

# Poor Health Behaviors among Housebound Japanese Community-Dwelling Older Adults Due to Prolonged Self-Restraint during the First COVID-19 Pandemic: A Cross-Sectional Survey

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## Abstract

**BACKGROUND:** Prolonged self-restraining behaviors induced by the coronavirus disease 2019 (COVID-19) pandemic's containment measures can limit various positive health behaviors.

**OBJECTIVE:** We examined the decline in going-out and certain other positive health behaviors and investigated the relationship between excessive decreases in going-out frequency and declining engagement in positive health behaviors among community-dwelling older adults during the self-restraint period.

**DESIGN:** This study employed a cross-sectional survey design.

**SETTING:** This study was conducted in Nishi Tokyo City, Tokyo, Japan.

**PARTICIPANTS:** The participants were 294 respondents (150 women) aged 50 years and older who lived in public housing that were permitted to be surveyed during the self-restraint period.

**MEASUREMENTS:** Their pre-pandemic going-out frequency around February 2020 and going-out frequency during the self-restraint period starting in April 2020 were reported. We mainly assessed the existence of home health behaviors (i.e., exercise, in-person and phone conversations, and healthy diet). A self-report questionnaire was used to obtain data.

**RESULTS:** Going-out frequency decreased in 41.2% of the 294 respondents owing to the government's request for self-restraint. In total, 13 individuals had been going out less than one time per week (housebound) before the request. Of the 281 people who were not housebound before the government's self-restraint request, 13.9% were newly housebound. Newly housebound individuals were 5.3 times less likely to exercise, had 2.1 times fewer social contacts, and 2.6 times less balanced or healthy diets than those who maintained their frequency of going out.

**CONCLUSIONS:** Prolonged self-restraint due to the COVID-19 pandemic may lead to housebound status and poor health behaviors. Public health intervention is needed to prevent excessive self-restraint, along with new measures integrating information and communication technologies to enable older adults to live active lives.

**Key words:** COVID-19, going out, health behavior, frailty, older adults.

## Introduction

In the wake of the coronavirus disease 2019 (COVID-19) pandemic, on April 7, 2020, the Japanese government declared a state of emergency in seven large cities, including Tokyo, and requested residents to avoid nonessential going-out behaviors to reduce contact with others. Although it

was necessary to avoid going out in this situation, especially for older adults, it could result in a list of unintended secondary effects. In particular, physical and social inactivity when homebound might pose a high risk of frailty, a serious condition of increased vulnerability to stressors—including infections—due to declines in physiological reserve associated with aging (1). It is well known that frail older adults are more likely to have negative health outcomes, such as functional disability and death (2). Conversely, frailty can be prevented or improved through healthy behaviors comprising a well-balanced diet, exercise, and social contact (3).

It is expected that self-restraint due to COVID-19 limits daily living activities, including various health behaviors. However, this concern has not been fully examined. Thus, in the present study, we aimed to examine older adults with regard to their decreased going-out behaviors (as required by the emergency declaration of the Japanese government) and increased housebound living. Furthermore, we examined the association of decreasing going-out behaviors on their health behaviors (exercise, healthy diet, and conversation).

## Methods

### Study design and participants

This cross-sectional survey involved the administration of a self-report questionnaire to community-dwelling older adults. The participants were men and women aged 50 years and older living in public housing in Nishi Tokyo City, Tokyo, Japan. The survey was conducted only in apartments where permission to conduct the survey was obtained during the state of emergency. Residents of these public housing were of the Japanese general economic class. We distributed the questionnaires to about 600 households that included non-elderly households. We conducted the survey on April 25, which was during the declared state of emergency. We excluded people younger than 50 years from the analysis, as well as those with missing questionnaire items.

**Table 1.** Basic characteristics of study participants

	Overall	Men, n = 144		Women, n = 150		P
	n (%)	n (%)	ASR*	n (%)	ASR	
<b>Age</b>						
50 to 59 years	8 (2.7%)	3 (2.1%)	-0.7	5 (3.3%)	+0.7	.482
60 to 69 years	42 (14.4%)	22 (15.3%)	0.5	20 (13.3%)	-0.5	
70 to 79 years	148 (50.7%)	67 (46.5%)	-1.3	81 (54.0%)	1.3	
80 or older	96 (32.2%)	52 (36.1%)	1.2	44 (29.3%)	-1.2	
<b>Living arrangement</b>						
Alone	75 (25.2%)	17 (11.8%)	-5.3	58 (38.7%)	5.3	<.001
With spouse or siblings	140 (47.6%)	85 (59.0%)	3.8	55 (36.7%)	-3.8	
With children or grandchildren	79 (26.9%)	42 (29.2%)	0.9	37 (24.7%)	-0.9	
<b>Self-restraining behaviors during the COVID-19 pandemic</b>						
<i>Exercise for health</i>						
Yes	36 (12.2%)	22 (15.3%)	1.7	14 (9.3%)	-1.7	.328
Rather yes	135 (45.9%)	61 (42.4%)	-1.2	74 (49.3%)	1.2	
Rather no	109 (37.1%)	54 (37.5%)	-0.1	55 (36.7%)	0.1	
No	14 (4.8%)	7 (4.9%)	0.3	7 (4.7%)	-0.3	
<i>Healthy eating habits</i>						
Yes	73 (24.8%)	48 (33.3%)	1.7	25 (16.7%)	-1.7	.112
Rather yes	183 (62.2%)	78 (54.2%)	-1.6	105 (70.0%)	1.6	
Rather no	37 (12.6%)	17 (11.8%)	-0.7	20 (13.3%)	0.7	
No	1 (0.3%)	1 (0.7%)	1.0	0 (0.0%)	-1.0	
<i>Conversation with someone</i>						
Increased	13 (4.4%)	2 (1.4%)	-2.3	11 (7.3%)	2.3	.048
No change	150 (51.0%)	71 (49.3%)	0.0	79 (52.7%)	0.0	
Decreased	96 (32.7%)	49 (34.0%)	-0.2	47 (31.3%)	0.2	
Greatly decreased	35 (11.9%)	22 (15.3%)	1.7	13 (8.7%)	-1.7	

\*ASR, adjusted standardized residual.

## Measures

Going-out frequency was assessed using four response options (daily, every 2-3 days, one day a week, and rarely going out). The frequency of going out before the COVID-19 pandemic, which began around February 2020, and the frequency during the self-restraint period were both evaluated. In this study, individuals who went out less than once per week were considered housebound (4, 5).

In addition, health behaviors were assessed as follows: “Are you on a well-balanced diet?” and “Are you getting physical exercise?” were assessed using a four-category scale (Yes, Rather yes, Rather no, and No), and “Do you have the opportunity to talk to people, including on the phone?” was assessed using a three-category scale (increased, remained the same, and decreased). The reasons for each answer were provided through an open-ended question: “What is the reason for the current situation?” Confounding factors were assessed, including age, gender, and residence status (i.e., living alone, living with peers, or living with multiple generations).

## Statistical analysis

Differences in demographic characteristics and health behaviors between genders were analyzed using the chi-square test. Changes in going-out frequency before and after the period of self-imposed restraint were analyzed using the marginal homogeneity test, which is typically used in repeated-measures situations. This test also serves as an extension of the McNemar test for binary to multinomial response. After the marginal homogeneity tests, multiple comparisons with Bonferroni adjustment were performed. The association between the frequency change of going out and gender was examined by calculating whether there was a decrease in the frequency of going out and using the chi-square test. We excluded individuals who had been housebound before the COVID-19 first wave from the analysis.

The association between changes in going-out frequency and health behaviors was identified using binomial logistic regression analysis. The reference group was the group that maintained the frequency of going out, and the odds ratio against the group that decreased this frequency was calculated.

**Table 2.** Changes in the frequency of going out before and after self-restraint due to the COVID-19 pandemic's first wave

	Before COVID-19's first wave	After COVID-19's first wave	P
Overall (n = 294)			
Every day	185 (62.9%)	104 (35.4%) <sup>†</sup>	<.001
Once every 2 or 3 days	96 (32.7%)	136 (46.3%) <sup>‡</sup>	
Once a week/rarely	12 (4.1%)/1 (0.3%)	36 (12.2%)/18 (6.1%) <sup>‡</sup>	
Men (n = 144)			
Every day	94 (65.3%)	56 (38.9%) <sup>†</sup>	<.001
Once every 2 or 3 days	41 (28.5%)	59 (41.0%) <sup>‡</sup>	
Once a week/rarely	8 (5.6%)/1 (0.7%)	20 (13.9%)/9 (6.3%) <sup>‡</sup>	
Women (n = 150)			
Every day	91 (60.7%)	48 (32.0%) <sup>†</sup>	<.001
Once every 2 or 3 days	55 (36.7%)	77 (51.3%) <sup>‡</sup>	
Once a week/rarely	4 (2.7%)/0 (0.0%)	16 (10.7%)/9 (6.0%) <sup>‡</sup>	

\*There was no significant difference by gender in whether the frequency of going out decreased (men vs. women, 40.1% vs 42.3%;  $p = 0.523$ ); <sup>†</sup>significantly decreased after multiple comparisons with Bonferroni adjustment was performed after marginal homogeneity tests; <sup>‡</sup>significantly increased after multiple comparisons with Bonferroni adjustment was performed after marginal homogeneity tests.

**Table 3.** Frequency of going out after the COVID-19 pandemic's first wave by pre-restraint frequency status

		Before COVID-19's first wave	After COVID-19's first wave			
			Every day	Once every 2 or 3 days	Once a week or rarely	Rarely
Overall (n = 294)	Every day	185	101 (54.6%)	75 (40.5%)	6 (3.2%)	3 (1.6%)
	Once every 2 or 3 days	96	3 (3.1%)	61 (63.5%)	23 (24.0%)	9 (9.4%)
	Once a week	12	0 (0.0%)	0 (0.0%)	7 (58.3%)	5 (41.7%)
	Rarely	1	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100%)
Men (n = 144)	Every day	94	56 (59.6%)	34 (36.2%)	4 (4.3%)	0 (0.0%)
	Once every 2 or 3 days	41	0 (0.0%)	25 (61.0%)	12 (29.3%)	4 (9.8%)
	Once a week	8	0 (0.0%)	0 (0.0%)	4 (50.0%)	4 (50.0%)
	Rarely	1	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.0%)
Women (n = 150)	Every day	91	45 (49.5%)	41 (45.1%)	2 (2.2%)	3 (3.3%)
	Once every 2 or 3 days	55	3 (5.5%)	36 (65.5%)	11 (20.0%)	5 (9.1%)
	Once a week	4	0 (0.0%)	0 (0.0%)	3 (75.0%)	1 (25.0%)
	Rarely	0	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Those who tended to stay indoors before the request for self-restraint were excluded from the analysis. Odds ratios were adjusted for confounding factors, and 95% confidence intervals were calculated. Statistical significance was set at less than 5%. All statistical procedures were performed using SPSS IBM statistics ver. 26 (IBM Japan, Tokyo).

## Results

Of the approximately 600 households surveyed in the apartment complexes, 298 individuals responded. The exact response rate was not determined because households other than the elderly were included. A total of 294 respondents (150 women, 51%) without missing data were included in the analysis.

The demographic characteristics and status of health behaviors during self-restraint are shown in Table 1. Most respondents were in their 70s, followed by those in their 80s,

and there were no gender differences in these age groups. Regarding living arrangements, 25.2% of all respondents lived alone, with a significantly higher number of these individuals being women; men were more likely to live with their spouse or siblings. Regarding health behaviors during the period of self-restraint, the proportion of older adults with physical inactivity was 41.9%, while the proportion of those who did not have a well-balanced diet was 12.9%. In free responses from those who were unable to maintain a well-balanced diet, many were related to securing food, such as "I cannot go out to buy fresh fish and vegetables because I am worried about the crowded supermarkets" and "Because I don't have the opportunity to shop as much, eating has become a dreary task." Furthermore, the proportion reporting a decreased amount of conversation was 44.6%. There were no gender differences in exercise or diet, but women were more likely to report increased conversation.

Table 2 and Table 3 shows the changes in going-out

**Table 4.** Changes in the frequency of going out and health behaviors due to avoidance of going-out behaviors during the COVID-19 pandemic’s first wave

	Health behaviors while avoiding going-out behaviors due to the COVID-19 pandemic’s first wave					
	Exercise for health (Rather no or no)		Healthy eating habits (Rather no or no)		Conversation (Decreased or greatly decreased)	
	n‡	aOR* (95% CI)§	n	aOR (95% CI)†	n	aOR (95% CI)
Frequency of going out						
Sustained (n = 173, 58.8%)	57/ 116	1.00 (reference)	23/150	1.00 (reference)	60/ 113	1.00 (reference)
Decreased (n = 121, 41.2%)	66/ 55	3.30 (1.95-5.59)	15/106	1.09 (0.53-2.26)	71/ 50	2.82 (1.72-4.63)
Newly housebound						
Housebound before self-restraint (n = 13, 4.4%)	6/ 7	Excluded	2/ 11	Excluded	6/ 7	Excluded
No onset (n = 240, 81.6%)	86/ 154	1.00 (reference)	24/ 216	1.00 (reference)	105/ 135	1.00 (reference)
New onset due to self-restraint (n = 41, 13.9%)	30/ 11	5.28 (2.29-12.16)	12/ 29	2.63 (1.06-6.54)	20/ 21	2.11 (1.02-4.52)

\*aOR, adjusted odds ratio; †95%CI, 95% confidence interval; ‡indicates the number of participants (unable to engage in healthy behaviors)/participants (able to engage in healthy behaviors); §indicates that odds ratios and 95% confidence intervals are adjusted by variables as follows: age, sex, living arrangement, and the frequency of going out before the avoidance of going-out behaviors due to the COVID-19 pandemic’s first wave.

frequency before and after self-restraint due to COVID-19. The frequency of going out decreased significantly for both men and women after the government’s request for people to avoid going out. There was no significant interaction between change in going-out frequency and sex or age group. In Table 3, frequency of going out decreased among 121 (41.2%) of the respondents. Of the 281 people who were not housebound before the governmental request for self-restraint, 41 (13.9%) became newly housebound as a result of the request.

In terms of the relationships between health behaviors and decreased going-out frequencies, those who went out less frequently were unable to be physically active during the period of self-restraint, even after considering the effects of the confounding factors. A significantly higher number of older adults experienced decreased conversation. Moreover, a significant number of respondents said they were unable to eat well-balanced meals. When asked an open-ended question regarding the reason for this, the most common answer was that they could not go shopping and could not get food such as vegetables. Some of the responses were attributed to avoiding going-out behaviors.

## Discussion

This study aimed to investigate the association of self-restraint during the COVID-19 pandemic with older adults’ activities of daily living and health behaviors. We conducted a questionnaire survey for older adults living in public housing in Tokyo. We found that the frequency of going out was reduced, with 13.9% of the participants being considered housebound. Importantly, regarding health behaviors (exercise, healthy diet, and conversation), our results showed that the negative association of decreasing going-out behaviors was accompanied by not participating in social interaction and exercise. Especially among the newly housebound, the negative association with healthy eating habits was further exhibited.

Supporting our results, it has been demonstrated that housebound tendencies in older adults are a predictor of functional disability (6). Particularly, older women who do not go out are at increased risk of disability, even when they have

sufficient social networking (7). Hence, our results suggest that prolonged low frequency in terms of going-out behaviors could lead to secondary effects potentially related to COVID-19. Additionally, our results show that infrequent going-out behaviors were most strongly associated with the low level of exercise opportunities. An online survey among the Japanese population has shown that the amount of physical activity decreased due to the self-restraint (8). Consistently, our results showed that decreasing going-out behaviors were associated with not participating in health-directed exercise. Regarding the effects of physical inactivity caused by COVID-19, further examination on the effects of sedentary living during self-restraint are needed since this is an independent risk factor for mortality (9).

Although the requested self-restraint significantly reduced social contact, the association between decline in going-out behaviors and decline in social contact was relatively small. Rather, our data suggest that some women significantly increased their amount of conversation in comparison to men. The reason for this is thought to be the use of telephones, the Internet, and communication technology, which has reduced the negative impact of infrequent going-out behaviors to a relatively small extent. In our results, women were more likely to live alone, whereas some participants commented that relatives living farther away were more worried about COVID-19 and began to call them regularly.

In addition, when compared to the decline in social contact and low exercise opportunities, though a few did not have well-balanced dietary habits, they were particularly worse among those who were housebound. This result may be because of the restrictions on restaurants and other food service establishments, and the unavailability of food. Further, housebound status may lead to an increase in skipping meals and a decrease in food diversity. Previous studies have reported that being housebound and socially isolated were associated with increased risks of frailty, functional decline, and death (4, 10-14). Low nutrient intake and eating alone were also associated with increased prevalence of frailty and depressive symptoms (9, 15-18).

Since older adults have a relatively high fatality rate, the

prevention of COVID-19 is of primary importance (19). However, the impact of secondary effects on older adults should not be overlooked, given what we know about the reported association between post-disaster depression and posttraumatic stress disorder and mortality during the 2011 Great East Japan earthquake and tsunami (20). In this study, since we examined the health behaviors that are predictors of multifaceted frailty and mortality in older adults, these older adults might suffer outcomes such as a need for long-term care or earlier death due to frailty if these self-restraints continue.

### Limitations

This study has some limitations. First, since this was a cross-sectional study using a questionnaire survey, no causal relationship can be identified. In addition, the data is subjective and may differ from the actual situation. Second, this study's participants were older adults from single public housing; thus, the data may not be generalizable or representative of the Japanese population, and further study is necessary. Third, health behaviors were assessed only once during the self-restraint period. Accordingly, we cannot deny the possibility that the condition existed even before the request. Fourth, the possibility that there might be another reason for the tendency toward seclusion besides the request for self-restraint cannot be denied.

### Conclusions and implications

As a result of the Japanese government's request for self-restraint in activities of daily living due to the COVID-19 pandemic, many community-dwelling older adults went out less frequently, which in turn may have reduced their opportunities for social contact and exercise. Moreover, difficulty in obtaining food items may have negatively affected their dietary habits. As a secondary effect of COVID-19, there is a major concern regarding frailty due to inactivity, and it is necessary to establish methods to prevent frailty during this pandemic.

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