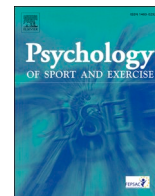




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Exercise as a coping strategy and its impact on the psychological well-being of Japanese community-dwelling older adults during the COVID-19 pandemic: A longitudinal study

Manami Ejiri^{a,*}, Hisashi Kawai^a, Takeshi Kera^{a,b}, Kazushige Ihara^c, Yoshinori Fujiwara^a, Yutaka Watanabe^d, Hirohiko Hirano^a, Hunkyung Kim^a, Shuichi Obuchi^a

^a Tokyo Metropolitan Institute of Gerontology, 35-2 Sakae-cho, Itabashi-Ku, Tokyo, 173-0015, Japan

^b Department of Physical Therapy, Takasaki University of Health and Welfare, 37-1 Nakaorui-machi, Takasaki-shi, Gunma, 370-0033, Japan

^c Department of Social Medicine, Hirosaki University School of Medicine, 5 Zaifu-cho, Hirosaki City, Aomori, 036-8560, Japan

^d Gerodontology, Department of Oral Health Science, Faculty of Dental Medicine, Hokkaido University, Nishi-7, Kita-13, Kita-ku, Sapporo, Hokkaido, 060-8586, Japan

ARTICLE INFO

Keywords:

Psychological well-being
Exercise
Coping strategy
COVID-19 pandemic
Older adults
Longitudinal study

ABSTRACT

This study aimed to examine the prevalence of exercise as a coping strategy among Japanese community-dwelling older adults and its impact on their psychological well-being during the COVID-19 pandemic. In October 2019 (baseline [BL]), 720 community-dwelling older adults living in an urban area in Japan participated in a comprehensive health survey. Of these, 618 responded to a mail survey (follow-up [FL]) in June 2020, after the first state of emergency was lifted. Their psychological well-being was assessed using the WHO-5 Well-Being Index (WHO-5). Exercise as a coping strategy during the stay-at-home period was determined at FL by asking respondents whether they had engaged in 1) walking and 2) at-home exercise and strength training to maintain their physical and mental health. Each type of exercise's impact and the effective exercise combinations were examined. Time and group interaction effects on the WHO-5 scores were investigated using a two-way analysis of covariance. Of the final sample, 65.1% engaged in walking. The WHO-5 mean scores at BL and FL were 16.7 and 15.4 for the walking group and 16.7 and 14.5 for the non-walking group, respectively; interaction for time and group was significant. Additionally, 56.4% of the participants engaged home training. The WHO-5 mean score at BL and FL were 17.5 and 15.5 for the home training group and 15.7 and 14.5 for the no home training group, respectively; there was no significant interaction. Older adults who engaged in both walking and home training received higher score on the WHO-5 than those who engaged in only one activity at FL. The decline in psychological well-being was most attenuated in the walking only group compared to the at-home exercise and strength training groups. Exercise as a coping strategy during the stay-at-home period was associated with psychological well-being, with different impacts observed depending on the type of activity.

At the onset of the 2019 coronavirus disease (COVID-19) pandemic, the World Health Organization's (WHO) guidelines recommended social distancing to control the virus's spread (World Health Organization, 2020). In response to the first wave in Japan, the government declared a state of emergency on April 7, 2020 (Prime Minister of Japan and His Cabinet, 2020). This included a "stay-at-home" order for the public, "working from home" order for the workers, and shutdown request for schools, public places, and businesses. Although these restrictions did not involve the same strict limitations as "lockdowns" in other countries, Japanese people were still asked to remain at home except to perform

essential activities, such as medical care or purchasing necessary basic goods.

While these social distancing measures were effective in controlling the spread of infection, the associated physical restrictions may have unintended health consequences. Previous studies conducted during the pandemic reported that the prevalence of physical activity decreased, and psychological disorders increased in Asia, North America, and Europe (Caputo & Reichert, 2020; Mauerer et al., 2020; Park et al., 2021; Salari et al., 2020; Sepúlveda-Loyola et al., 2020). Similar to these findings, the prevalence of physical inactivity (Yamada et al., 2020) and

* Corresponding author. 35-2 Sakae-cho, Itabashi-Ku, Tokyo, 173-0015, Japan.

E-mail address: ejiri@tmig.or.jp (M. Ejiri).

<https://doi.org/10.1016/j.psychsport.2021.102054>

Received 27 April 2021; Received in revised form 2 September 2021; Accepted 3 September 2021

Available online 4 September 2021

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depressive mood (Fujita et al., 2021) also increased in the Japanese population. Although the stay-at-home order was not legally binding, year-over-year objectively measured step counts were significantly lower during the state of emergency (Hino & Asami, 2021).

Consequently, professional bodies published recommendations for engaging in physical activities inside and outside the house (Japanese Association of Exercise Epidemiology, 2020). Notably, the stay-at-home order in Japan allowed residents to exercise and walk outside because these activities are necessary for daily living. It is well known that exercise not only resolves problems associated with physical inactivity but also sustains mental health (Cooney et al., 2013; Kadariya et al., 2019; Scully et al., 1998). Longitudinal and cross-sectional studies have reported that even during the COVID-19-induced quarantine period, the relationship between exercise and mental health continued. According to Wolf et al.'s (2021) systematic review, people who were engaged in regular physical activity or exercise and maintained their physical activity routines showed less depression and anxiety symptoms. Exercise is currently thought to protect against the negative mental health consequences of COVID-19-associated quarantines (Jiménez-Pavón et al., 2020).

Moreover, physical activity and exercise have also been reported to be associated with positive mental health, such as psychological well-being. For example, Jacob et al. (2020) observed a negative association between moderate-to-vigorous physical activity and poor mental well-being among adults living in United Kingdom. Meanwhile, Mageri et al. (2020) investigated the impact of physical activity on psychological well-being during Italy's lockdown and revealed that reductions in total physical activity were related to poorer psychological well-being; they recommended that people should "stay active to feel better." Exercise during the stay-at-home period may be regarded as a key coping behavior for maintaining psychological well-being under the pandemic-induced circumstances.

The Centers for Disease Control and Prevention has recommended exercising to cope with stress and maintain health during the COVID-19 pandemic (Centers for Disease Control and Prevention, 2021). It is possible that people who chose exercise as a coping strategy to remain healthy during the COVID-19 pandemic maintained their psychological well-being. Furthermore, Faulkner et al. (2021) reported in their multi-country cross-sectional study that 15.2% of the adults who participated in their study made positive changes in their exercise behaviors during the early COVID-19 restrictions, compared to the pre-COVID-19 restrictions, and were found to have significantly higher psychological well-being than those who made negative changes to their exercise behaviors. However, it is unclear how older adults—who are more vulnerable to COVID-19—exercised as a coping mechanism during the pandemic, and how such exercises are related to their psychological well-being. Additionally, the association between exercise and psychological well-being may vary depending on the exercise type. However, as De Sousa et al. (2021) point out, the effects of different forms of exercise on mental health during the pandemic remain unexplored due to a lack of original studies investigating these associations.

This study aimed to examine 1) the prevalence of community-dwelling older adults who engaged in exercise as health-promoting coping behaviors during the stay-at-home period of the first wave of the pandemic in Japan; and 2) the relationship between such exercises and psychological well-being, using data from before and during the pandemic.

Material and methods

Participants and procedure

This study was based on a cohort study, "The Otassha Study," of community-dwelling older adults living in Itabashi Ward, an urban area of Tokyo, Japan. The study began in 2011. At the start of the study, we sent mail recruitment letters to all residents aged 65–84 years who were

registered in the Basic Resident Register of Itabashi Ward and were living in the study area in October 2011. The respondents participated in a comprehensive health survey that included motor and cognitive functioning tests, and medical interviews. We followed up with our participants every year and recruited new participants each year as they turned 65-years old. The details and results of this cohort study are described elsewhere (Kawai et al., 2018; Kera et al., 2018). In the current study, the initial participants were 720 older adults (mean age [standard deviation {SD}], 73.9 [6.7] years; range, 65–92 years; 36.9% men) who participated in a comprehensive health survey in October 2019 (baseline survey, BL). On June 29, 2020, after the state of emergency was lifted on May 25, 2020, we sent the participants a self-report questionnaire (follow-up survey, FL). Of the initial participants, 618 responded (mean age [SD], 73.7 [6.5] years; range, 65–92 years; 36.7% men; response rate, 85.8%). Figure 1 presents a process flowchart illustrating the enrollment of the study participants. Ethical approval was granted by the ethics committee of the Tokyo Metropolitan Institute of Gerontology (approval no. 2020-2, 2019-E32). Before study participation, all participants provided written informed consent for both the BL and FL studies.

Measurements

Dependent variable

Psychological well-being was assessed at both BL and FL using the WHO-5 Well-Being Index (WHO-5)—the most widely used questionnaire for measuring subjective psychological well-being (Topp et al., 2015). Respondents answered five statements about their feelings over the past two weeks. The total score ranges from 0 to 25, with higher scores indicating higher psychological well-being. The validity and utility of the Japanese version among older adults were already evaluated by Awata et al. (2007).

Independent variable

To explore the health-promoting coping behaviors during the COVID-19-related stay-at-home period in Japan, the authors—who have specialized in long-term care prevention, gerontology and health behavioral sciences—developed a questionnaire regarding coping behaviors. The questionnaire asked the following question: What measures have you taken to maintain your physical and mental health during the stay-at-home period? The respondents selected answer(s) that were applicable to them from a list comprising 11 items which addressed their hobbies, social interactions, diets, and exercises. Regarding exercise, the respondents were asked to select from the following two types of exercise: 1) walking and 2) at-home exercise and strength training. Respondents selected the type of exercise that they engaged in during the stay-at-home period. In Japan, during the stay-at-home period, people could only exercise in private outdoor settings or at-home due to social distancing measures and the closing of sports clubs, gyms, and other common places for exercise. Therefore, we selected walking, which is the most popular exercise among Japanese older adults (Japan Sports Agency, 2019), as the outdoor exercise, and at-home training as the indoor exercise.

Covariates

The covariates, that were reported to be associated with psychological well-being in previous studies, were collected at BL; sex (Pinquart & Sörensen, 2001), age, family structure, perceived financial status (Zhou et al., 2019), and regular exercise (Chodsko-Zajko et al., 2009).

Family structure was determined based on the question "Who do you currently live with?" Respondents selected answer(s) from following options: no one (living alone) or spouse, son, daughter, parent, child-in-

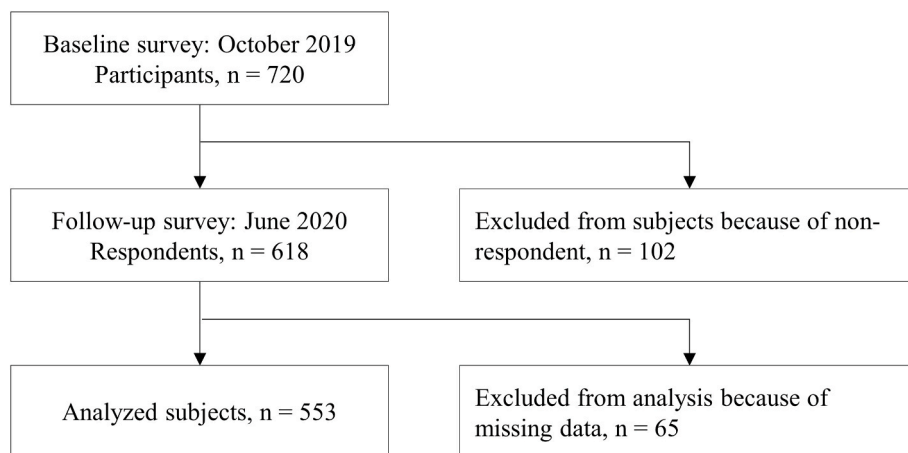


Figure 1. Flow diagram of study participant enrollment

law, parent-in-law, grandchildren, or others (not living alone). Based on their answer, the respondents were categorized as “living alone” or “not living alone.”

Perceived financial status was determined based on the question “Generally speaking, do you have financial leeway?” Respondents selected an answer from following: (1) I have a lot of financial leeway, (2) I have financial leeway, (3) average, (4) my finances are tight, or (5) my finances are very tight. Respondents who selected (1) to (3) were categorized as “not tight,” and those who selected (4) or (5) were categorized as “tight.” (Sakurai et al., 2019).

Regular exercise was determined based on the question “How often do you do exercise or participate in sporting activities per week?” Respondents selected an answer from following: (1) everyday, (2) five to six times, (3) two to four times, (4) once a week or less, or (5) not at all. Based on a Japanese nationwide survey, the National Health Nutrition Survey (Ministry of Health, Labour and Welfare, 2018), respondents who exercised twice a week or more were categorized as “regular exercise,” and those who exercised once a week or less were categorized as “irregular exercise.”

Other variables

The prevalence of chronic diseases, which increase vulnerability to COVID-19, such as hypertension, diabetes, and heart disease, were assessed by the nurses at BL.

Statistical methodology

Patterns of missing data were evaluated using Little’s MCAR test. To investigate the association between exercise as a coping strategy during the stay-at-home period and psychological well-being, based on their response to each exercise, participants were divided into a) walking and non-walking groups and b) home training and no home training groups, and the effects of each exercise were examined. Additionally, participants were divided into four groups: walking and home training, walking only, home training only, and neither walking nor home training groups, after which, effective exercise combinations were examined. Homogeneity of variance was evaluated using Box’s M test. Descriptive statistics were used to characterize each group. We investigated the effects of time and group interaction on the WHO-5 scores using a two-way analysis of covariance (ANCOVA) adjusted for age, sex, family structure, perceived financial status, and regular exercise at BL. When the interaction effect was significant, simple main effects were analyzed. Moreover, Cohen’s d effect size of the change in the WHO-5 score was calculated using the adjusted mean score and SD. All statistical analyses were performed using IBM SPSS Statistics for Windows,

Version 23.0 (IBM Japan, Ltd., Tokyo, Japan). The significance level was set at $p < 0.05$.

Results

The evaluation of the missing data with Little’s MCAR test indicated that the data were missing completely at random ($p = 0.549$), so listwise deletion was used. The final sample comprised 553 participants, whose responses had no missing values (mean age [SD], 73.5 [6.5] years; range, 65–92 years; 37.1% men). The WHO-5 mean scores (SD) of all the participants at BL and FL were 16.7 (4.8) and 15.0 (5.2). First, walking’s impact on psychological well-being was examined. Of the final sample, 360 (65.1%) belonged to the walking group (mean age [SD], 73.7 [6.2] years; 39.2% men) and 193 belonged to the non-walking group (mean age [SD], 73.0 [6.9] years; 33.2% men) (Table 1). Among the walking and non-walking groups, 46.7% and 31.6% of the participants engaged in regular exercise at BL, respectively. The WHO-5 mean scores (SD) at BL and FL were 16.7 (4.9) and 15.3 (5.1) for the walking group and 16.7 (4.7) and 14.5 (5.3) for the non-walking group, respectively.

Figure 2 shows the adjusted WHO-5 mean scores at BL and FL of the walking and non-walking groups. The ANCOVA showed a significant interaction for time and group ($F = 7.69, p = 0.006$). The simple main

Table 1
Baseline characteristics of participants in the walking groups during the stay-at-home period.

	Walking group (n = 360)		Non-walking group (n = 193)	
	n	%	N	%
Sex				
Men	141	39.2%	64	33.2%
Women	219	60.8%	129	66.8%
Age (mean (SD))	73.7	(6.2)	73.0	(6.9)
Family structure				
Not living alone	259	71.9%	149	77.2%
Living alone	101	28.1%	44	22.8%
Perceived financial status				
Not tight	313	86.9%	157	81.3%
Tight	47	13.1%	36	18.7%
Regular exercise				
Irregular	192	53.3%	132	68.4%
Regular	168	46.7%	61	31.6%
Chronic diseases				
Hypertension	140	38.9%	85	44.0%
Diabetes	33	9.2%	21	10.9%
Heart disease	51	14.2%	35	18.1%
WHO-5 score (mean (SD))				
Baseline survey	16.7	(4.9)	16.7	(4.7)
Follow-up survey	15.3	(5.1)	14.5	(5.3)

Note. SD; standard deviation, WHO-5; WHO-5 Well-Being Index

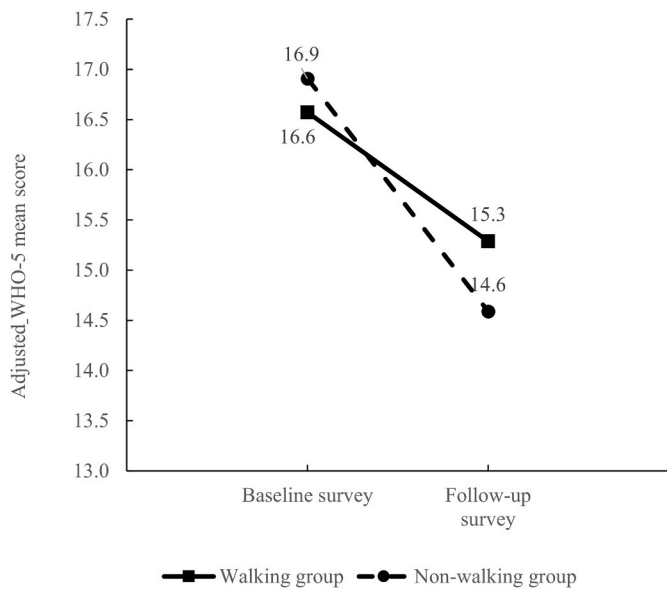


Figure 2. Adjusted WHO-5 well-being index (WHO-5) mean scores at baseline and follow-up surveys of participants (walking versus No walking)
 Note. Adjusted for age, sex, family structure, perceived financial status, and regular exercise at baseline survey.

effect of time was significant in both groups ($p < 0.001$), whereas the main group effect was not significant at BL and FL ($p = 0.426, p = 0.130$, respectively). Cohen's d effect size of the change in the WHO-5 score was 0.263 and 0.471 for the walking and non-walking groups, respectively.

Second, home training's impact on psychological well-being was examined. Of the total sample, 312 (56.4%) participants belonged to the home training group (mean age [SD], 74.2 [6.5] years; 32.1% men) and 241 belonged to the no home training group (mean age [SD], 72.4 [6.2] years; 43.6% men) (Table 2). Among the home training and no home training groups, 45.8% and 35.7% of the participants engaged in regular exercise at BL, respectively. The WHO-5 mean scores (SD) at BL and FL were 17.5 (4.3) and 15.5 (5.1) for the home training group and 15.7 (5.2) and 14.5 (5.3) for the no home training group, respectively.

Figure 3 shows the adjusted WHO-5 mean scores at BL and FL of the

Table 2

Baseline characteristics of participants in the at-home training groups during the stay-at-home period.

	Home training group (n = 312)		No home training group (n = 241)	
	n	%	n	%
Sex				
Men	100	32.1%	105	43.6%
Women	212	67.9%	136	56.4%
Age (mean (SD))	74.2	(6.5)	72.4	(6.2)
Family structure				
Not living alone	221	70.8%	187	77.6%
Living alone	91	29.2%	54	22.4%
Perceived financial status				
Not tight	281	90.1%	189	78.4%
Tight	31	9.9%	52	21.6%
Regular exercise				
Irregular	169	54.2%	155	64.3%
Regular	143	45.8%	86	35.7%
Chronic diseases				
Hypertension	121	38.8%	104	43.2%
Diabetes	32	10.3%	22	9.1%
Heart disease	47	15.1%	39	16.2%
WHO-5 score (mean (SD))				
Baseline survey	17.5	(4.3)	15.7	(5.2)
Follow-up survey	15.5	(5.1)	14.5	(5.3)

Note. SD; standard deviation, WHO-5; WHO-5 Well-Being Index

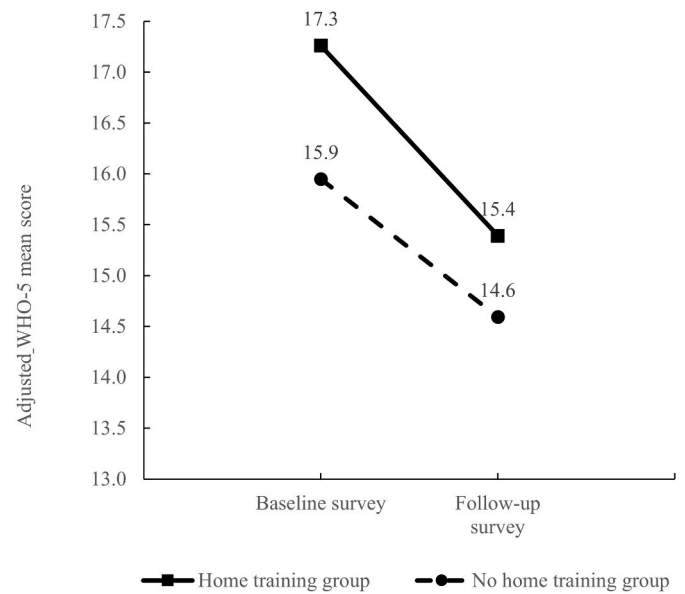


Figure 3. Adjusted WHO-5 Well-Being Index (WHO-5) Mean Scores at Baseline and Follow-up Surveys of Participants (Home Training vs. No Home Training)
 Note. Adjusted for age, sex, family structure, perceived financial status, and regular exercise at baseline survey.

home training and no home training groups. The ANCOVA showed no significant interaction ($F = 1.98, p = 0.160$), and only the main group effect was significant ($p = 0.011$; main effect of time: $p = 0.087$). Cohen's d effect size of the change in the WHO-5 score was 0.380 and 0.275 for the home training and no home training groups, respectively.

Finally, we examined the effective exercise combinations. Of the final sample, 225 (40.7%), 135 (24.4%), 87 (15.7%), and 106 (19.2%) belonged to the walking and home training, walking only, home training only, and neither walking nor home training groups, respectively (Table 3). The evaluation of the data's homogeneity of variance with Box's M test indicated that it met the necessary assumptions ($p = 0.219$). The WHO-5 mean scores (SD) at BL and FL were 17.7 (4.3) and 16.0 (4.9), 15.0 (5.3) and 14.2 (5.3), 16.9 (4.3) and 14.1 (5.4), and 16.6 (5.0) and 14.8 (5.2) for the walking and home training, walking only, home training only, and neither walking nor home training groups, respectively.

Figure 4 shows the four groups' adjusted WHO-5 mean scores at BL and FL. The ANCOVA showed a significant interaction for time and group ($F = 3.71, p = 0.012$). Time's simple main effect was significant in all the groups ($p = 0.014$ in the walking only group and $p < 0.001$ in the other three groups). Group's simple main effect was significant between the walking and home training group versus the walking only group and the neither walking nor home training group versus the walking only group at BL ($p < 0.001, p = 0.018$, respectively), and between the walking and home training group versus the walking only group and the walking and home training group versus the home training only group at FL ($p = 0.026, p = 0.033$, respectively). Cohen's d effect size of the change in the WHO-5 score was 0.313, 0.180, 0.560, and 0.407 for the walking and home training, walking only, home training only, and neither walking nor home training groups, respectively.

Discussion

This study examined the prevalence of older adults who engaged in exercise as a health-promoting coping behavior during the stay-at-home order in the first wave of the COVID-19 pandemic in Japan and its impact on their psychological well-being. In this study, approximately 80% of the participants, who are community-dwelling older adults, engaged in either walking or exercise and strength training at home to

Table 3
Baseline characteristics of the participants based on the combination of the two types of exercise during the stay-at-home period.

	Walking and home training group (n = 225)		Walking only group (n = 135)		Home training only group (n = 87)		Neither walking nor home training group (n = 106)	
	n	%	n	%	n	%	n	%
Sex								
Men	76	33.8%	65	48.1%	24	27.6%	40	37.7%
Women	149	66.2%	70	51.9%	63	72.4%	66	62.3%
Age (mean (SD))	74.4	(6.3)	72.5	(5.8)	74	(6.9)	72.3	(6.7)
Family structure								
Not living alone	155	68.9%	104	77.0%	66	75.9%	83	78.3%
Living alone	70	31.1%	31	23.0%	21	24.1%	23	21.7%
Perceived financial status								
Not tight	207	92.0%	106	78.5%	74	85.1%	83	78.3%
Tight	18	8.0%	29	21.5%	13	14.9%	23	21.7%
Regular exercise								
Irregular	113	50.2%	79	58.5%	56	64.4%	76	71.7%
Regular	112	49.8%	56	41.5%	31	35.6%	30	28.3%
Chronic diseases								
Hypertension	84	37.3%	56	41.5%	37	42.5%	48	45.3%
Diabetes	22	9.8%	11	8.1%	10	11.5%	11	10.4%
Heart disease	28	12.4%	23	17.0%	19	21.8%	16	15.1%
WHO-5 score (mean (SD))								
Baseline survey	17.7	(4.3)	15.0	(5.3)	16.9	(4.3)	16.6	(5.0)
Follow-up survey	16.0	(4.9)	14.2	(5.3)	14.1	(5.4)	14.8	(5.2)

Note. SD; standard deviation, WHO-5; WHO-5 Well-Being Index.

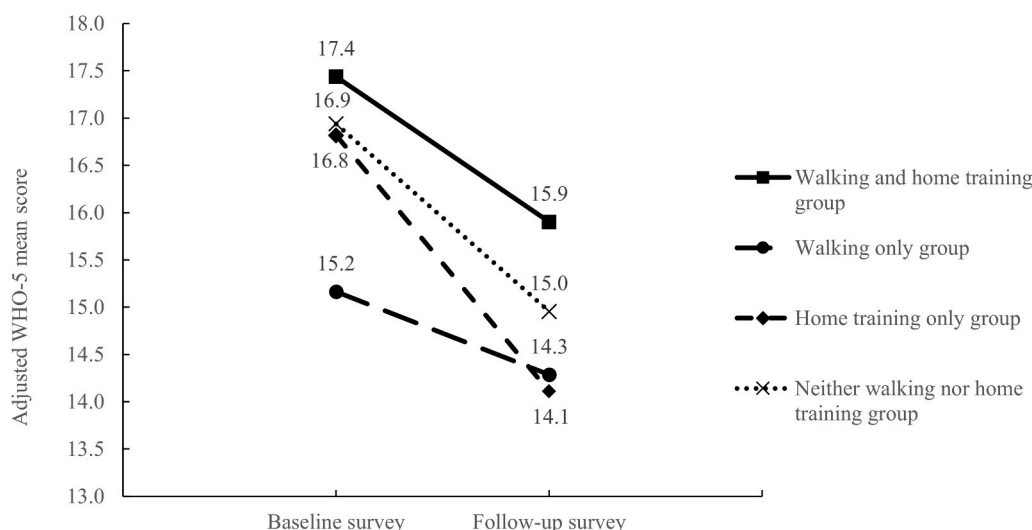


Figure 4. Adjusted WHO-5 well-being index (WHO-5) mean scores at baseline and follow-up surveys of participants (four groups)
Note. Adjusted for age, sex, family structure, perceived financial status, and regular exercise at baseline survey.

maintain their health. These exercises proved to be associated with older adults' psychological well-being, with different impacts observed depending on the activity type.

Specifically, 65% and 56% of the participants engaged in walking and home training, respectively, as health-promoting coping behaviors during the stay-at-home order to maintain their health. This study revealed that most community-dwelling older adults engaged in either walking or home training to maintain their health. It is possible that the older adults became more interested in exercise and health maintenance because pandemic restrictions prevented them from engaging in more social activities. According to Faulkner et al.'s (2021) study, 15.2% of adults positively changed their exercise behaviors during the early COVID-19-related restrictions compared to before the COVID-19-related restrictions. Interestingly, before the COVID-19-related restrictions, 74% of them did not meet the recommended amount of physical activity. This also suggested that people who were not physically active before the pandemic were encouraged to exercise. Amagasa et al. (2021)

reported that public awareness about physical inactivity increased at an unprecedented rate during the state of emergency in Japan.

Moreover, some pandemic guidelines and recommendations related to physical activity and exercise may have encouraged older adults to engage in exercise (Khoramipour et al., 2021; Polero et al., 2020). Another reason we observed for the high prevalence of exercise during the pandemic may be the participants' characteristics. Our participants were likely to have more positive attitudes toward health than the general population because we selected them from a health-focused cohort study—it is likely the rates of using exercise as a coping behavior during the stay-at-home order were lower among the non-respondents at FL or among Japanese older adults in general. In this study, the change in WHO-5 score between BL and FL was -1.65 . Additionally, the yearly fluctuations in WHO-5 score in this longitudinal cohort were 0.32 and -0.28 in 2017–2018 and 2018–2019, respectively (data not shown). These changes were smaller than that of this study, which was conducted during the pandemic. Thus, the effect of the

pandemic on psychological well-being was considered much greater than the normal annual change. To prevent the increase in poor health outcomes from pandemic-associated physical inactivity, it is extremely necessary to support good exercise habits in the population.

Exercise as a health-promoting coping behavior during the stay-at-home order was associated with psychological well-being in community-dwelling older adults in Japan, with different impacts observed depending on the activity type. While participants who walked to maintain physical and mental health reported declines in psychological well-being, they still maintained better well-being than those who did not walk. In line with previous cross-sectional studies conducted on the COVID-19 pandemic (Jacob et al., 2020; Mageri et al., 2020), we confirmed that exercise was beneficial for psychological well-being. The primary novelty of this study is that it confirms previous cross-sectional studies, using a longitudinal method before and after the first wave of the COVID-19 outbreak in Japan. Previously, Smith et al. (2010) reported in a longitudinal study that walking is strongly and independently protective against the development of depressive symptoms (Smith et al., 2010). Through this study we have expanded the knowledge regarding walking's impact on mental health during the pandemic.

Meanwhile, although those who engaged in strength training at home had better psychological well-being than those who did not, we found no association between home training and changes in psychological well-being. A previous study showed that strength training decreases depression risk more than walking (Joshi et al., 2016). Although this finding was about depression, we reason that our study's results may have differed from this finding due to the special circumstances related to the COVID-19 pandemic—during the stay-at-home order in Japan, walking for exercise was one of the only legitimate reasons to go outside. Therefore, walking may have more significantly affected mental health than strength training at home in our sample because the mood improved due to going outside rather than the exercise type. Harada et al. (2017) found that objectively-measured outdoor time (steps per day) influenced older adult well-being and, thus, argued that encouraging older adults to go outdoors on foot may effectively delay psychological function decline. The result of our study is in line with this finding.

We further examined the effective exercise combinations of walking and home training to further understand the impact of exercise as coping behaviors on psychological well-being. Older adults who engaged in both walking and home training reported higher psychological well-being than those who engaged in only one of them at FL. The walking only group had the lowest WHO-5 score at BL, but the effect size of change in these scores was also the lowest among the four groups—the decline in psychological well-being was prevented the most for this group. However, the home training only group had highest effect size and the most severe decrease in the WHO-5 score. Among the four groups, the neither walking nor home training group had an intermediate score and effect size. This group may have preferred to use other coping strategies rather than exercise during this pandemic. It is necessary to investigate this group's coping strategies in the future.

The study has several limitations that are worth noting. First, the validity of assessment that was used to measure the coping behavior was not confirmed, and its sensitivity may have been lost due to the dichotomization of the responses. The amounts and frequencies of exercise that the participants undertook as a coping behavior were unclear. Moreover, since only two types of exercise were considered in this study, we could not examine the impact of other exercises (e.g., running). Second, although we did not measure the WHO-5 score during the stay-at-home order, it is possible that people with higher levels of psychological well-being were those who were able to walk outdoors during the stay-at-home order—notably, Julien et al.'s (2013) longitudinal study showed that depressive symptoms predicted reduced walking frequency among Canadian older adults. Third, we did not collect COVID-19 related data such as symptomatology, hospitalization, and the loss of a

loved one due to COVID-19 (López et al., 2020). However, since the number of positive COVID-19 cases in Tokyo at FL (June 29, 2020) was 6171 (Tokyo Metropolitan Government, 2021), which is only 0.04% of its population, it is unlikely that the results were affected by this, even if some of our participants had COVID-19. Finally, the results of this study were obtained from community-dwelling older adults in an urban area in Japan; thus, it is unclear whether these findings could be generalized to other areas with different situations and policies to control the spread of COVID-19.

Conclusion

Exercise as a health-promoting coping behavior during the stay-at-home order of the first wave of the pandemic in Japan was associated with psychological well-being, with different impacts observed depending on the activity type. Older adults who walked to maintain their physical and mental health experienced better well-being than those who did not. As of January 2021, Japan faced the third wave of COVID-19 (Ministry of Health, Labour and Welfare, 2020), with a larger number of new cases reported than during the first wave. The Japanese government declared another state of emergency and stay-at-home order again on January 8 (Prime Minister of Japan and His Cabinet, 2020). As the pandemic endures, continuing to encourage older adults to walk may help prevent declines in their psychological well-being.

Funding

This work was supported by the team expenses of Autonomous Prevention Research from Tokyo Metropolitan Institute of Gerontology, JSPS KAKENHI (grant numbers: 16K01853, 18K18462), and the 2019 Research Funding for Longevity Sciences (grant numbers: 29–42) from the National Center for Geriatrics and Gerontology, Japan. The funders had no role in the study design, data collection, analysis, decision to publish, or preparation of the manuscript.

Declaration of interest

The authors declare they have no conflicts of interest.

Declaration of competing interest

The authors declare they have no conflicts of interest.

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