

# Impact of the COVID-19 pandemic on the living conditions and physical functioning of community-dwelling older adults

Satoko Sasaki<sup>1,2</sup>, Shigeru Ota<sup>3</sup>, Kazuyoshi Takashima<sup>2</sup>, Yoshiyasu Dezaki<sup>2</sup>, Tomomi Sato<sup>2</sup>, Yumi Sakogashira<sup>2</sup>, Hitoshi Okamura<sup>1</sup>

<sup>1</sup>Department of Psychosocial Rehabilitation, Graduate School of Biomedical and Health Sciences, Hiroshima University, Minami-ku, Hiroshima, Japan, <sup>2</sup>Department of Rehabilitation, JCHO Yufuin Hospital, Yufu, Oita, Japan, <sup>3</sup>Department of Rehabilitation, JCHO Fukuoka Yutaka-Cyuo Hospital, Nogata, Fukuoka, Japan

## ABSTRACT

**Background:** The novel coronavirus disease 2019 (COVID-19) changed the lives of older adults as well as their activities, and these changes will likely impact their physical functioning. However, few reports have prospectively assessed the individual characteristics and pandemic-related changes associated with the living conditions and physical functioning of community-dwelling older adults or clarified the associated factors. This study evaluated the changes in the living conditions and physical functioning of community-dwelling older adults due to the COVID-19 pandemic and identified the associated factors. **Methods:** Forty-one community-dwelling older adults who met the eligibility criteria were surveyed before and after the first wave of the COVID-19 pandemic to assess their living conditions and physical functioning. The association between changes in physical functioning and the characteristics of older adults was examined using multiple regression analysis. **Results:** It was demonstrated that the number of participants who indicated that they rarely went out increased approximately threefold after the first wave of the pandemic. In addition, significant differences were found in 5-meter walking speeds (comfort speed) of participants after the first wave; however, the change was significantly lower for the group requiring nursing care than for the group requiring assistance. **Conclusions:** These results indicate that, given the increased number of homebound older adults due to the pandemic, more attention should be given to maintain physical functioning of older adults, specifically those requiring nursing care.

**Keywords:** Community-dwelling older adults, COVID-19, homebound, long-term care insurance, walking speed

## Introduction

The novel coronavirus disease 2019 (COVID-19) that spread across the world beginning in December 2019 necessitated various guidelines to be applied around the world,<sup>[1]</sup> including quarantine and social distancing. Many studies reported that social

and physical isolation meant to protect older adults from fatal COVID-19 infection have been associated with the deterioration of physical, cognitive, and mental health.<sup>[2-4]</sup>

Furthermore, several studies have also examined the effects of social and physical isolation on the lives and physical functioning of older adults, with some international and domestic studies also reporting decreases in physical activity.<sup>[5-14]</sup> An international online survey showed an increase in sitting time during the day, from 5% to 8% per day.<sup>[5]</sup> In addition, several studies have reported a decrease in mobility and number of steps (mean steps and

**Address for correspondence:** Dr. Hitoshi Okamura, Graduate School of Biomedical and Health Sciences, Hiroshima University, 1-2-3, Kasumi, Minami-ku, Hiroshima 734-8553, Japan. E-mail: hokamura@hiroshima-u.ac.jp

Received: 01-07-2024

Revised: 17-10-2024

Accepted: 02-12-2024

Published: 25-04-2025

### Access this article online

#### Quick Response Code:



#### Website:

<http://journals.lww.com/JFMPC>

#### DOI:

10.4103/jfmprc.jfmprc\_1137\_24

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Sasaki S, Ota S, Takashima K, Dezaki Y, Sato T, Sakogashira Y, et al. Impact of the COVID-19 pandemic on the living conditions and physical functioning of community-dwelling older adults. J Family Med Prim Care 2025;14:1409-15.

daily steps) among older adults during the pandemic.<sup>[8,15,16]</sup> The decline in activity and mobility during lockdown can also lead to more frailty and a lower wellbeing in older adults.<sup>[17]</sup> During the COVID-19 pandemic, frail older adults experienced higher levels of loneliness, suggesting that frailty and loneliness are independently associated among older adults who receive home-based healthcare.<sup>[18]</sup> Furthermore, social and physical isolation has been reported to cause detrimental mental health effects such as anxiety, depression, and poor sleep quality.<sup>[2]</sup>

In Japan, the first case of COVID-19 was confirmed in January 2020. Subsequently, the infection spread across the country, and a state of emergency was declared in April 2020 (first wave). With the aim of reducing human contact by at least 70% and as much as 80%, the emergency declaration prevented people from leaving their homes. This emergency declaration and the prolonged COVID-19 epidemic raised concerns about older adults being confined in a homebound state, as such living circumstances could lead to the deterioration of their physical and mental functions.

Several studies in Japan have been conducted on the changes in activity and physical function, including a decrease in physical activity due to the COVID-19 epidemic.<sup>[9,11,13,14,19]</sup> A study found that decreased frequency of going outside due to COVID-19 had detrimental effects on their psychological conditions—mental fatigue, not smiling as much as before, and anxiousness surrounding going outside.<sup>[20]</sup> Another study reported that anxiety about the COVID-19 pandemic was significantly associated with the decreased frequency of going out<sup>[21]</sup> and that refraining from going out was associated with depressive symptoms<sup>[22]</sup> along with lower locomotive function.<sup>[23]</sup> Moreover, approximately 20% of community-dwelling Japanese older adults refrained from visiting medical institutions during the COVID-19 pandemic.<sup>[24,25]</sup> Those who were 65 years and older had a heightened susceptibility to severe illness and outcome if coming in contact with COVID-19<sup>[26]</sup>; thus, older adults may have been more cautious and adhered more stringently to public health restrictions to mitigate their risk of contracting the virus.<sup>[27]</sup>

However, few reports have prospectively assessed individual characteristics of older adults and pandemic-related changes in the living conditions and physical functioning of community-dwelling older adults; furthermore, the associated factors have not been clarified. Clarifying the impact of individual characteristics associated with physical functioning in older adults could help experts provide targeted support to maintain their physical health and function should they become housebound after a public health crisis. Furthermore, in the face of a public health crisis such as an infectious disease epidemic, it is important for primary care physicians, who need to build ongoing partnerships, to understand how the lives and physical functions of older people living in the community have changed. This study evaluated 1) pandemic-related changes in the living conditions and physical functioning of community-dwelling older adults before and after the first COVID-19 wave and 2) identified the associated factors.

## Participants and Methods

### Participants

The participants were older adults receiving long-term, outpatient day care and for whom physical function assessment data were obtained before and after the COVID-19 pandemic. In addition, they met the following eligibility criteria: cognitively intact (a score of 21 or higher on the revised Hasegawa Dementia Scale-Revised [HDS-R]),<sup>[28]</sup> had no aphasia or other communication difficulties, and were able to complete the questionnaires. We excluded those who were hospitalized during the study period. The HDS-R screening tool for dementia has nine questions and a maximum score of 30; a score of 20 or less suggests dementia.

### Survey method

We surveyed the participants twice, before the first COVID-19 wave (around December 2019) and after (around June 2020), to assess their living conditions and physical functioning. This time period was chosen for the following reasons: the first case of infection was confirmed in Japan in January 2020 and a nationwide state of emergency was declared on April 16, 2020. Therefore, the study period was set “around December 2019” before the pandemic and “around June 2020” after the pandemic, when an emergency was declared and people refrained from going out. It should be noted that all the subjects had no fever of 37.2°C or higher and no symptoms (such as cough or fatigue) related to COVID-19 during the study period.

Taking into account living conditions, day rehabilitation staff (PT, OT) distributed the questionnaires to the subjects in the day rehabilitation hall, and staff and subjects worked one-on-one, with staff reading the questions on the spot and asking subjects to respond. Data on physical and mental function, ADLs, and IADLs were collected from electronic medical records, and sociodemographic information was collected from the electronic medical record and from interviews with day rehabilitation staff.

### Measures

#### Basic characteristics

We collected data on age, sex, family structure (living together or alone), mobility during outings (requiring assistance or not), and the level of care required. Long-term care insurance eligibility in Japan has five levels for those requiring nursing care (i.e., needing significant assistance with daily activities) and two levels for those requiring assistance (i.e., needing modest assistance with daily activities).<sup>[29]</sup>

#### Living conditions

We assessed the frequency of going out before and after the first COVID-19 wave using a four-point Likert scale (almost every day, two–three times a week, approximately once a week, or rarely). In addition, we assessed the frequency of interaction with others apart from the family members using a six-point Likert

scale (almost every day, two–three times a week, approximately once a week, one–two times a month, almost never, or never). Furthermore, by providing a list of options, we assessed whether the participants had increased their telephone or computer use to make calls or send e-mails to engage with others after the first COVID-19 wave versus accepting occasions of meeting others in person.

### Physical functioning

We collected data on grip strength and 5-meter walking speed (comfortable speed and maximum speed). In addition, we evaluated activities of daily living using the Barthel Index,<sup>[30]</sup> which assesses independence by rating 10 self-care items of independence. The highest score is 100; the higher the score, the greater the independence. We assessed instrumental activities of daily living (IADLs) using the Frenchay Activities Index,<sup>[31,32]</sup> which uses a four-point scale to grade the frequency of 15 activities (e.g., housework, hobbies, and work). The highest score is 100; the higher the score, the greater the activity.

### Statistical analyses

We used descriptive statistics to tabulate the basic characteristics. For changes in physical functioning, we used descriptive statistics and the Wilcoxon signed-rank test or a paired *t*-test after checking the normality of the data. Furthermore, we used *t*-tests, the Pearson correlation coefficient, or Spearman's rank correlation coefficient (univariate analysis) to examine the association between changes in physical functioning and the characteristics of older adults, followed by multiple regression analysis for factors with  $P < 0.10$  in the univariate analysis. We conducted all the statistical analyses using IBM SPSS Statistics for Windows (SPSS), version 25.0J for Windows (Armonk, NY: IBM Corp.). The *P* values were two-tailed, with  $P < 0.05$  being significant.

### Ethical considerations

This study was conducted with the approval of the JCHO Yufuin Hospital Ethics Committee (Approval No. 88). Subjects were informed, both orally and in writing, about the purpose and methods of the study, that they could refuse to participate at any time and would not be disadvantaged in any way, that their privacy would be strictly protected, and that they would be asked to provide consent for publication in academic conferences and papers. Only the participants who provided written informed consent were included in the study.

## Results

### Basic characteristics

There were 41 valid responses (16 men and 25 women; mean age: 79.7 years) summarized as follows: 35 participants lived with their families and 6 lived alone; 23 participants required assistance from others (family members driving, care cab, or care manager) to get around when going out [Table 1].

## Changes in living conditions

### Change in outings

Four participants (9.7%) answered that they went out “approximately once a week” or “rarely” before the pandemic. This percentage increased nearly three-fold to 12 participants (30.0%) after the first wave of the pandemic [Figure 1]. The frequency of going out before and after the first wave did not decrease or change for 24 (58.5%) participants but decreased for 17 (41.5%) participants.

### Changes in Interactions with Others

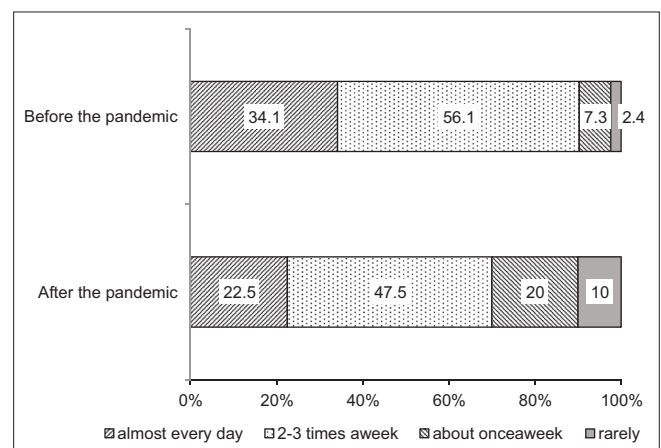
Before the pandemic, 23 (56.1%) participants interacted with others less than once a week on average. After the first wave of the pandemic, this number increased to 32 (78.0%) [Figure 2]; 7 (17.1%) participants reported that they increased their use of the telephone to make calls or the computer to send e-mails to engage with people after the first wave of the pandemic, while 34 (82.9%) participants said that their telephone or computer use had not increased. Phone calls (five respondents) were the most common method of communication, followed by letters (two respondents) and e-mail (one respondent).

## Changes in Physical Functioning

We used the Wilcoxon signed-rank and paired *t*-tests to assess changes in the physical functioning of participants. We calculated walking speed (m/s) as the distance (5 meters) divided by the

**Table 1: Basic characteristics of the participants**

Factors	Categories	n (%)
Age (average±SD)	79.7±8.4 years old	
Sex	Male	16 (39.0)
	Female	25 (61.0)
Family structure	Living together	35 (85.4)
	Living alone	6 (1.6)
Mobility when going out	Requiring assistance	23 (56.1)
	Not requiring assistance	18 (43.9)
Care level	Requiring assistance	20 (48.8)
	Requiring nursing care	21 (51.2)

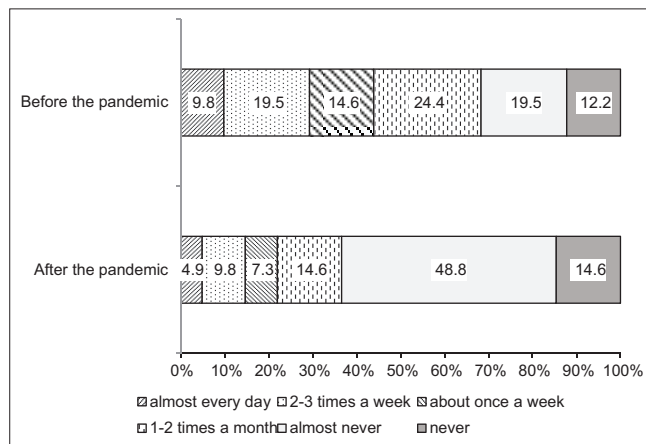


**Figure 1: Change in frequency of going out**

**Table 2: Objective changes in the physical functioning of older adults**

	Median (min.–max.)		<i>P</i> <sup>a</sup>
	Before pandemic	After pandemic	
BI	100 (55–100)	100 (55–100)	0.891
Right hand grip strength	18.9 (7.2–44.4)	19.5 (7.5–40.2)	0.681
	Mean (SD)	Mean (SD)	<i>P</i> <sup>b</sup>
FAI	20.9 (7.9)	20.8 (8.2)	0.842
Left grip strength	17.6 (6.3)	18.1 (5.9)	0.319
5-meter walk (comfort speed, m/s)	0.67 (0.28)	0.63 (0.27)	0.022
5-meter walk (max. speed, m/s)	0.84 (0.33)	0.82 (0.33)	0.255

BI: Barthel Index; FAI: Frenchay Activities Index; SD: Standard deviation; <sup>a</sup>Wilcoxon signed-rank test; <sup>b</sup>Paired t-test

**Figure 2: Change in frequency of interaction with others**

walking time(s)<sup>[33]</sup>; the comfortable walking speed of participants with respect to a 5-meter walk decreased significantly after the first pandemic wave [Table 2]. There were no significant changes in BI and FAI before and after the pandemic [Table 2].

## Relationship between Changes in Physical Functioning and Characteristics

Since we observed significant differences in walking speed (comfort speed) before and after the first pandemic wave, we employed univariate analysis using the difference in walking speed (comfort speed) as the dependent variable and the characteristics of older adults, physical changes, and life changes as the independent variables [Table 3]. Multiple regression analysis performed for the two factors resulted in  $P < 0.10$ ; we identified the level of care required to be a significantly associated factor [Table 4]. In summary, walking speed (comfort speed) was significantly lower after the first wave of the pandemic for the group requiring nursing care than for those requiring assistance.

## Discussion

This first objective of this study was to investigate the changes in older adults' living conditions and physical functioning due to the COVID-19 pandemic. Researcher definitions of *homebound* vary. However, most studies defining the state of being homebound based on outing frequency have used once a week as the criterion, and most considered people homebound

if they went out less than once a week.<sup>[34]</sup> Using this definition, we found that the number of homebound older adults increased three-fold after the first wave of the pandemic. Homebound older adults are particularly vulnerable to social isolation and its psychological sequelae.<sup>[35]</sup> Being homebound is associated with a higher risk of declining physical and mental functioning in older adults, such as depression, mortality risk, weight loss, and IADL impairments.<sup>[35–38]</sup> Thus, one notable finding of the study was the increase in the number of older adults at risk of physical and mental dysfunction due to becoming homebound because of the pandemic.

Older adults who learned new skills pertaining to using communication media during the pandemic were less likely to be homebound.<sup>[35]</sup> Initially, most housebound older adults had fewer social interactions through communication media. During the pandemic, differences in technology use increased loneliness among housebound older adults.<sup>[35]</sup> Similarly, in the present study, only seven (17.1%) older adults reported an increase in their use of communication media except to interact with others during the pandemic, regardless of whether they were homebound. In view of similar infectious disease outbreaks and subsequent restricting outings in the future, greater efforts should be made to establish and disseminate communication methods and technologies to encourage older adults to maintain communication beyond face-to-face meetings, thus preventing social isolation and health problems among older adults, housebound or otherwise.

The study's second objective was to clarify the relationship between changes in the physical functioning of older adults and their characteristics. We found significant declines in walking speed (comfort speed) after the first wave of the pandemic. Gait speed is associated with survival and incident disability in older adults.<sup>[39,40]</sup> Walking speed also predicts 5- and 10-year survival rates over and beyond age.<sup>[39]</sup> Walking speed in community-dwelling older adults showed that gait speed at the usual pace was a consistent risk factor for disability,<sup>[41]</sup> cognitive impairment, institutionalization, falls, or mortality.<sup>[42]</sup> Low grip strength and speed scores are also associated with lower life satisfaction.<sup>[43]</sup> Thus, gait speed has been associated with various aspects of physical and mental health in older adults. Measuring gait speed is reproducible, inexpensive, and feasible in clinical settings. Therefore, gait speed should be considered a vital sign for the care of older patients.<sup>[44]</sup>



**Table 3: Relationship between the change in 5-meter walk (comfort speed) and each variable**

Factors	Categories	n	Mean±SD	P <sup>a</sup>
Sex	Male	16	-0.060±0.143	0.553
	Female	25	-0.036±0.103	
Care level	Requiring assistance	20	-0.004±0.103	0.036
	Requiring nursing care	21	-0.082±0.121	
Family structure	Living together	35	-0.054±0.119	0.263
	Living alone	6	0.006±0.111	
Outing support	Necessary	23	-0.060±0.106	0.394
	Unnecessary	18	-0.027±0.132	
Change in frequency of going out	No change/increase	24	-0.057±0.115	0.523
	Decreased	15	-0.031±0.131	
Change in frequency of interaction	No change/increase	23	-0.066±0.120	0.216
	Decreased	17	-0.018±0.117	
Factors			r	P
Age			-0.048 <sup>b</sup>	0.767
FAI before the pandemic			0.200 <sup>b</sup>	0.236
Left hand grip strength before the pandemic			-0.319 <sup>b</sup>	0.062
Right hand grip strength before the pandemic			-0.128 <sup>b</sup>	0.493
BI before the pandemic			-0.030 <sup>c</sup>	0.857
HDS-R before the pandemic			0.024 <sup>c</sup>	0.893

BI: Barthel Index; FAI: Frenchay Activities Index; HDS-R: Hasegawa Dementia Scale—Revised; a) *t*-test; b) Pearson's correlation coefficient; c) Spearman's rank correlation coefficient; SD: standard deviation

**Table 4: Factors associated with the change in 5-meter walk (comfort speed): Multiple regression analysis**

	B	Beta	t	P	VIF
Care level	-0.106	-0.401	-2.340	0.026	1.190
Left hand grip strength before the pandemic	-0.005	-0.224	-1.392	0.174	1.049

Adjusted R<sup>2</sup>=0.211

Subsequently, we used multiple regression analysis with walking speed (comfort speed) as the dependent variable and each characteristic of older adults as the independent variables to examine the relationship between the two. The results showed a significant decrease in walking speed (comfort speed) after the first wave of the pandemic in the group requiring nursing care. Examining the impact of walking factors before and after the pandemic among life insurance policyholders (mean age 60.3 ± 28.9) living in Japan, Obuchi *et al.*<sup>[45]</sup> found that the number of steps taken was significantly lower in 2020 than in 2019; however, walking speed improved, contributing to an increase in stride length. In other words, no significant decrease in walking speed was observed before and after the COVID-19 pandemic among relatively young community residents as reported in previous studies and in the group requiring assistance in the elderly as reported in this study. However, the significant decrease in walking speed in the group requiring nursing care among older adults in the present study is a significant result. In addition to the various associations of walking speed with the physical and mental health of older adults, studies of community-dwelling older adults before and after the pandemic have demonstrated that those who maintained a fast walking speed had a higher quality of life.<sup>[46]</sup> Therefore, our results suggest that with regard to life changes following crises such as the COVID-19 pandemic, older adults requiring nursing care are particularly

susceptible to declines such as a decrease in walking speed that lower their quality of life. Although lifestyle changes following the pandemic or natural disasters could affect the physical and mental health of all older adults, our results highlight the need for closer monitoring of the physical functioning changes of those requiring nursing care. In particular, primary care physicians who support older adults living in the community need to be aware of this need.

This study had some limitations. First, there were only 41 participants, which limits the generalizability of the study results. Second, we did not objectively investigate the changes in physical activity or clarify the causal relationship explaining why the walking speed of persons requiring nursing care decreased due to the pandemic. Finally, the day-care rehabilitation facility that was surveyed is located in an area with a lot of tourist attractions and that targeted its older residents. Surveying older adults in areas with fewer places and opportunities for outings might have produced different results. Thus, our findings cannot be generalized to all older adults without additional studies in other parts of Japan and beyond.

## Conclusion

Our results indicate that the pandemic has led to more older adults in Japan becoming homebound, leading to social isolation and health problems. Furthermore, walking speed (comfort speed) significantly decreased after the COVID-19 pandemic, especially among older adults requiring nursing care. Therefore, there is an urgent need to focus on the decline in physical functioning of older adults, especially with regard to those requiring nursing care.

## Acknowledgements

We would like to thank Editage ([www.editage.jp](http://www.editage.jp)) for English language editing.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: Pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med* 2020;27:taaa020.
2. Sepúlveda-Loyola W, Rodríguez-Sánchez I, Pérez-Rodríguez P, Ganz F, Torralba R, Oliveira DV, *et al.* Impact of social isolation due to COVID-19 on health in older people: Mental and physical effects and recommendations. *J Nutr Health Aging* 2020;24:938-47.
3. National Council on Aging. COVID-driven isolation can be dangerous for older adults. Available from: <https://www.ncoa.org/covid-driven-isolation-can-be-dangerous-for-older-adults/>

- ncoa.org/article/covid-driven-isolation-can-be-dangerous-for-older-adults. [Last accessed on 2024 Jun 01].
4. World Health Organization. Social isolation and loneliness among older people: Advocacy brief. Available from: <https://www.who.int/teams/social-determinants-of-health/demographic-change-and-healthy-ageing/social-isolation-and-loneliness>. 2021. [Last accessed on 2024 Jun 01].
5. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, *et al.* Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. *Nutrients* 2020;12:1583.
6. Browne RAV, Macêdo GAD, Cabral LLP, Oliveira GTA, Vivas A, Fontes EB, *et al.* Initial impact of the COVID-19 pandemic on physical activity and sedentary behavior in hypertensive older adults: An accelerometer-based analysis. *Exp Gerontol* 2020;142:111121.
7. Rhodes RE, Liu S, Lithopoulos A, Zhang CQ, Garcia-Barrera MA. Correlates of perceived physical activity transitions during the COVID-19 pandemic among Canadian adults. *Appl Psychol Health Well-Being* 2020;12:1157-82.
8. Tison GH, Avram R, Kuhar P, Abreau S, Marcus GM, Pletcher MJ, *et al.* Worldwide effect of COVID-19 on physical activity: A descriptive study. *Ann Intern Med* 2020;173:767-70.
9. Yamada M, Kimura Y, Ishiyama D, Otake Y, Suzuki M, Koyama S, *et al.* Effect of the COVID-19 epidemic on physical activity in community-dwelling older adults in Japan: A cross-sectional online survey. *J Nutr Health Aging* 2020;24:948-50.
10. Ong JL, Lau TY, Massar SAA, Chong ZT, Ng BKL, Koek D, *et al.* COVID-19-related mobility reduction: Heterogeneous effects on sleep and physical activity rhythms. *Sleep* 2021;44:zsaa179.
11. Sasaki S, Sato A, Tanabe Y, Matsuoka S, Adachi A, Kayano T, *et al.* Associations between socioeconomic status, social participation, and physical activity in older people during the COVID-19 pandemic: A cross-sectional study in a northern Japanese city. *Int J Environ Res Public Health* 2021;18:1477.
12. Schlichtiger J, Steffen J, Huber BC, Brunner S. Physical activity during COVID-19 lockdown in older adults. *J Sports Med Phys Fitness* 2021;61:164-6.
13. Yamada M, Kimura Y, Ishiyama D, Otake Y, Suzuki M, Koyama S, *et al.* The influence of the COVID-19 pandemic on physical activity and new incidence of frailty among initially non-frail older adults in Japan: A follow-up online survey. *J Nutr Health Aging* 2021;25:751-6.
14. Yamada M, Arai H. Recovery from or progression to frailty during the second year of the COVID-19 pandemic. *Geriatr Gerontol Int* 2022;22:681-2.
15. Wang Y, Zhang Y, Bennell K, White DK, Wei J, Wu Z, *et al.* Physical distancing measures and walking activity in middle-aged and older residents in Changsha, China, during the COVID-19 epidemic period: Longitudinal observational study. *J Med Internet Res* 2020;22:e21632.
16. Tosato M, Ciciarello F, Zazzara MB, Janiri D, Pais C, Cacciatore S, *et al.* Lifestyle changes and psychological well-being in older adults during COVID-19 pandemic. *Clin Geriatr Med* 2022;38:449-59.
17. Brooke J, Jackson, D. Older people and COVID-19: Isolation, risk and ageing. *J Clin Nurs* 2020;29:2044-6.
18. Klesiora M, Tsaras K, Papathanasiou IV, Malliarou M, Bakalis N, Kourkouta L, *et al.* Frailty assessment and its impact on loneliness among older adults receiving home-based healthcare during the COVID-19 pandemic. *Healthcare* 2024;12:1666.
19. Hirose T, Sawaya Y, Ishizaka M, Hashimoto N, Kubo A, Urano T. Prevalence and factors associated with changes in frailty among community-dwelling older adults in Japan during the COVID-19 pandemic: A prospective cohort study from 2020 to 2022. *Geriatr Gerontol Int* 2023;24:40-7.
20. Shimokihara S, Maruta M, Akasaki Y, Ikeda Y, Han G, Kamasaki T, *et al.* Association between frequency of going out and psychological condition among community-dwelling older adults after the COVID-19 pandemic in Japan. *Healthcare (Basel)* 2022;10:439.
21. Sugawara Y, Yabe Y, Hagiwara Y, Tsuji I. Effect of the decreased frequency of going out on the association between anxiety and sleep disorder during the COVID-19 pandemic: A mediation analysis. *Ann Gen Psychiatry* 2023;22:26.
22. Hamatani M, Su Y, Yuki M, Ogawa N, Kawahara K. Depressive symptoms associated with infection prevention measures and daily lifestyle habit characteristics among Japanese community-dwelling older adults during the COVID-19 pandemic. *Jpn J Nurs Sci* 2023;21:e12575.
23. Uehara M, Takahashi J, Ikegami S, Tokida R, Nishimura H, Sakai N, *et al.* Association between restricted outings and geriatric locomotive function scale score in the general elderly population during the COVID-19 pandemic. *J Orthop Sci* 2024.
24. Kera T, Kawai H, Ejiri M, Takahashi J, Nishida K, Harai A, *et al.* Change in subjective health status among frail older Japanese people owing to the coronavirus disease pandemic and characteristics of their responses. *Geriatr Gerontol Int* 2021;21:1053-9.
25. Kubo Y, Noguchi T, Hayashi T, Tomiyama N, Ochi A, Hayashi H. Changes in psychosocial factors among community-dwelling older adults before and after Japan's declaration of a state of emergency over coronavirus disease 2019. *Psychogeriatrics* 2022;22:3-10.
26. Davies NG, Klepac P, Liu Y, Prem K, Jit M; CMMID COVID-19 working group, Eggo RM. Age-dependent effects in the transmission and control of COVID-19 epidemics. *Nat Med* 2020;26:1205-11.
27. González D, Aixalà MB, Neimeyer RA, Cantillo J, Nicolson D, Farré M. Restorative retelling for processing psychedelic experiences: Rationale and case study of complicated grief. *Front Psychol* 2022;13:832879.
28. Imai Y, Hasegawa K. The revised Hasegawa's Dementia Scale (HDS-R) - Evaluation of its usefulness as a screening test for dementia. *Hong Kong J Psychiatry* 1994;4:20-4.
29. Ikegami N. Financing long-term care: Lessons from Japan. *Int J Health Policy Manag* 2019;8:462-6.
30. Mahoney FI, Barthel DW. Functional evaluation: The Barthel index. *Md State Med J* 1965;14:61-5.
31. Holbrook M, Skilbeck CE. An activities index for use with stroke patients. *Age Ageing* 1983;12:166-70.
32. Suenaga H, Miyazawa K, Chisaka H, Kawazu T, Hachisuka K. Modified version of the Self-Rating Frenchay Activities Index and its reliability and validity (Japanese). *Jpn J Occup Med Traumatol* 2000;48:55-60.
33. Amano T, Suzuki N. Minimal detectable change for motor function tests in patients with knee osteoarthritis. *Progr Rehabil Med* 2018;3:20180022.
34. Lee J, Suh Y, Kim Y. Multidimensional factors affecting

- homebound older adults: A systematic review. *J Nurs Scholarsh* 2022;54:169-75.
35. Ankuda CK, Kotwal A, Reckrey J, Harrison KL, Ornstein KA. The experience of homebound older adults during the COVID-19 pandemic. *J Gen Intern Med* 2022;37:1177-82.
36. Ganguli M, Fox A, Gilby J, Belle S. Characteristics of rural homebound older adults: A community-based study. *J Am Geriatr Soc* 1996;44:363-70.
37. Fujita K, Fujiwara Y, Chaves PHM, Motohashi Y, Shinkai S. Frequency of going outdoors as a good predictors for incident disability of physical function as well as disability recovery in community-dwelling older adults in rural Japan. *J Epidemiol* 2006;16:261-70.
38. Cohen-Mansfield J, Shmotkin D, Hazan H. The effect of homebound status on older persons. *J Am Geriatr Soc* 2010;58:2358-62.
39. Studenski S, Perera S, Patel K, Rosano C, Faulkner K, Inzitari M, *et al.* Gait speed and survival in older adults. *JAMA* 2011;305:50-8.
40. Perera S, Patel KV, Rosano C, Rubin SM, Satterfield S, Harris T, *et al.* Gait speed predicts incident disability: A pooled analysis. *J Gerontol A Biol Sci Med Sci* 2016;71:63-71.
41. Alrawaili SM, Alkhathami K, Elsehrawy MG, Alghamdi MS, Alkahtani HM, Alhwoaimel NA, *et al.* A longitudinal decline in walking speed is linked with coexisting hypertension and arthritis in community-dwelling older adults. *J Clin Med* 2024;13:5478.
42. Abellan van Kan GA, Rolland Y, Andrieu S, Bauer J, Beauchet O, Bonnefoy M, *et al.* Gait speed at usual pace as a predictor of adverse outcomes in community-dwelling older people an International Academy on Nutrition and Aging (IANA) Task Force. *J Nutr Health Aging* 2009;13:881-9.
43. Pinto JM, Neri AL. Factors associated with low life satisfaction in community-dwelling elderly: FIBRA study. *Cad Saúde Pública* 2013;29:2447-58.
44. Cummings SR, Studenski S, Ferrucci L. A diagnosis of disability-giving mobility clinical visibility: A mobility working group recommendation. *JAMA* 2014;311:2061-2.
45. Obuchi SP, Kawai H, Ejiri M, Ito K, Murakawa K. Change in outdoor walking behavior during the coronavirus disease pandemic in Japan: A longitudinal study. *Gait Posture* 2021;88:42-6.
46. Koivunen K, Portegijs E, Sillanpää E, Eronen J, Kokko K, Rantanen T. Maintenance of high quality of life as an indicator of resilience during COVID-19 social distancing among community-dwelling older adults in Finland. *Qual Life Res* 2022;31:713-22.