

Suggestions Regarding the Impact of Coronavirus Disease 2019 Epidemic Responses on the Lives of the Older Japanese Population: Review of JAGES studies

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With the coronavirus disease 2019 (COVID-19) becoming a pandemic, it appears that the Japanese government will extend its policy of asking the public to stay home and avoid contact with others. Extending this policy will benefit the public as fewer individuals will be infected. On the other hand, there is concern that extension of these measures could increase the harm arising from individuals being homebound and having little interaction with others. Here, we summarize our suggestions regarding what should be done to meet the needs of the older Japanese population based on studies performed as part of the Japan Gerontological Evaluation Study (JAGES). This includes the health benefits associated with going out, interacting socially with others, and participating in social activities in the community and the risk of adverse effects that can arise when older adults do not engage in these activities.

JAGES studies reported that being homebound and having few social interactions with others increases an older adult's risk of developing dementia and needing long-term care. As a result, as older adults follow the government's recommendation to avoid the "three Cs" (closed spaces with poor ventilation, crowded places with many people nearby, and close-contact setting such as close-range conversations), to avoid increasing the risk of dementia and needing long-term care, they need some opportunities for social interaction and physical activity.

In the explanation that follows, the JAGES press releases are indicated in small font at the

end of the sentences, e.g., “1) Hirai 09-011” where “1)” is the number of the press release in the reference list, “Hirai” is the principal author’s name, and “09-011” is the year and number of the press release, which can be used to find the press releases on the JAGES website.

Not participating in social activities, being socially isolated, and being homebound constitute risks to older adult’s health

When older adults have no opportunity to participate in activities in the community or go out and interact socially with others, in other words, when they become socially isolated and homebound, they have a higher risk of having poorer health, a few years later, than those who are not isolated or homebound.

For example, it has been shown that older adults who spend less than 30 min a day walking, meet friends less than once a month, and do not participate in community activities, doing not work or perform housework are at risk of needing long-term care after 3 years¹⁾ Hirai 09-011. Similarly, it has been found that among older men and women, those who did not go out, shop, or cook, as well as men who did not garden and women who did not exercise, had twofold risk of onset of dementia after 3 years compared to those who did (Fig. 1)²⁾ Takeda 11-020. In addition, mortality risk was 1.3 times greater in older men who rarely met with friends than in to those who did at least once a month and 1.81 times greater in older women who had no friends (Fig. 2)³⁾ Aida 12-030.

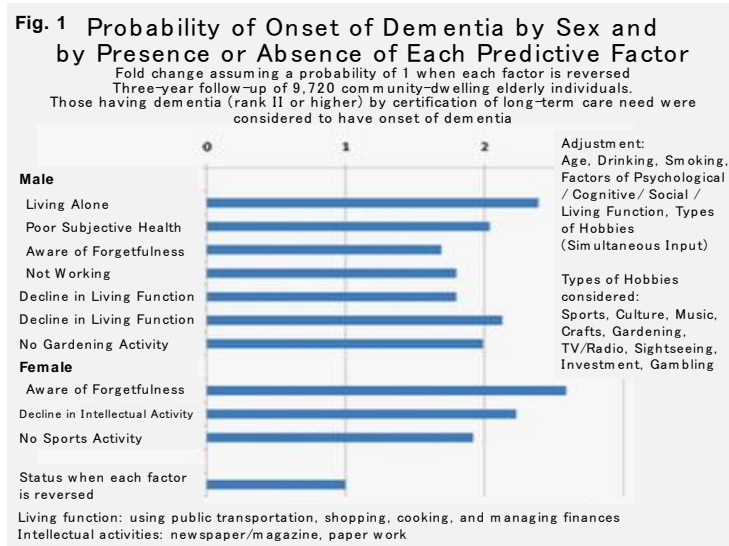
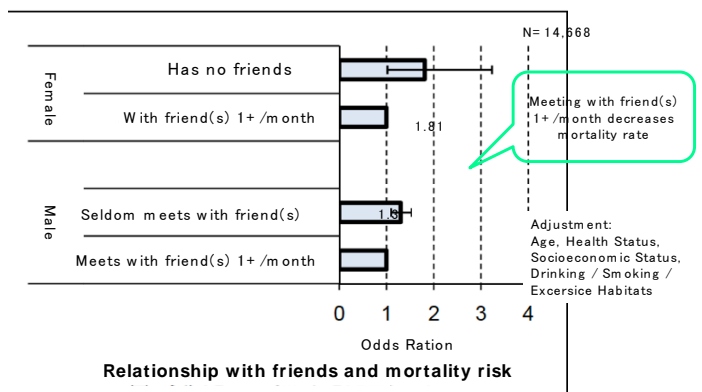


Fig. 2 Frequency of Meeting with Friends and Mortality Risk



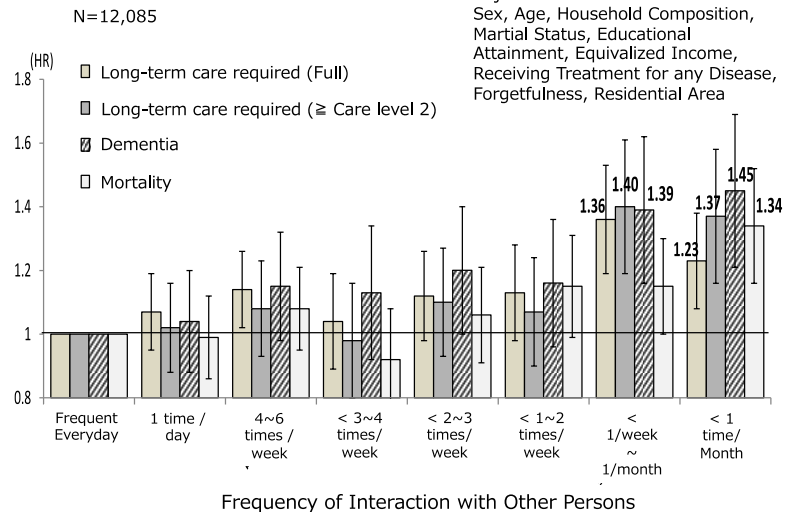
J. Aida, K. Kondo, H. Hirai, S.V. Subramanian, C. Murata, N. Kondo, Y. Ichida, K. Shirai and K. Osaka. Assessing the association between all-cause mortality and multiple aspects of individual social capital among the older Japanese. BMC Public Health (2011) 11(1), 499. DOI : 10.1186/1471-2458-11-499

Furthermore, compared to older adults who interacted with people outside the home daily or frequently, those who had less than one interaction per week or less than one per month had 1.3 to 1.4 times, respectively, the risk of long-term care needing or developing dementia. Those with less than one interaction a month, in addition to these risks, were 1.3 more likely to die prematurely. In other words, interacting with others less than once per week constitutes a level

of social isolation associated with long-term care needing and developing dementia, while interacting with others less than once per month constitutes a serious level of social isolation closely associated with premature death (Fig. 3)⁴⁾ Saito 054-14-08.

Next, we evaluate the type and frequency of interactions with others. Socially isolated older adults, those who directly interacted with separately living family members and friends in person (face-to-face interaction) or indirectly, such as by mail, telephone call, or e-mail (remote interaction) less than once or twice per month, were 1.28 times more likely to need long-term care and 1.22 times more likely to die after 4 years than those who were not socially isolated. These results indicated that, nationally, 25,000 older adults could potentially need long-term care and 31,000 could die from social isolation,

Fig. 3



indicating that there is an opportunity to improve the risk of needing long-term care or mortality in approximately 60,000 older adults⁵⁾ Saito 10-017. In addition, even older adults who only had few face-to-face interactions (but had other remote interactions, such as by telephone call) were 1.4 times more likely to need long-term care and

Fig. 4

	Estimation of population-attributable risk	
	Social isolation	
	In need of nursing care	Death
Relative risk ¹⁾	1.28	1.22
Exposure rate	15.5%	15.5%
Population-attributable risk	4.20%	3.25%
Real number ²⁾	25,091	31,269

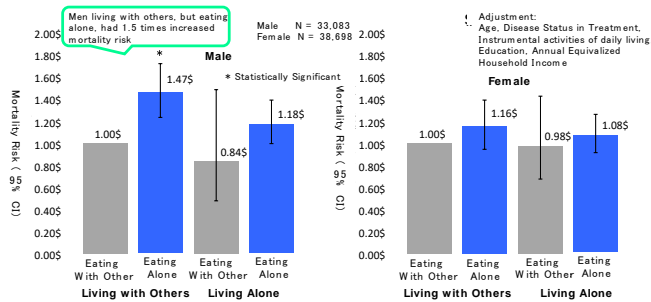
- 1) Sex, Age, Marital Status, Equivalent Income, Disease Status in Treatment, Residential Area were adjusted
- 2) Estimation was performed based on the number of people (nationwide) newly certified Long-term Care Required (597,114) and death of those aged over 65 years (960,917) in 2008

	Only face-to-face interaction is poor		Satisfied social isolation
	Long-term care required	Death	Long-time care required
Relative risk ¹⁾	1.37	1.47	1.22
Exposure rate	3.7%	3.7%	11.0%
Population-attributable risk	1.3%	1.7%	2.3%
Real number (10,000) ²⁾	0.8	1.6	1.3

- 1) Sex, Age, Marital Status, Disease Status in Treatment, Disorientation in Time and Place, Equivalent Income, Residential Area were adjusted
- 2) Estimation was performed based on the number of people (nationwide) newly certified Long-term Care Required (597,114) and death of those aged over 65 years (960,917) in 2008

1.5 times more likely to die prematurely. These results indicated that, annually, 8,000 older adults may be certified long-term care required and 16,000 may potentially die due to

Fig. 5 Eating Alone and Mortality
- A 3-year longitudinal study (2010-2013) -



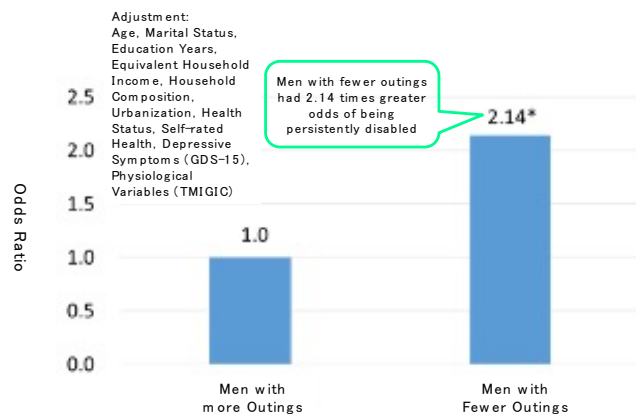
Tani Y, Kondo N, Noma H, Miyaguni Y, Saito M, Kondo K. Eating alone yet living with others is associated with mortality in older men: The JAGES cohort survey. *J Gerontol B Psychol Sci Soc Sci*

inadequate face-to-face interactions with others (Fig. 4)⁶⁾ Saito 11-028. Regarding meals, compared to peers who ate their meals with someone, men who lived alone and ate their meals alone were 2.7 times more likely and women who ate alone, regardless of whether they lived alone or with others, were 1.4 times more likely to have depression after 3 years (Fig. 5)⁷⁾

Tani 061-15-06.

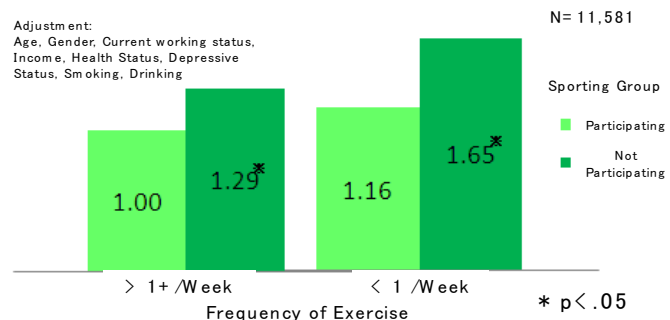
In a community that the more older adults who felt that they had fewer interactions with their neighbors, the more healthy older adults tended to become homebound. Regardless of population density or proportion of the population that was older, cities and towns with high rates of older adults who are socially withdrawn tended to have high percentages of the population certified to receive long-term care and high percentages of new certifications⁸⁾ Saito12-032. A follow-up survey after 2 ½ years also showed that socially withdrawn older men were 2.14 times more likely to have functional decline than men who were not socially withdrawn and continuously need a moderate level of long-term care and, their symptoms would further progress after receiving certification for higher level of long-term care (Fig. 6)⁹⁾ Saito138-18-1.

Fig. 6



Saito J, Kondo N, Saito M, Takagi D, Haseda M, Tani Y, Tabuchi T, Kondo K. Exploring 2.5-year trajectories of functional decline in older adults by applying a growth mixture model and frequency of outings as a predictor: a 2010-2013 JAGES cohort survey. *J Gerontol B Psychol Sci Soc Sci*

Fig. 7 Frequency of Exercise, Participating in Sporting Group and Incidence of Long-term Care Required
- A 4-year longitudinal study (2003-2007) -

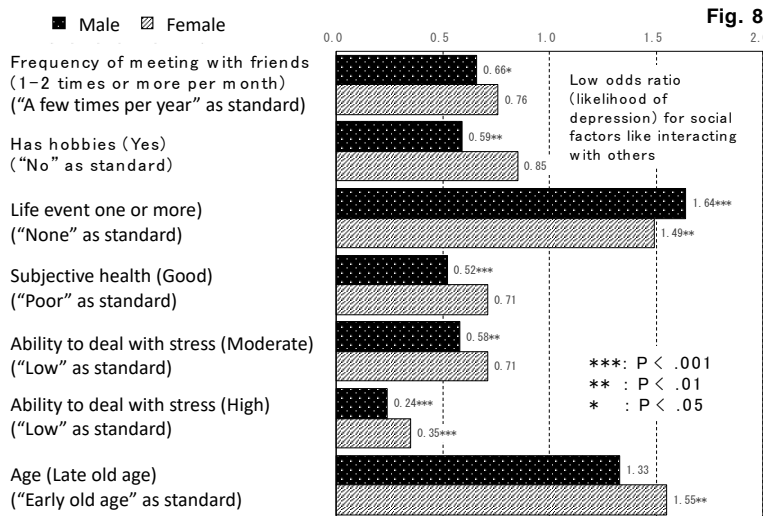


Kanamori S, Kai Y, Kondo K, Hirai H, Ichida Y, Suzuki K, Kawachi I. Participation in sports organizations and the prevention of functional disability in older Japanese: the AGES Cohort Study. *PLOS ONE* 2012

In addition, compared with older adults who joined sports groups and exercised at least once per week, those who were not participating in a group and exercised less than once per

week had 1.65 times greater risk of needing long-term care after 4 years. Even though older adults exercised at least once per week, if they do exercise alone, their risk was still 1.29 times greater than older adults who participated in sporting group. Thus, exercising with others appears to mitigate the risk of needing long-term care (Fig. 7)¹⁰ Kanemori 12-041.

Outings, social interaction, and social participation are important for elderly health



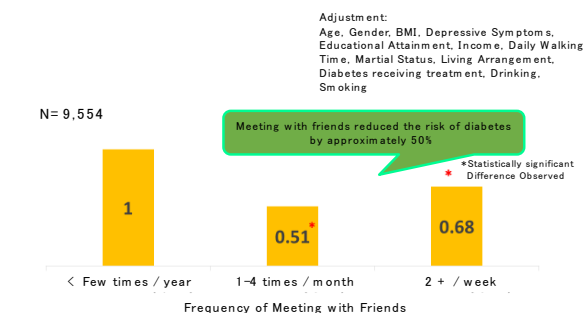
Jimpei Misawa & Katsunori Kondo (2018) Social factors relating to depression among older people in Japan: analysis of longitudinal panel data from the AGES project, Aging & Mental Health, DOI: 10.1080/13607863.2018.1496225

To date, JAGES studies have shown that, in older adults, outings, social interaction, and social participation are extremely important for health maintenance. For example, compared to older adults without depressive symptoms who met with friends less than a few times a year, among older adults who met with friends at least once per

month, 30% fewer men had depression after 4 years (Fig. 8)¹¹ Misawa 163-18-26. Moreover, older adults who met with friends 1-4 times per month had about half the risk of developing diabetes compared to those who met with friends, at most a few times annually (Fig. 9)¹² Yokobayashi 102-16-32.

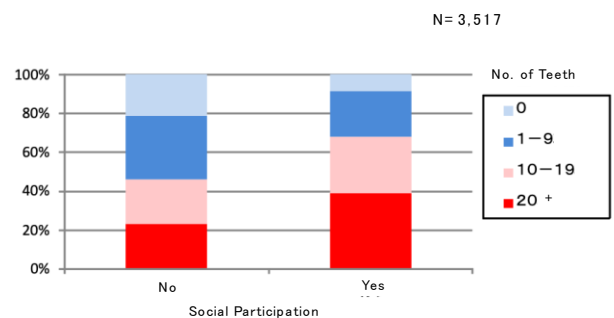
Being socially active with friends also has a major impact on health; for example, an analysis of data at one point in time showed that socially active older adults had 1.3 times as many

Fig. 9 Risk of Uncontrolled Diabetes



Yokobayashi K, Kawachi I, Kondo K, Kondo N, Nagamine Y, Tani Y, et al. (2017) Association between Social Relationship and Glycemic Control among Older Japanese: JAGES Cross-Sectional Study. PLoS ONE 12(1): e0169904. doi:10.1371/journal.pone.0169904

Fig. 10 Social Participation and Dental Health Status



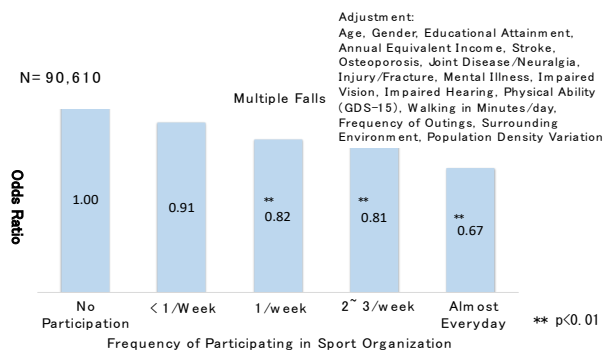
Takeuchi K, Aida J, Kondo K, Osaka K, Osaka K. Social Participation and Dental Health Status among Older Japanese Adults: A Population-based Cross-sectional Study. PLOS ONE 2013. doi: 10.1371/journal.pone.0061741

teeth as people who were not (Fig. 10)¹³ Takeuchi 13-

042. Another study showed that 20% fewer older adults who participated in activities at a sports organization at least once per week compared to those who did not had a history of falls (Fig. 11). In addition, the more frequently they participated in an activity, the less often these older adults had had a fall¹⁴⁾ Hayashi 053-14-07. Moreover, older adults had a lower risk of falling when they exercised in a group rather than alone (Fig. 12)¹⁵⁾ Hayashi 162-18-25. Compared to older adults who did not exercise, those who exercised at least twice per week or with others had reduced risk of having depression by almost half (47–48%) after 2 years (Fig. 13). Moreover, older adults who exercised with someone at least twice per week had a 60% lower risk of depression¹⁶⁾ Kanamori 153-18-16.

Fig. 11

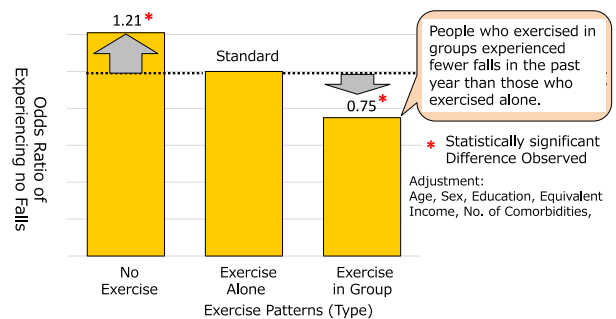
Falls and Participating in Sports Organization



Hayashi T, Kondo K, Suzuki K, et al. Factors associated with falls in community-dwelling older people with focus on participation in sport organizations: the Japan gerontological evaluation study project. *BioMed research international* 2014; 2014:537614 doi: 10.1155/2014/537614[Published Online First: Epub Date]

In a longitudinal follow-up study, in socially active older adults, the risks of needing long-term care and mortality after 9.4 years were both 20% lower than those in older adults who were not socially active (Fig. 14)¹⁷⁾ Takahashi 202-19-36. Furthermore, in 65 – 74 years old older adults, being socially active reduced the risk of developing dementia by 22% after 10 years (Fig. 15)¹⁸⁾ Nemoto 130-17-23. Furthermore, the more types of organization older adults used to participate in, the greater the reduction in the risk of needing long-term care after 4 years compared to older adults who were not socially active, that is, 17% for one type, 28% for two types, and 43% for three or more types (Fig. 16). Particularly, older adults participating in activities at sports organizations had a 34% lower risk of needing long-term care after 4 years than those who did not (Fig. 17)¹⁹⁾ Kanamori 047-14-01. In older adults who participated in activities

Fig. 12

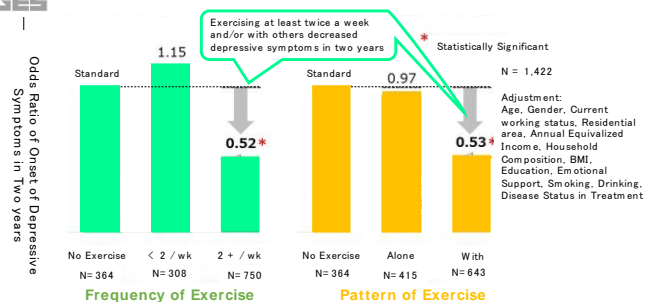


Hayashi T, Kondo K, Kanamori S, Tsuji T, Saito M, Ochi A, Ota S, Differences in Falls between Older Adult Participants in Group Exercise and Those Who Exercise Alone: A Cross-Sectional Study Using Japan Gerontological Evaluation Study (JAGES) Data. *International Journal of Environmental Research and Public Health*, 15(7), 1413, 2018.

Fig. 13

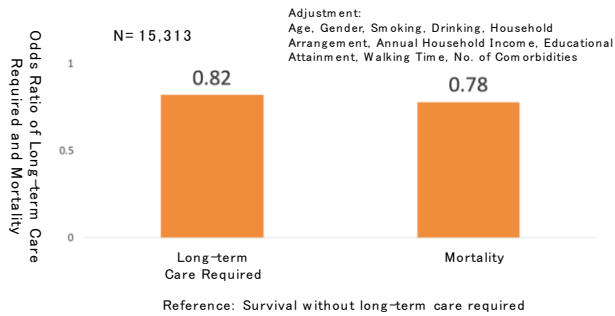


Frequency and Pattern of Exercise and Depression – A 2-year longitudinal study (2011-2013) –



Satoru Kanamori, Tomoko Takamiya, Shigeru Inoue, Yuko Kai, Taishi Tsuji & Katsunori Kondo. Frequency and pattern of exercise and depression after two years in older Japanese adults: the JAGES longitudinal study. *Scientific Reports* 2018; 8: 11224.

Fig. 14
Risk of Long-term Care Required and Mortality after 9.4 years (Odds Ratio)



Takahashi S, Ojima T, Kondo K, et al. Social participation and the combination of future needs for long-term care and mortality among older Japanese people: a prospective cohort study from the Aichi Gerontological Evaluation Study (AGES) *BMJ Open* 2019;9:e030500. doi: 10.1136/bmjopen-2019-030500

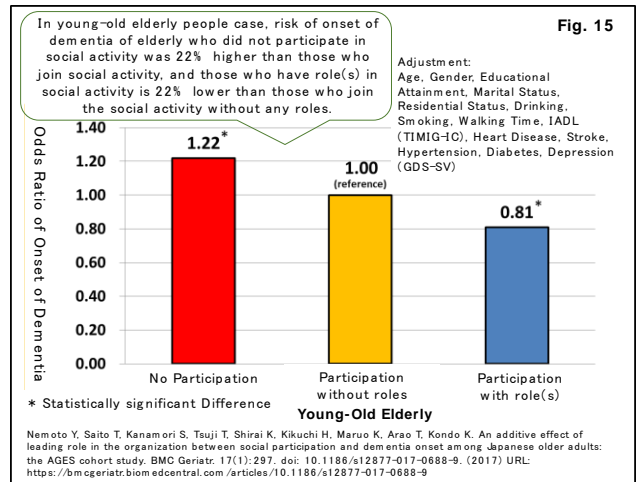
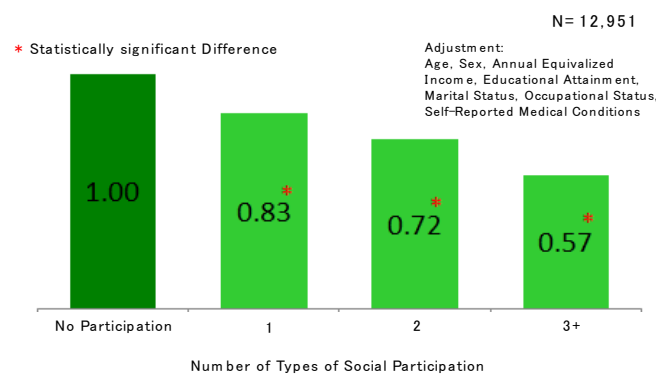
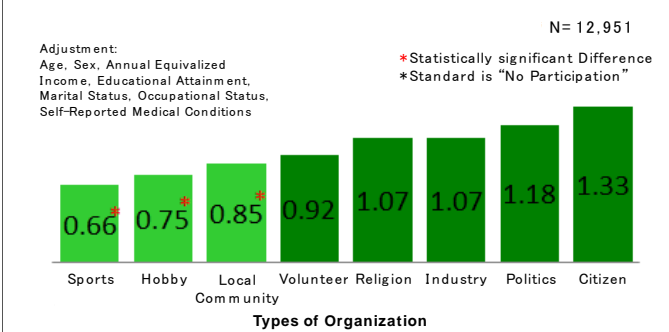


Fig. 16
Number of Types of Social Participation and Risk of Onset of Long-term Care Required



Kanamori S, Kai Y, Aida J, Kondo K, Kawachi I, et al. (2014) Social Participation and the Prevention of Functional Disability in Older Japanese: The JAGES Cohort Study. *PLoS ONE* 9(6): e99638. doi:10.1371/journal.pone.0099638

Fig. 17
Types of Social Participation and Risk of Onset of Long-term Care Required

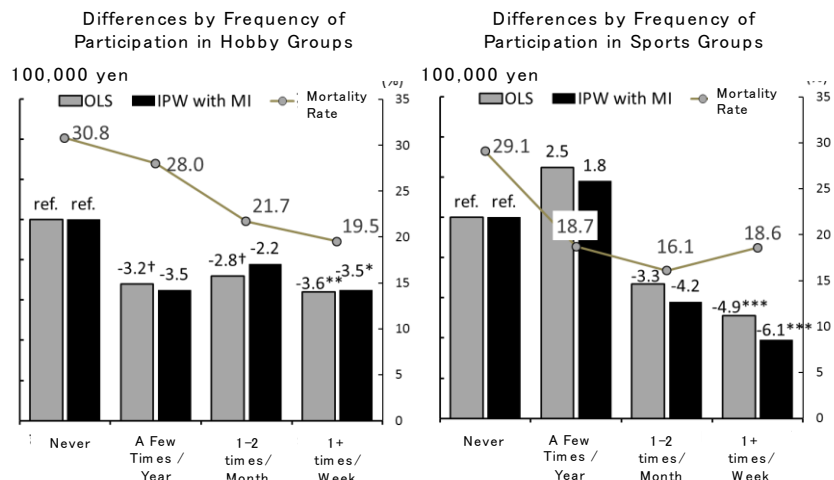


Kanamori S, Kai Y, Aida J, Kondo K, Kawachi I, et al. (2014) Social Participation and the Prevention of Functional Disability in Older Japanese: The JAGES Cohort Study. *PLoS ONE* 9(6): e99638. doi:10.1371/journal.pone.0099638

at least once per week at sports- or hobby-related clubs, the duration of their long-term care was shorter and total cost of long-term care was ¥350,000 to ¥610,000 lower than in older adults who never did (Fig. 18)²⁰ Saito 168-19-2.

A study that looked at *kayoi-no-ba* (places providing social activities in a community) all over Japan, found that older adults who used "kenkō kōryū no ie"

Fig. 18
N = 5,377



Saito Masashige, Aida Jun, Kondo Naoki, Saito Junko, Kato Hiroataka, Yasuhiro Ota, Amemiya Airi, Kondo Katsunori. Reduced long-term care cost by social participation among older Japanese adult: A eleven-year follow-up study in JAGES. *BMJ Open*.

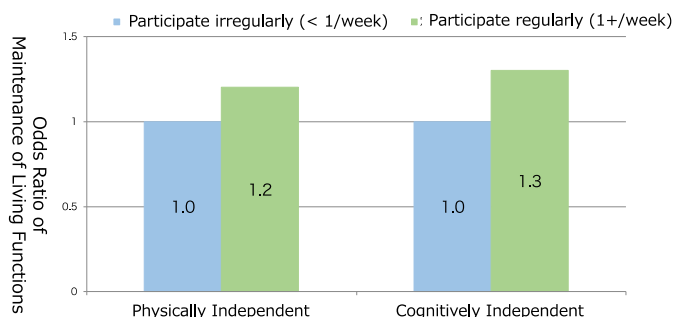
(community centers for health-related and social activities) at least once per week scored 1.2 times better on a standard Japanese measure of instrumental independence (ability to perform “housework,” such as cleaning and meal preparation) and 1.3 times better on a standard Japanese measure of intellectual activity (ability to perform intellectual activities, such as being creative and engaging in leisure activities) than those who did not. As a result, regular use of such facilities can help maintain and improve older adults’ functional capabilities (Fig. 19)²¹⁾ Hosokawa

Fig. 19

Usage of Community Centers and Maintaining Functional Capacity

Adjustment: Age, Sex, Income, Marital Status, Education, Functional Capacity

N=108



Ikuya Hosokawa, Katsunori Kondo, Michiyo Ito, Yasuhiro Miyaguni, Seiko Mizutani, Fumie Goto, Yoshinobu Abe, Yumi Tsuge, Yuko Handa, Toshiyuki Ojima. The Effectiveness of Japan’s Community Centers in Facilitating Social Participation and Maintaining the Functional Capacity of Older People. *Research on Aging*, 1-21, 2018.

156-18-19.

In addition, one study found that > 60% of older adults who participated in *kayoi-no-ba* activities had increased participation in other social activities (Fig. 20). More than 90% of these

Fig. 20 Social Participation after *Kayoinoba* and Health Information

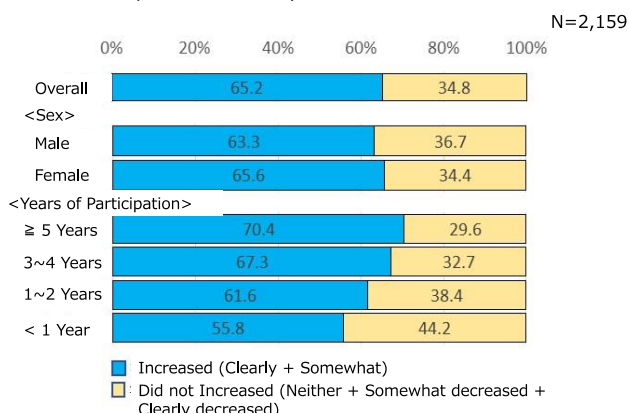
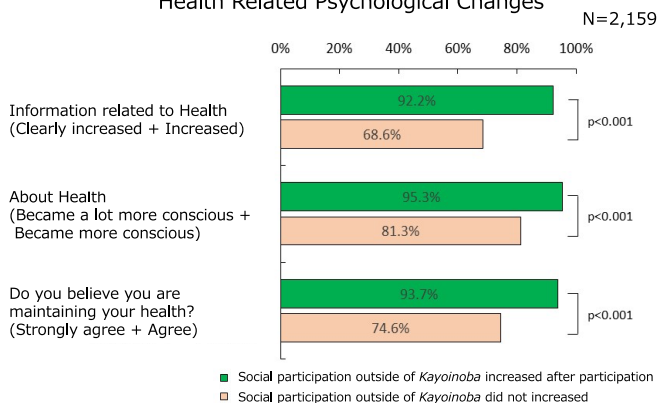
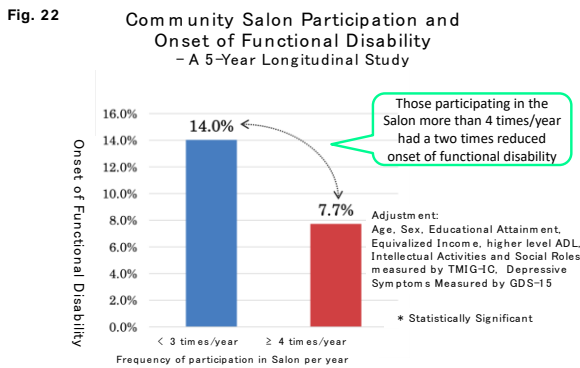


Fig. 21 Social Participation Outside of *Kayoinoba* and Health Related Psychological Changes

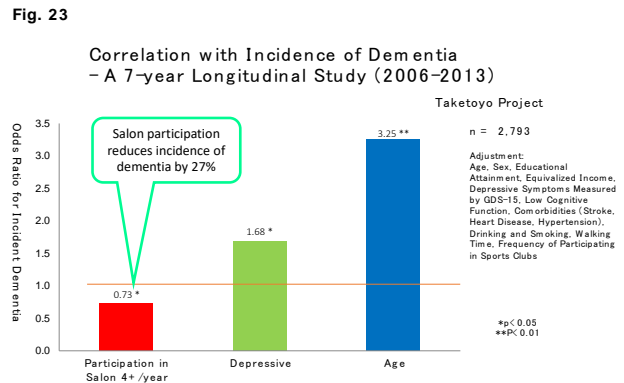


Hayashi T, Takeda T, Kato K, Kondo K. Association between subjective changes in social participation and those in the health information they receive and health awareness among participants in “Kayoino-Ba”: JAGES survey of participants in “Kayoino-Ba” [in Japanese]. *Sogo Rihabiriteshon*, Vol 47-11, pp.1109-1115, 2019 DOI <https://doi.org/10.11477/mf.1552201798>

activities resulted in desirable psychological changes, such as improving older adults health consciousness (Fig. 21)²²⁾ Hayashi 84-19-18. It has also been shown that older adults participating in “salons”—a type of community-based social activity, primarily for elderly residents, aimed at facilitating socializing and preventing long-term care—were 2.5 times more likely to subjectively rate their health as “good” after 2 years than non-participants²³⁾ Ichida 13-043. After 5 years, older adults who participated in “salon” activities had reduced risk of having been certified for long-term care by half than that in those who did not attend “salon” activities (Fig. 22)²⁴⁾ Hikichi056-15-01. After 7 years, in “salon” participants, the risk of dementia was reduced by 30% (Fig 23)²⁵⁾ Hikichi 095-16-25.



Hikichi H, Kondo N, Kondo K, Aida J, Takeda T, Kawachi I. Effect of a community intervention programme promoting social interactions on functional disability prevention for older adults: propensity score matching and instrumental variable analyses. JAGES Taketoyo study. *J Epidemiol Community Health* 2015;69(9):905-910.

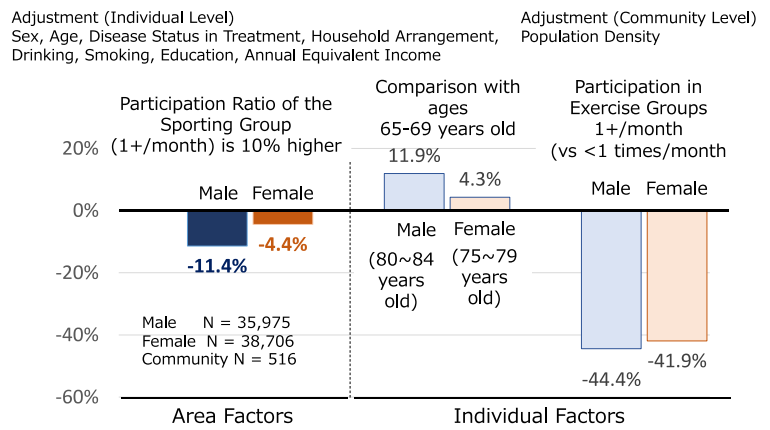


Hikichi H, Kondo K, Takeda T, Kawachi I. Social interaction and cognitive decline: Results of a 7-year community intervention. *Alzheimers Dement (N Y)* 2017, 3(1):23-32.

Studies have also suggested that social participation has a knock-on effect on non-participants in the surrounding environment. For example, if the percentage of residents participating in community-based exercise groups was 10% higher, regardless of whether an older adult was a participant, from the perspective of community's overall risk for elderly adults of developing depression, that risk decreased by 11% in men and 4% in women (Fig. 24)²⁶ Tsuji 135-17-27. Moreover, after 6 years, the community-level risk of developing dementia was found to be 8% lower²⁷ Tsuji 182-19-16. Another study found that an older adult living in a community where rather fewer elderly older adults participated in social activities had a 10% lower risk of dementia-related decline in instrumental activities of daily living in 3 years (Fig. 25)²⁸ Fujihara 174-19-8.

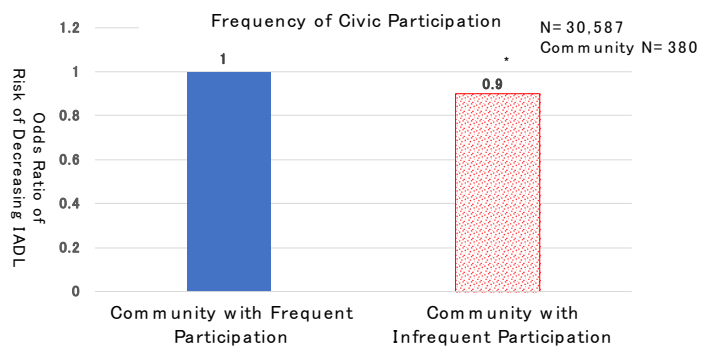
Similarly, when more older adults in the community participated in social activities, the prevalence of high blood pressure among the community's elderly population was

Fig. 24 Community-level Sports Group Participation and Older Individuals' Depressive Symptoms – A Multi Level Analysis -



Tsuji T, Miyaguni Y, Kanamori S, Hanazato M, Kondo K. Community-level sports group participation and older individuals' depressive symptoms. *Medicine & Science in Sports & Exercise* 2018 Jun;50(6):1199-1205. Doi: 10.1249/MSS.0000000000001541

Fig. 25 Community-Level Civic Participation and Risk of Decreasing IADL in 3 years

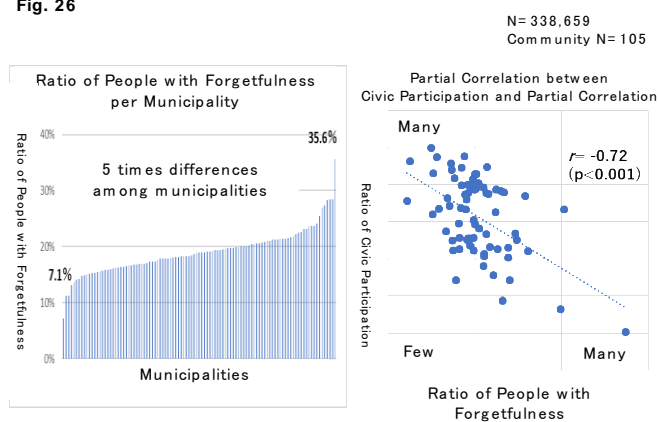


Fujihara S, Tsuji T, Miyaguni Y, Aida J, Saito M, Koyama S, Kondo K. International Journal of Environmental Research and Public Health, 16(5), 828, 2019; <https://doi.org/10.3390/ijerph16050828>

found to be lower. For example, with 5% more socially active participants, the prevalence of high blood pressure was 2–3% lower²⁹⁾ Nakgomi 173-19-7. In addition, cities and towns with large numbers of older adults who were socially active had fewer older adults who suffered from forgetfulness (Fig. 26)³⁰⁾ Jeong 189-19-23 . They also tended to have a lower number of older adults needing support services or long-term care (Fig. 27)³¹⁾ Ito 171-19-5.

In addition, in another study, 35.6% of men and 31.3% of women who were frail but not yet in need of long-term care had improved health in 3 years. Behaviors that they were found to have had in common included going out daily, walking for at least 30 min daily, and meeting with friends at least once a month (Fig. 28)³²⁾ Watanabe 136-17-28.

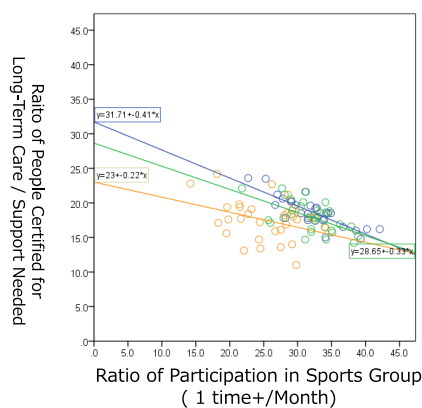
Fig. 26



Seungwon Jeong, Yusuke Inoue, Katsunori Kondo, Kazushige Ide, Yasuhiro Miyaguni, Eisaku Okada, Tokunori Takeda, Toshiyuki Ojima. Correlations between Forgetfulness and Social Participation: Community Diagnosing Indicators. Int. J. Environ. Res. Public Health 16(13): 2426, 1–11, 2019.

Fig. 27

Ratio of Participation in Sports Group and Ratio of People Certified for Long-term Care/Support Needed



So, what should be done?

From these studies, it can be expected that, in older adults, not participating in social activities and being socially isolated and homebound will increase the risks related to developing depression, dementia, the need for long-term care, and mortality and severity of symptoms of older adults receiving long-term care. Response to the COVID-19 epidemic needs to be considered with the understanding that the benefit of controlling the risk of infection by having older adults refrain from going out, interacting with others, and participating in social/group activities will come at the expense of inflicting other health-related harms.

Going out, walking, interacting with other individuals, and social participation reduce older adults' risk of falling; developing hypertension, diabetes, depression, dementia, and long-term care and mortality. This opportunity is necessary to maintain and improve the health of all older adults in a community. As a result, approaches that will increase these opportunities even while controlling the risk of infection need to be established. Specifically, we believe that the benefits of going out and interacting with others can be largely maintained, if the risk of infection can be controlled by following the government's recommendations to "avoid the 3Cs." That is, avoiding

crowds and going out with a small number of individuals, avoiding closed spaces with poor ventilation and staying outside, and avoiding close contact by socializing in person by maintaining a distance of 2 m or remotely using the Internet (texting, e-mail, videoconferencing), phone calls, or writing letters.

Fig. 28
Characteristics of Seniors who Recover from Frailty at a Level that would Require Long-Term Care
- A 3 Year Longitudinal Study (2010/11-2013) -



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