The relationship of community activities with cognitive impairment and depressive mood independent of mobility disorder in Japanese older adults

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**A R T I C L E   I N F O**

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**A B S T R A C T**

**Aim:** This study aimed to examine the relationship of participating in community activities (CA) with cognitive impairment and depressive mood independent of mobility disorder (MD) among older Japanese people.

**Methods:** Elderly residents in institutions or those requiring long-term care insurance services were excluded; questionnaires were mailed to 5401 older adults in 2013. The response rate was 94.3% (n = 5094). We used multiple imputation to manage missing data. The questionnaire addressed physical fitness, memory, mood, and CA. Participants were divided into two groups (good and bad) based on the median scores for physical fitness, memory, and mood. We identified items related to periodically performed CA, cognitive impairment, and depressive mood, and examined correlations between scores on these sets of items.

**Results:** The mean age was 75.9 years; 58.4% of participants were women. The following CA significantly predicted reduced cognitive impairment and depressive mood independent of MD: volunteer activity, community activity, visiting friends at home, pursuing hobbies, paid work, farm work, and daily shopping. These results were corrected for age, sex, and response method (mail or home visit). Higher CA scores were associated with lower cognitive impairment and lower depressive mood independent of MD.

**Conclusions:** CA is negatively associated with cognitive impairment and depressive mood among community-dwelling elderly independent of MD; promoting CA may protect against cognitive impairment and depressive mood in this population. However, MD, cognitive impairment, and depressive mood may lead to reduced CA.

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1. **Introduction**

In countries with rapidly aging populations such as Japan, exploring the trajectory of frailty and developing frailty prevention strategies are increasingly important to slowing elderly people’s functional decline and ultimately extending healthy life expectancies (Arai et al., 2012; Shinkai et al., 2016). Frailty critically affects public health including mortality, institutionalization, and hospitalization (Fried, Ferrucci, Darger, Williamson, & Anderson, 2004; Rockwood et al., 1999; Shinkai et al., 2016; Yamada, Arai, Sonoda, & Aoyama, 2012). Additionally, interventions may prevent or
ameliorate frailty. Fried’s frailty index includes several objective measurements, such as grip strength and gait speed (Fried et al., 2001; Fried et al., 2004); sarcopenia (as measured in Fried’s frailty index) refers to the overall loss of muscle mass and strength inherent to the aging process (Fried et al., 2001; Fried et al., 2004). In contrast, frailty reflects physical disability in activities of daily living (ADL) and incorporates a wide range of factors, such as nutritional deterioration and the decline of cognitive function or ADL accompanied by aging syndrome decline (Vermeulen, Neyens, van Rossum, Spreeweunenberg, & de Witte, 2011). Therefore, Fried’s frailty index is unsuitable for use regarding public health, and a simpler scale without objective measurements and that is widely usable among community-dwelling older people would be preferable. Therefore, a self-report questionnaire called the Kihon Checklist (composed of 25 items) was developed in Japan in 2006 to screen frail elderly under the instruction of the Ministry of Health, Labor and Welfare of Japan (Japanese Ministry of Health, Labour and Welfare, 2011). The Kihon Checklist has been used to screen for frailty among older adults (Arai & Satake, 2015); however, previous researches have not used it to examine social activities’ effects on frailty.

Promoting social activity is among the best ways to prevent frailty among community-dwelling older people (Chang et al., 2013; Everard et al., 2013; Glassin, De Leon, Marottoli, & Berkman, 1999; Lennartsson & Silversle, 2001; Woo, Goggin, Sham, & Ho, 2005); however, people generally experience increasing difficulty in engaging in social activities (e.g., volunteering, active social participation) as they age (Everard et al., 2000; Glassin et al., 1999; Lennartsson & Silversle, 2001). We therefore assumed that maintaining older community dwellers’ regular engagement in community activities (CA) carried out close to home would importantly protect against frailty. Some research indicates that activities carried out alone (e.g., certain hobbies) are not associated with older people’s prognosis (Zimmer, Hickey, & Searle, 1995); however, other research indicates that the same activities (Everard et al., 2000; Lennartsson & Silversle, 2001) or local community activities (e.g., volunteer work) are associated with older people’s prognosis (Glassin et al., 1999; Lennartsson & Silversle, 2001; Woo et al., 2005). Additionally, many older people, particularly the younger elderly, possess sufficient physical strength to fulfill their employment duties and make a social contribution. This would yield a substantial increase in the labor force and increase national economic activity by increasing total consumption and decreasing the number of elderly people likely to need care (Arai et al., 2012; Levasseur, St.-Cyr Tribble, & Desrosiers, 2009).

In the present study, we defined CA as daily life activities that people periodically conduct around a long-term place of residence and that people may maintain into old age. We assumed that elderly people with mobility disorder (MD) would be less able to engage in CA, independent of their intention to do so, and that greater engagement in a wider range of CA would predict broader contact with the community among older people. This context suggests that CA engagement may protect against cognitive disorders and depressive mood.

This research therefore aimed to determine if CA engagement is associated with cognitive impairment and depressive mood among community-dwelling older people, independent of MD. These outcomes are associated with long-term care insurance service requirements and health care costs (Fried et al., 2004; Portegijs, Rantakokko, Mikkola, Viljanen, & Rantanen, 2014; Rockwood et al., 1999; Yamada et al., 2012). Frailty is strongly correlated with instrumental ADL, health-related quality of life, dementia, and depression (Chang et al., 2013; Fukutomi et al., 2013; Tomata et al., 2011); therefore, social participation may prevent dementia and depression through the improvement of frailty among community-dwelling older adults (Chang et al., 2013; Woo et al., 2005).

2. Materials and methods

2.1. Study design, setting, and participants

In April 2013, a questionnaire was distributed by mail to 5401 community-dwelling older adults aged 65 years or older who were living in Kami town, Hyogo prefecture, Japan. Kami town is located in the western part of Japan facing the Japan Sea; its area is 370 km². The primary local industry is the processing of Matsuba crab and the production of Tamba cows. In April 2013, the total population of Kami Town was 19,696, of whom 6684 were aged ≥65 years (36%). Individuals who were institutionalized in long-term care facilities or certified as having long-term care insurance service requirements were excluded. The sample size was 5401; of these, 3952 participants returned a completed questionnaire via mail by the end of May 2013. Participants who did not return the questionnaire by mail (1449) were visited at their homes by nursing staff between August and December 2013 for questionnaire collection; the remaining 307 people either refused to participate (230) or dropped out (77) at this stage. The resulting total number of survey responses collected by mail or home visit was thus 5076 (94.0% of the initial sample).

2.2. Measures

2.2.1. The Kihon checklist

Interviewers administered the Kihon Checklist and questionnaires examining medical consultations, daily living, and health conditions. The Kihon Checklist consists of 25 items divided into seven categories (ADL, mobility, nutritional status, oral function, isolation, cognitive function, and mood), and screens for frailty. In both cross-sectional and longitudinal studies that used the Kihon Checklist, items in the mobility and cognitive function categories more effectively detected frailty among older people. Additionally, the sensitivity, specificity, and positive predictive values of the mobility domain for predicting the risk of long-term insurance service care requirement were 62.7%, 77.6%, and 8.7%, respectively, in a 2006 Ohsaki cohort study (Tomata et al., 2011).

Additionally, we used the following three indicators as dependent variables: (1) five items from the mobility domain, (2) three items from the memory domain, and (3) five items from the mood domain. We used the cut-off scores suggested by the Ministry of Health, Labour and Welfare for each domain. The mobility domain is composed of the following items: climbing stairs without a handrail, standing up from a chair without any aids, walking for fifteen minutes, experience of falling, and fear of falling. Scores of three or more on all five items are considered to indicate MD (Arai & Satake, 2015).

The memory domain is composed of the following items: pointing out one’s own memory loss, calling by looking up a phone number, and knowing the current date. Scores of one or more on all three items are considered to indicate cognitive impairment (Arai & Satake, 2015).

The mood domain is composed of the following items: lack of fulfillment, lack of joy, difficulty doing what one has normally done before, feeling helpless, and tired without a reason. Scores of two or more on all five items are considered to indicate depressive mood (Arai & Satake, 2015).

2.2.2. CA items

We used items examining the following seven areas to assess CA as potentially protecting against frailty: volunteer activity,
community activity, visiting friends at home, pursuing hobbies (at least once a week), paid work, farm work (at least once a week), and daily shopping (by oneself at least once a week). Responses to each item were “yes” or “no.”

2.3. Statistical analysis

Total of analyzed data were conducted the response answer of $\geq 1/2$ for each measure. We used multiple imputation to appropriately manage missing data and control for possible bias.

### Table 1

<table>
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<tr>
<th>Subjects’ characteristics according to age, sex, and response method (%)</th>
<th>Number of missing data</th>
<th>Total</th>
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**Motor function domain**

- Mobility disorder $^a$
  - Do you usually climb stairs without using handrail or walk for support? No
  - Do you usually stand up from a chair without any aids? No
  - Do you usually walk continuously for 15 minutes? No
  - Have you experienced a fall in the past year? Yes
  - Do you have a fear of falling while walking? Yes

- Cognitive impairment $^b$
  - Do your family or your friends point out your memory loss? Yes
    - e.g., “You ask the same question repeatedly.”
    - Do you make a call by looking up phone numbers? No
    - Do you find yourself not knowing today’s date? Yes

- Mood domain
  - Depressive mood $^c$
    - In the last 2 weeks have you felt a lack of fulfillment in your daily life? Yes
    - In the last 2 weeks have you felt a lack of joy when doing the things you used to enjoy? Yes
    - In the last 2 weeks have you felt difficulty in doing what you could do easily before? Yes
    - In the last 2 weeks have you felt helpless? Yes
    - In the last 2 weeks have you felt tired without a reason? Yes

- Community activities (CA) items
  - Do you do volunteer work? No
  - Do you do volunteer work in community activities and events? No
  - Do you volunteer in community activities and events? No
  - Do you volunteer your hobbies at least once a week? No
  - Do you earn any income? Yes
  - Do you work at the farm and grow vegetables at least once a week? No
  - Do you go shopping to buy daily necessities by yourself at least once a week? No

All results were used the analysis of the multiple imputation to treatment of missing data. Analysis was conducted on responses $\geq 1/2$ for each measure. There were some significant group differences in demographics according to age, sex, and the response method while using multiple imputation to treat missing data. P-values are based on chi-square test for categorical variables.

$a$ Mobility disorder indicates the participants with a score of $\geq 3/5$ in the motor function domain of the Kihon Checklist.

$b$ Cognitive impairment indicates the participants with a score of $\geq 1/3$ in the memory domain of the Kihon checklist.

$c$ Depressive mood indicates the participants with a score of $\geq 2/5$ in the mood domain of the Kihon checklist.
Table 2
Correlations among the CA items and other measures.

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</table>

All results were used the analysis of the multiple imputation to treatment of missing data. Results shown were calculated Spearman's correlation coefficient.

* p < 0.05.

** p < 0.01.
After conducting pattern analysis relating to missing data in each variable, Little’s missing completely at random (MCAR) test was performed to test for possible multiple assignment. Subsequently, the chi-square test was used to examine variables’ dependency on subjects’ age, sex, and response method (i.e., mail or home-visit). Additionally, Spearman’s correlation coefficient was used to examine correlations between CA items and other measures. We calculated odds ratios (OR) and 95% confidence intervals (95% CI) for each CA item’s ability to predict cognitive impairment and depressive mood using univariate logistic regression stratified by the presence or absence of MD. The sum of affirmative responses to the seven CA items was subsequently designated as participants’ CA score. ORs for CA scores were then calculated with a CA score of zero as the reference. Statistical significance was set at P < 0.05. We used SPSS v.22.0 (IBM, Japan, 2014) for all statistical analysis.

2.4. Ethical considerations

This study was conducted in accordance with the guidelines set forth in the Declaration of Helsinki; the study protocol was reviewed and approved by the Ethics Committee of the Kyoto University Graduate School of Medicine (approved in August 2012).

3. Results

Participants’ mean age was 75.9 years; 58.4% were women. The average prevalence of MD, cognitive impairment, and depressive mood were 33.2% (men, 25.7%; women, 39.1%; P < 0.001), 34.5% (men, 40.2%; women, 31.0%; P < 0.001), and 25.0% (men, 27.6%; women, 25.7%; P = 0.304), respectively (Table 1). MD, cognitive impairment, and depressive mood were more common in the older age group (≥75 years) than in the old age group (65–74 years). The correlation coefficient between total CA score and mean CA item score was r = 0.1–0.5. However, the correlation coefficient between each CA item was very small. Additionally, each CA item’s correlation coefficient with the other examined variables was not significant (Table 2).

No significant difference in correlation with outcomes was found for the following CA items (stratified by MD presence): (1) volunteer activity was not associated with cognitive impairment among either MD or non-MD respondents; (2) pursuing hobbies or farm work was not associated with cognitive impairment in non-MD respondents; and (3) paid work was not associated with cognitive impairment in MD respondents (Table 3). Therefore, CA score was significantly negatively associated with MD prevalence after adjusting for age, sex, and response method. With a CA score of zero as the reference, adjusted ORs of MD with CA scores decreased as scores increased. CA score was also significantly negatively associated with cognitive impairment after adjusting for age, sex, and response method. Similar results were obtained for cognitive impairment and depressive mood. However, there was no significant difference in CA scores. Furthermore, there was no significant difference in the cognitive function of the MD group even when the CA score was six or more (Table 4). Incidentally, when MD was treated as a quantitative variable, the result of multiple regression analysis after adjusting for age, sex, and response method was β = –0.268, R² = 0.225 (p < 0.001).

4. Discussion

CA score was negatively associated with cognitive impairment and depressive mood among community-dwelling older people with and without MD. Earlier community-based research has found that social activity and participation predict better prognosis, improved instrumental ADL and health-related quality of life, and reduced dementia and depression (Chang et al., 2013; Everard et al., 2000; Fukutomi et al., 2013), which is consistent with our findings. Additionally, the present results support the hypothesis

| Table 3 |

<p>| Odds ratios of univariate analysis for each CA items predicting mobility disorder, cognitive impairment, and depressive mood. |
|-----------------|-----------------|-----------------|-----------------|
| [Case/n] Mobidity Disorder&lt;sup&gt;a&lt;/sup&gt; Cognitive impairment&lt;sup&gt;b&lt;/sup&gt; Non-Mobility Disorder&lt;sup&gt;c&lt;/sup&gt; Depressive mood&lt;sup&gt;d&lt;/sup&gt; |
|-----------------|-----------------|-----------------|-----------------|
| Total            | Mobility Disorder Group [758/1,686] | Non-Mobility Disorder Group [1,016/3,390] | Total            |</p>
<table>
<thead>
<tr>
<th>OR (95% CI)</th>
<th>OR (95% CI)</th>
<th>OR (95% CI)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you do volunteer work?</td>
<td>0.538 (0.451–0.612)</td>
<td>0.829 (0.711–1.275)</td>
<td>0.932 (0.568–1.548)</td>
</tr>
<tr>
<td>Do you participate in community activities and events?</td>
<td>0.526 (0.460–0.600)</td>
<td>0.657 (0.580–0.744)</td>
<td>0.718 (0.608–0.847)</td>
</tr>
<tr>
<td>Do you sometimes visit your friends?</td>
<td>0.548 (0.480–0.625)</td>
<td>0.721 (0.637–0.816)</td>
<td>0.749 (0.612–0.918)</td>
</tr>
<tr>
<td>Do you pursue any hobby at least once a week?</td>
<td>0.509 (0.434–0.597)</td>
<td>0.776 (0.677–0.889)</td>
<td>0.670 (0.513–0.875)</td>
</tr>
<tr>
<td>Do you earn an income?</td>
<td>0.567 (0.470–0.683)</td>
<td>0.730 (0.623–0.856)</td>
<td>0.891 (0.641–1.327)</td>
</tr>
<tr>
<td>Do you go to the farms and grow vegetables at least once a week?</td>
<td>0.564 (0.455–0.739)</td>
<td>0.694 (0.483–0.962)</td>
<td>1.168 (0.990–1.379)</td>
</tr>
<tr>
<td>Do you go shopping to buy daily necessities by yourself at least once a week?</td>
<td>0.508 (0.438–0.598)</td>
<td>0.636 (0.556–0.728)</td>
<td>0.747 (0.605–0.924)</td>
</tr>
</tbody>
</table>

All results were analyzed using multiple imputation to treat missing data. Univariate logistic regression was used to analyze each CA item for reference “No”. Results as ORs were adjusted for age, sex and the response method.

<sup>a</sup> Mobility disorder indicates the participants with a score of ≥3/5 in the motor function domain of the Kihon checklist.
<sup>b</sup> Cognitive impairment indicates the participants with a score of ≥1/3 in the memory domain of the Kihon checklist.
<sup>c</sup> Depressive mood indicates the participants with a score of ≥2/5 in the mood domain of the Kihon checklist.
Table 4
Odds ratios of univariate analysis for each CA score predicting mobility disorder, cognitive impairment, and depressive mood.

<table>
<thead>
<tr>
<th>Total Mobility Disorder</th>
<th>Cognitive impairment</th>
<th>Depressive mood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%) Total [1686]</td>
<td>Total [758/1686]</td>
<td>Total [1016/3390]</td>
</tr>
<tr>
<td>CA = 0</td>
<td>ref.</td>
<td>ref.</td>
</tr>
<tr>
<td>CA = 1</td>
<td>219(4.3)</td>
<td>0.314</td>
</tr>
<tr>
<td>CA = 2</td>
<td>447(8.8)</td>
<td>0.314</td>
</tr>
<tr>
<td>CA = 3</td>
<td>1212(239)</td>
<td>0.134</td>
</tr>
<tr>
<td>CA = 4</td>
<td>1215(239)</td>
<td>0.104</td>
</tr>
<tr>
<td>CA = 5</td>
<td>747(14.7)</td>
<td>0.082</td>
</tr>
<tr>
<td>CA = 6</td>
<td>333(6.6)</td>
<td>0.050</td>
</tr>
<tr>
<td>CA = 7</td>
<td>57(11)</td>
<td>0.052</td>
</tr>
</tbody>
</table>

CA score was the sum of affirmative responses to the 7 CA items: Volunteer activity, Community activity, Visiting friends’ home, Hobby or lesson, Work with some income, Field work and Shopping at least once a week. All results used the analysis of the multiple imputation to treatment of missing data. Logistic regression was used to analyze the CA = 0 for reference values. Results as ORs were adjusted for age, sex and the response method.

a Mobility disorder indicates the participants with a score of ≥3/5 in the motor function domain of the Kihon checklist.

b Cognitive impairment indicates the participants with a score of ≥1/3 in the memory domain of the Kihon checklist.

c Depressive mood indicates the participants with a score of ≥2/5 in the mood domain of the Kihon checklist.

that CA protects against cognitive impairment and depressive mood independently of MD.

We found that responses to each of the Kihon Checklist’s domains were associated with several outcomes, as follows: (1) responses to five items in the mobility domain correlated with instrumental ADL and physical fitness, (2) responses to three items in the memory domain correlated with intellectual activity and the Tokyo Metropolitan Institute of Gerontology Index of Competence, and (3) responses to five items in the mood domain correlated with scores on the Geriatric Depression Scale and subjective qualitative quality of life (Fukutomi et al., 2013). Additionally, lower CA score was associated with a proportional MD-dependent decline in cognition and mood. Further, these results extend research that has found that social activity is an essential component of healthy aging, as earlier research has typically examined commonplace activities rather than contribution to society or one’s community (Rowe & Kahn, 2015). Further, the present results indicate that community activity predicts reduced cognitive impairment and depressive mood independently of MD.

Age-related MD is associated with the progressive decline of muscle mass, strength, and physical performance (i.e., sarcopenia); however, we did not attempt to diagnose sarcopenia, as we did not conduct physical examinations. We found that MD predicted lower CA scores and less frequent excursion from home and communication with others. Social participation and communication with others are associated with MD (Hughes, Flatt, Fu, Chang, & Ganguli, 2013); however, the ORs of pursuing a hobby or lessons of interest and visiting friends at home were remarkably similar to those of community activity among both MD and non-MD participants, independent of age, sex, and response method. This suggests that interventions aiming to protect against frailty in older people might successfully promote CA as a replacement for decreasingly frequent energetic social activity.

Cognitive decline independently predicts certified long-term care insurance requirements in Japan (Nishiguchia et al., 2013). Preventing dementia is urgently important in super-aged societies (i.e., those in which the proportion of people aged >65 years is ≥21%, e.g., Japan). Increased engagement in social activity protects against dementia and delays further cognitive decline among older adults with mild cognitive impairment (Saïas, Beck, Boddard, Guignard, & du Roscoët, 2012). The present results identify the following factors as possibly protecting against cognitive impairment: participating in community activities, visiting friends at home, and daily shopping (≥once per week).

Given that aging is inevitable, interventions should therefore aim to facilitate public participation in, and enjoyment and understanding of, CA from a young age, and inform older adults that CA protects against frailty. However, a strong association was found between community participation and death among European participants (Saïas et al., 2012). We have therefore commenced a longitudinal study in Kashi town examining CA’s association with mortality and long-term care certification rates.

Suicidal ideation is linked to suicidal behavior, which is a major public health issue (Saïas et al., 2012). A community-based suicide prevention program that aimed to educate participants and cultivate their social networks was effective among older women but not older men in Japan (Oyama et al., 2005). Depressive symptoms are directly associated with limited social activity (Choi, Wilbur, Miller, Szalacha, & McAuley, 2008; Yang et al., 2007) and loneliness (Kim, 1999; Park, Jang, Lee, Haley, & Chiriboga, 2013). We found that the following factors as all CA items may protect against depressive mood among older individuals with and without MD: participating volunteer activities, participating community activities, visiting friends at home, engaging in a hobby or lessons of personal interest (≥once per week), paid work, farm work (at least once a week) and daily shopping (≥once per week).
These results suggest that older adults who undertake less CA are more vulnerable to depression; the present results also indicate that this effect is independent of age and sex. We found that CA is associated with social frailty; this result extends research indicating that frailty predicts depression among older people (Feng, Nyunt, Feng, Yap, & Ng, 2014): promoting CA may indirectly reduce depression by protecting against frailty.

This study operationalized CA to include activities undertaken alone (e.g., hobbies) as well as local community activities such as volunteering and sports; this is a novel approach to CA. Interventions encouraging CA should consider older peoples’ individual needs and preferences independently of sex and age, as well as encouraging participation in local healthcare programs.

Our survey had a 94.3% response rate, greatly exceeding the mean national response rate for the Kihon Checklist in 2011 (Japanese Ministry of Health, Labour and Welfare, 2011) and the 2006 Ohsaki cohort study’s response rate (Tomata et al., 2011) (34.9% and 73.5% respectively). The present results may be more representative of the actual situation obtaining among community-dwelling older people than those of earlier research. In Kami-town, the measured prevalence of MDs, cognitive impairment, and depressive mood were 33.2%, 34.5%, and 25.0%, respectively; they were 14.5%, 12.6%, and 11.5% according to the national data (Japanese Ministry of Health, Labour and Welfare, 2011) and 33.2%, 34.5%, and 25.0% in the Ohsaki cohort study, respectively (Tomata et al., 2011). The measured proportion of frail older adults in Kami town may have exceeded the measured national average for reasons such as selective responding (the national survey had a lower response rate than our survey; selective responding may have caused frail elderly people to compose an inflated proportion of the individuals who did not respond to the national survey) and the disproportionately large population of frail elderly people in Kami town (36% vs. the national average of 25%). Additionally, the proportion of participants who satisfied the cognitive impairment or depressive mood criteria was lower than in the Ohsaki cohort study although both cohorts’ mean age was similar (Tomata et al., 2011); this may reflect response inaccuracy caused by using self-report questionnaires to measure elderly people with cognitive impairment and depressive mood. According to the systematic review, the prevalence of cognitive and social frailty were 9.9% (95% CI = 9.6–10.2%) and 44.2% (95% CI = 44.2–44.7%), respectively (Collard, Boter, Schoevers, & Oude Voshaar, 2012). We found that cognitive and social frailty’s prevalence was estimated at 13.6% and 33.5% (95% CI = 13.2–14.0%; 95% CI = 32.9–34.1%), respectively, based on results from the Kihon Checklist, which is consistent with the systematic review (Collard et al., 2012).

The present study has the following limitations. First, we examined only one town in a rural area; this sample had a very high response rate, but may not accurately represent Japan or aging adults in other countries. Additionally, frailty was assessed using a self-report questionnaire; no physical function tests were administered. This may diminish the accuracy of frailty’s measurement in the present study. Finally, the study design was cross-sectional; no causal relations may therefore be validly inferred based on the present results. Longitudinal research should therefore examine the causal relationship between CA and frailty and disability. Thus, it is necessary to recognize that MD, cognitive impairment, and depressive mood may reduce CA.

5. Conclusions

CA is negatively associated with cognitive impairment and depressive mood among community-dwelling older people; this effect is independent of MD. Interventions should therefore encourage older people to participate in any community activities their functional ability allows. Thus, it is necessary to recognize that MD, cognitive impairment, and depressive mood may reduce CA.

Conflicts of interest

None.

Funding sources

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Acknowledgements

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References

elderly successfully reduced the high suicide rate for females. Psychiatry and Clinical Neurosciences, 59, 337–344.