi-no-ba* for 1 year during the COVID-19 pandemic had a reduced rate of frailty. The amount of change in the percentage points of the frailty prevalence tended to be larger for the CPG, NPG and IPG, in that order. These findings add new knowledge to the literature, showing that long-term participation in *Kayoi-no-ba* is effective in reducing the prevalence risk of frailty.^{9,12} Our study provides evidence that older adults participating in *Kayoi-no-ba* is effective in preventing and improving frailty, and might have an important role, even for a period as short as 1 year.

The baseline survey results showed that, in the fall of 2020, $>80\%$ of older adults were exercising at least once a week, and approximately 40% were getting out of the house at least once a day. Although older adults refrained from contact with others and social activities during the early stages of the COVID-19 pandemic,¹⁶ the results of this study were consistent with those of a previous study²⁵ showing a recovery in physical activity among older adults in Japan since the first wave of the COVID-19 pandemic. Even during the COVID-19 pandemic, many older adults engaged in voluntary exercises and social activities. However, what is unique about this study is that it showed differences in the percentage of frailty, depending on whether people did or did not participate in *Kayoi-no-ba*, even after adjusting for socioeconomic factors,^{26,27} employment status,²⁸ and type and number of social participation activities,^{29,30} which have been associated with the risk of needing long-term care, besides exercise habits and frequency of outings. *Kayoi-no-ba* primarily offers exercises and physical activities, and encourages direct interaction among participants.⁸ Previous studies have reported improvements in physical indicators in older adults after 12 months or more of continuous participation in exercise groups,³¹ and that face-to-face interactions help maintain mental health in older adults.³² The

results of this study suggested that participation in *Kayoi-no-ba*, even for a period as short as 1 year, might have contributed to the maintenance and improvement of motor function in older adults, and to the reduction of anxiety and depression.

Another unique feature of this study was that the percentage of frailty at baseline was higher in the participating group (37.2%) than in the nonparticipating group (30.8%). The frailty prevalence has been reported to increase with age³³ and sex.³⁴ Participation in *Kayoi-no-ba* was actively promoted among residents in District A; the large number of older women among the participants might be reflected in the high frailty rate (Table 1). Note that the frailty prevalence at baseline was higher than that reported^{2,3} before the COVID-19 pandemic in both the participating and nonparticipating groups. This finding is presumably related to differences in the COVID-19 pandemic³⁵ and the frailty status assessment criteria. Although the KCL used in this study to determine frailty status has been validated for predictive validity,²¹ it differs from the assessment criteria used in previous studies,^{2,3} and many items that might have been more constrained by the COVID-19 pandemic than in normal times (e.g. Do you go out by bus or train by yourself? Do you sometimes visit your friends?). The Kaigo-Yobo Checklist is an index of frailty with modifiable items similar to the KCL. A Japanese study²⁹ using the Kaigo-Yobo Checklist in 3769 community-dwelling people, aged ≥ 65 years, reported that 30.1% of them were frail. Thus, this finding suggested that the assessment of frailty depends on the timing of the measurement and the variability in the measurement method.

The subgroup analysis showed that a reduction in the proportion of frailty cases tended to be greater for the CPG, the NPG and the IPG, in that order, although the difference was not significant. This result might be explained by differences in the effects associated with the amount of physical activity. A prospective cohort study³⁶ that followed older adults in the UK every 4 years for 8 years examined the association between starting or stopping physical activity (at least once a week) in old age and subsequent healthy aging. In the aforementioned study, participants who remained physically active were 7.7-fold more likely to achieve healthy aging, participants who started physical activity midway through the study were 3.4-times more likely to achieve healthy aging, and participants who stopped physical activity midway through the study were 2.4-fold more likely to achieve healthy aging than were participants who had no exercise habits during the follow-up period. This study did not consider the participation status of the *Kayoi-no-ba* participation group from 2021 to 2022. However, differences in the reduction of frailty rates between subgroups were similar to those associated with initiation or cessation of physical activity and subsequent healthy aging. Given that participation in *Kayoi-no-ba* involves physical activity, it is possible that differences in the amount of physical activity occurred between subgroups depending on their participation in *Kayoi-no-ba* in 2021, and that this was reflected in the frailty prevalence 1 year later.

This study analyzed the short-term effects of participating in *Kayoi-no-ba* during the COVID-19 pandemic on the frailty status of each subgroup. This strength in this study allowed us to show differences in participation and nonparticipation in *Kayoi-no-ba*, and the association between the IPG and the NPG and changes in frailty rates. As frailty status improves, the risk of mortality decreases in frailty older adults.³⁷ Aside from COVID-19, there will likely be situations in the future where people will be forced to suspend or refrain from participating in *Kayoi-no-ba* as a countermeasure against influenza and other infectious diseases. Furthermore, older adults often face the possibility of having to

Table 1 Baseline characteristics of the study population, by *Kayoi-no-ba* participation status

Variable	Category	Nonparticipation group (<i>n</i> = 3603)	Participation group (<i>n</i> = 296)			<i>P</i> -value
			Interrupted participation (<i>n</i> = 69)	New participation (<i>n</i> = 38)	Continued participation (<i>n</i> = 189)	
Age, mean (SD)	Years	74.2 (6.6)	77.7 (5.5)	78.6 (7.1)	79.1 (5.8)	0.023
Sex, <i>n</i> (%)	Women	1767 (49.0)	55 (79.7)	25 (65.8)	134 (70.9)	<0.001
Living situation, <i>n</i> (%)	Living alone	1004 (27.9)	27 (39.1)	17 (44.7)	70 (37.0)	<0.001
Marital status, <i>n</i> (%)	Married	2214 (61.5)	30 (43.5)	14 (36.8)	84 (44.4)	<0.001
	Widowed or divorced	944 (26.2)	31 (44.9)	19 (50.0)	91 (48.2)	
	Never married	435 (12.1)	8 (11.6)	5 (13.2)	14 (7.4)	
Education year, <i>n</i> (%)	≥13 years	1993 (55.3)	33 (47.8)	15 (39.5)	91 (48.2)	0.080
Equivalent income, <i>n</i> (%)	<2.0 million yen	365 (10.1)	4 (5.8)	1 (2.6)	21 (11.1)	0.009
	2.0–3.99 million yen	1909 (53.0)	30 (43.5)	21 (55.3)	98 (51.9)	
	≥4.0 million yen	612 (17.0)	15 (21.7)	3 (7.9)	20 (10.6)	
	Unknown	717 (19.9)	20 (29.0)	13 (34.2)	50 (26.5)	
Employment, <i>n</i> (%)	≥1 times/week	1139 (31.6)	11 (15.9)	7 (18.4)	29 (15.4)	<0.001
Alcohol drinking status, <i>n</i> (%)	Current	1940 (53.8)	27 (39.1)	21 (55.3)	80 (42.3)	0.001
Smoking status, <i>n</i> (%)	Current	434 (12.1)	1 (1.5)	3 (7.9)	8 (4.2)	<0.001
Body mass index, mean (SD)	kg/m ²	23.0 (3.4)	22.2 (3.1)	22.3 (3.3)	22.9 (3.2)	0.414
	<18.5 kg/m ²	272 (7.6)	6 (8.7)	4 (10.5)	14 (7.4)	
	18.5–24.9 kg/m ²	2484 (69.0)	53 (76.8)	27 (71.1)	126 (66.7)	
	≥25 kg/m ²	847 (23.5)	10 (14.5)	7 (18.4)	49 (25.9)	
Hypertension, <i>n</i> (%)	Presence	1484 (41.2)	25 (36.2)	17 (44.7)	74 (39.2)	0.841
Heart disease, <i>n</i> (%)	Presence	384 (10.7)	5 (7.3)	8 (21.1)	20 (10.6)	0.373
Stroke, <i>n</i> (%)	Presence	80 (2.2)	0 (0)	0 (0)	10 (5.3)	0.078
Diabetes mellitus, <i>n</i> (%)	Presence	510 (14.2)	10 (14.5)	3 (7.9)	25 (13.2)	0.821
Cancer, <i>n</i> (%)	Presence	152 (4.2)	2 (2.9)	0 (0)	11 (5.8)	0.607
Arthritis, <i>n</i> (%)	Presence	428 (11.9)	13 (18.8)	10 (26.3)	48 (25.4)	<0.001
Exercise habit, <i>n</i> (%)	≥1 times/week	3044 (84.5)	66 (95.7)	35 (92.1)	182 (96.3)	<0.001
Dietary Variety Score	Points (0–10)	3.6 (2.4)	4.5 (2.7)	3.9 (2.2)	4.6 (2.6)	0.255
Going outdoors, <i>n</i> (%)	≥1 times/day	1636 (45.4)	26 (36.2)	14 (36.8)	92 (48.7)	0.234
Volunteer group participation, <i>n</i> (%)	≥1 times/month	169 (4.7)	7 (10.1)	6 (15.8)	48 (25.4)	<0.001
Sports group participation, <i>n</i> (%)	≥1 times/month	692 (19.2)	19 (27.5)	16 (42.1)	102 (54.0)	<0.001
Hobby group participation, <i>n</i> (%)	≥1 times/month	665 (18.5)	22 (31.9)	17 (44.7)	93 (49.2)	<0.001
Learning/culture group participation, <i>n</i> (%)	≥1 times/month	178 (4.9)	6 (8.7)	8 (21.1)	34 (18.0)	<0.001
Senior citizen club participation, <i>n</i> (%)	≥1 times/month	30 (0.8)	1 (1.5)	4 (10.5)	29 (15.3)	<0.001
Neighborhood group participation, <i>n</i> (%)	≥1 times/month	141 (3.9)	3 (4.4)	7 (18.4)	26 (13.8)	<0.001
WHO-5 well-being index, mean (SD)	Points (0–25)	14.8 (5.3)	15.1 (5.1)	15.3 (5.0)	15.9 (4.9)	0.315
Frailty, <i>n</i> (%)	Presence	1109 (30.8)	28 (40.6)	13 (34.2)	69 (36.5)	0.124

SD, standard deviation; WHO, World Health Organization.

interrupt their participation in *Kayoi-no-ba* for a period of time due to personal health issues, such as unexpected hospitalization or

family problems. Although the results of this study showed that short-term interruptions in participation did not significantly

Table 2 Change in frailty status from baseline to 1-year follow-up

	Nonparticipation group		Participation group			Adjusted change difference (group by time interaction term)	
	<i>n</i>	Adjusted change (95% CI)	Subgroups	<i>n</i>	Adjusted change (95% CI)	B (95% CI)	<i>P</i> -value
Dichotomous variable							
Frailty (percentage points)	3603	0.3 (−0.7, 1.3)	All	296	−3.8 (−7.3, −0.4)	−3.9 (−7.4, −0.5)	0.026
			Interrupted participation	69	−3.8 (−11.1, 3.5)	−2.4 (−9.1, 4.3)	0.477
			New participation	38	−3.6 (−11.4, 4.3)	−4.0 (−12.9, 5.0)	0.385
			Continued participation	189	−4.3 (−8.9, 0.2)	−4.5 (−8.9, −0.2)	0.042
Continuous variable							
Mean Kihon Checklist score (0–25)	3603	−0.08 (−0.15, −0.01)	All	296	−0.20 (−0.44, 0.04)	−0.11 (−0.35, 0.13)	0.357
			Interrupted participation	69	−0.06 (−0.48, 0.36)	0.00 (−0.46, 0.46)	1.000
			New participation	38	−0.82 (−1.69, 0.04)	−0.75 (−1.36, −0.13)	0.017
			Continued participation	189	−0.10 (−0.40, 0.20)	−0.01 (−0.31, 0.29)	0.936

Baseline age; sex; living situation; marital status; education years; equivalent income; employment; alcohol drinking and smoking status; body mass index; hypertension; heart disease; stroke; diabetes mellitus; cancer; arthritis; exercise habits; dietary variety score; going outdoors; participation in volunteer group, sports group, hobby group, learning/culture group, senior citizen club and neighborhood group; World Health Organization-5 Well-Being Index; and frailty were adjusted as fixed factors, and the individuals were defined as a random factor. An adjusted change difference (B) indicates the difference in percentage points between groups (participation-nonparticipation). An adjusted change difference (B) lower than zero signifies that the participation had a positive effect (favorable) for frailty, compared with the nonparticipation. Baseline age; sex; living situation; marital status; education years; equivalent income; employment; alcohol drinking and smoking status; body mass index; hypertension; heart disease; stroke; diabetes mellitus; cancer; arthritis; exercise habits; dietary variety score; going outdoors; participation in volunteer group, sports group, hobby group, learning/culture group, senior citizen club and neighborhood group; World Health Organization-5 Well-Being Index; and frailty were adjusted as fixed factors, and the individuals were defined as a random factor. CI, confidence interval.

change frailty rates, prolonged interruptions and non-participation must be avoided. Communities and volunteers need to consider support measures to encourage the resumption of activities and re-engagement in these settings to maintain or improve the frail status of these interrupted and non-participating individuals.

However, this study had several limitations. First, selection bias is a concern. This study was carried out in one municipality in an urban area of Japan. We consider that there are no significant regional differences in the participation rates in *Kayoi-no-ba* within Ward A. In contrast, concerns have been raised that COVID-19 might increase the risk of severe illness, especially among older adults and those with underlying medical conditions,³⁸ and older adults have been identified who refrain from contact with others and social activities for extended periods of time.¹⁵ Previous studies³⁵ reported that COVID-19 pandemic-related withdrawal from social activities might lead to an increase in frailty. However, because this study was carried out in an urban area, the impact of behavioral restrictions on frailty due to the COVID-19 pandemic might differ from that in rural areas, and it is not known whether similar results can be obtained in rural areas. Therefore, further studies are required to carefully examine the participation and frailty of the *Kayoi-no-ba* population, including different regions and situations of refraining from going out, during the COVID-19 pandemic. Second, this study found no reason for IPGs and NGs to suspend or refrain from participating in *Kayoi-no-ba*. Therefore, IPGs and NGs had reasons related to the COVID-19 pandemic (e.g. *Kayoi-no-ba* suspension,³⁹ refraining from going out to

prevent infection,¹⁵ opposition to participation from family and friends) and other reasons (e.g. relationship difficulties and aging,⁴⁰ hospitalization and care for the patient and family⁴¹), but we could not detect the difference between them. If the reasons for participation interruption or self-restraint are clarified, supporters might be able to consider more effective approaches according to the details.^{25,42} Third, regarding the frequency of *Kayoi-no-ba* participation before and after the COVID-19 pandemic, this study covered the past year and the year 2019 during the baseline survey in October 2021; therefore, participation from January to September 2020 is unknown. NG might have included individuals who participated in *Kayoi-no-ba* during this period and subsequently discontinued participation due to the COVID-19 pandemic. In addition, the *Kayoi-no-ba* participation status was obtained by recalling the situation at a certain time in the past, and did not include the participation status at the follow-up time points. Therefore, the results of this study should be re-evaluated after a detailed examination of the changes over time, such as considering whether the participants participated in the study at three or more time points, besides specifically identifying at what time they participated before and after the COVID-19 pandemic.

Conclusion

Even during the COVID-19 pandemic, the frailty prevalence at 1 year was significantly lower in the group that participated in

Kayoi-no-ba than in the nonparticipating group. The amount of change was larger in the CPG, the NPG and the IPG. In other words, it is important to note that differences in the frequency of participation in *Kayoi-no-ba* are associated with changes in the frailty prevalence at 1 year. Therefore, the importance of avoiding prolonged nonparticipation or interruptions as a public health approach for participants in *Kayoi-no-ba* is suggested.

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Disclosure statement

The authors declare no conflict of interest.

Author contributions

HM designed the study. SS and YY supervised the data collection, and SS carried out the data analysis. MY, YN and TU assisted the data collection. AK, SH, MY, KK, HA, HU, EK and YF supervised all the aspects of the study. HM and SS conceived the study and wrote the manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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