

Research Article

The Prevalence of Social Engagement in the Disabled Elderly and Related Factors

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The purpose of this study is to explore the prevalence and related factors of social engagement in the disabled elderly. Participants were 86 elderly ranging from 65 to 84 years of age with disability dwelling in Fukushima City, Fukushima Prefecture, Japan. Among them, socially engaged elderly were 23 people (26.7% of the participants). Seventeen of the 23 socially engaged elderly were mildly disabled (32.7% of the mild disability group). Four were moderately disabled (20.0% of the moderate disability group), and 2 were severely disabled elderly (14.3% of the severe disability group). Factors related to social engagement in the disabled elderly were examined using multiple logistic regression analysis. Results showed that self-rated health and psychological independence were significantly associated with social engagement in the disabled elderly. This result did not change even after adjusting for disability status level. These findings suggest that support in psychological aspects, such as self-rated health and psychological independence, may promote social engagement in the disabled elderly.

1. Introduction

As life expectancy increases, the concept of “successful aging,” which means how to live a healthy, meaningful, and satisfactory life, is attracting more attention [1, 2]. Social engagement has been considered a major component of successful aging and an active involvement in life [3, 4]. It is also thought to be an important factor for the elderly to age successfully despite changes in life, such as changes in the living environment and health conditions [5, 6]. The definition of social engagement varies among researchers; personal interaction and participation in social activities [7], the maintenance of many social connections and a high level of participation in social activities [8], and making social and emotional connections with people and the community [5]. In this paper, we defined social engagement as “activities which require contact with society and interpersonal activity outside home,” based on Hashimoto et al.’s definition [9].

Recent studies suggest that active social engagement in the community-dwelling elderly contributes to physical and

mental health [4, 10, 11], life expectancy [12], subjective well-being [6], self-rated health [13, 14], and life satisfaction [15]. In Europe and the United States, previous studies have already reported that active social engagement in the disabled elderly contributes to body functional status [16], cognitive function status [8], depressive symptoms [5, 17], and subjective well-being [18]. In Japan, however, most studies have focused on social engagement in the relatively healthy elderly without disability, and little is known about social engagement in the disabled elderly as far as we know.

Old age in the final stage of life, the majority of disabled elderly, who have difficulty in independent life, have been forced to the periphery of society. However, the progress of aging has diversified the image of the elderly. The disabled elderly do not necessarily fit the conventional image of social vulnerability [19]. Furthermore, social engagement may contribute to the physical and mental function of the disabled elderly as well as the nondisabled elderly. Thus, we suggest that even when long-term care is required due to disabilities or chronic illness, seeking purpose in life, in order

to achieve life satisfaction and self-realization through social engagement, is meaningful.

The purpose of this study is to investigate the prevalence of social engagement in the disabled elderly and related factors. This study will contribute to the basic data for realization of successful aging in the disabled elderly.

2. Methods

2.1. Study Design, Site, and Participants of the Research. This was a cross-sectional survey. The participants were 1,225 individuals between the ages of 65 and 84 years (as of 1 January 2011) dwelling in 2 districts in Fukushima City, Fukushima Prefecture, Japan. The two districts were chosen as they had similar living conditions and approximately equal numbers of households. In February 2011, the questionnaires were sent by mail to 1,225 people and 1,061 people responded (86.6%). Participants were excluded if they improperly answered the questionnaire on social engagement and Category of Condition of Need for Long-Term Care [20]. The eligible respondents were 968. Moreover, focusing on social engagement in the disabled elderly, we analyzed 86 participants (Figure 1).

2.2. Measures. Measures were demographic variables (sex, age structure [65–74 years/75–84 years], household composition, years of residence in each district, years of education, paid employment, and livelihood status), disability status [20], social engagement index [9], physical factors (number of visits to medical institutions, instrumental activities of daily living [21], and frequency of going out), psychological factors (self-rated health, health-related QOL [SF-8; Japanese version], psychological independence [22]), and social factors (social network [LSNS-6] [23], social support [24]). We investigated from February 09, 2011 to February 18, 2011.

2.3. Disability Status. The Japanese government introduced a long-term care insurance system in 2000, in order to support the disabled elderly by the whole society. In this system, based on the results of the evaluation of the physical and cognitive function, the disabled elderly are classified as those who are eligible for requiring support, or who are eligible for “long-term care requirement levels 1–5” due to being bedridden or having dementia [20]. We further classified the disabled elderly into 3 groups. Those who were eligible for requiring support and for long-term care requirement level 1 fell into the mild disability group (i.e., required partial support for using the toilet, bathing, and dressing). The elderly with long-term care requirement levels 2 and 3 fell into the moderate disability group (i.e., difficulty in walking, required entire support for using the toilet), and levels 4 and 5 were in the severe disability group (i.e., required entire support for eating, using the toilet, and bathing).

2.4. Social Engagement Variables. We used a scale we modified from an index of social activities which Hashimoto et al. [9] developed. Specifically, 6 new items related to volunteer

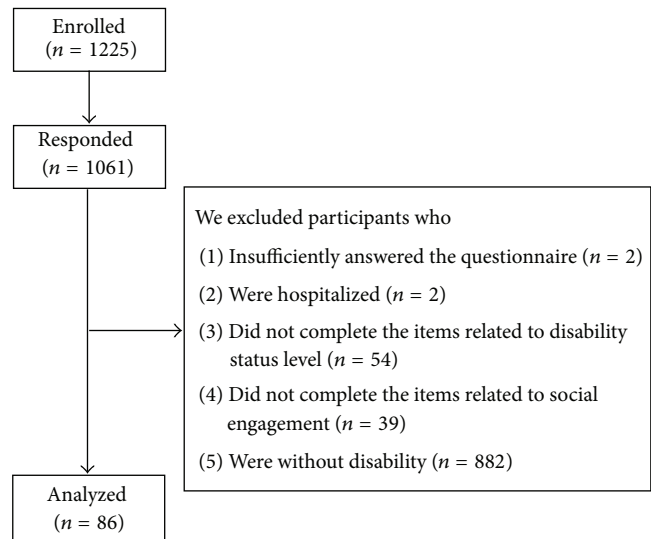


FIGURE 1: Flow of participants selection.

activities (clean-up and beautification activity, visits nursing home for the elderly, help for frail elderly, community child care, fire prevention and security in the community, and health promotion activity in the community) were added to the 5 items of socially related activities, which is a subscale of “the check list for vivid social activities.” The 5 items of socially related activities include participation in community events such as local festivals, neighborhood or residents’ association activity, golden age club activity, group activities such as hobby groups, activity to show special skills, and the sharing of experiences with other people. For each of the above items, we asked each subject about their average attendance over the past 12 months. The participants were asked to answer using a 4-point scale, “once or more a week,” “1–3 times a month,” “several times a year” and “no.” We classified “once or more a week,” “1–3 times a month” and “several times a year” into “I do,” and “no” into “I don’t.” We then classified the elderly into 2 groups: socially engaged and nonsocially engaged. The socially engaged group consisted of the elderly who participated in any one item of the socially related and volunteer activities.

2.5. Physical Factors. The frequency of visits to medical institutions and going out were asked: “How many times did you visit medical institutions (including house calls) over the past year?” “Do you go out at least once a week?”

Instrumental activities of daily living (IADL) was calculated as a subscale of the TMIG Index of Competence [21], which measure the vital functions required for an independent social life. The elderly were asked 5 questions such as “Can you go out alone by bus or train?” or “Can you go shopping for necessities?” 1 point was given for each affirmative answer and the total score ranged 0–5. We classified the elderly into 2 groups, with and without a score, as functional capabilities of the disabled elderly for an independent social life are low compared to the relatively

healthy elderly, who are usually classified into 2 groups labeled full score and less than full score.

2.6. Psychological Factors. Self-rated health was questioned by “How do you rate your health in general?” using a 4-point scale ranging from “bad,” “fairly bad,” “fairly good” to “excellent.” We reclassified “excellent” and “fairly good” into “good,” and “fairly bad” and “bad” into “poor.”

Health-related QOL was assessed using the Japanese version of The 8-Item Short Form Health Survey, which consists of 8 subscales: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. These 8 subscales were calculated into 2 summary scores: physical and mental. Each summary score was calculated based on the national standard value by sex and age of Japanese. A score equal to or greater than 50 indicates high level health, whereas a score less than 50 indicates low level health.

Psychological independence was assessed using “Measurement of Psychological Independence” by Suzuki and Sakihara [22], which is defined as a concept consisting of 2 subconstructs: a purposefulness and personal accountability. A 4-item scale is created for each subconstruct. We questioned each subconstruct by using a 4-point scale and a score of 4-points for “I think so,” 3-points for “I’d rather think so,” 2-points for “I’d rather not think so,” and 1-point for “I do not think so.” We calculated the total score, which ranged from 4 to 32 points, and a higher score indicated higher psychological independence.

2.7. Social Factors. Social network was assessed using the Japanese version [25] of the abbreviated-Lubben Social Network Scale (LSNS-6) [23], which is defined as a concept consisting of 2 subconstructs: support from relatives and support from friends. The following questions were used in a 3-item scale for each subconstruct: “How many relatives do you see or hear from at least once a month?” “How many relatives do you feel close to such that you could call on them for help?” “How many relatives do you feel at ease with that you can talk about private matters?” These 3 questions were repeated after replacing the word “relatives” with “friends.” The total score was an equally weighted sum of the 6 items, with scores ranging from 0 to 5. Higher scores indicated larger social networks.

Social support was assessed using the Social Support Scale from Muraoka et al. [24]. The questions we asked were “Do you have someone whom you consult when you are in trouble?” “Do you have someone whom you consult when you are sick?” “Do you have someone who assists your everyday life such as housework?” “Do you have someone who takes you to a hospital when you are unhealthy?” “Do you have someone who takes care of you when you are laid up?” The answers were “yes” or “no.” We did not calculate the score but analyzed each item.

2.8. Data Analysis. The participants were divided into 2 groups, with and without social engagement. The prevalence of social engagement in 2 groups was calculated at each disability status.

First, we conducted univariate analyses and assessed the differences between 2 groups using the Mann-Whitney *U*-test or Student’s *t*-test for continuous variables, and chi-square analysis or Fisher’s exact test for categorical variables.

Next, in order to examine factors associated with social engagement in the disabled elderly, multiple logistic regression was conducted in two models. In Model 1, factors with significance and marginal significance in univariate analyses as explanatory variables, age and sex as adjustment variables, were entered. In Model 2, certification of disability status level was added to the explanatory variables in Model 1 to adjust for confounding effects by disability status.

The significance level was less than 5% and the marginal significance level was less than 10%. We performed all statistical analyses with the use of SPSS17.0J for Windows.

2.9. Ethical Consideration. The study protocol was approved by the Fukushima Medical University Ethics Committee (approval number 1159), and informed consent was obtained from all participants. Anonymous ID was used for data collection and analyses to protect their personal information.

3. Results

3.1. The Prevalence of Social Engagement in the Disabled Elderly. The prevalence of social engagement of the disabled elderly was 23 people (26.7% of the participants). As shown in Figure 2, 17 people of the 23 socially engaged elderly were mildly disabled (32.7% of the mild disability group), 4 were moderately disabled (20.0% of the moderate disability group), and 2 were severely disabled (14.3% of the severe disability group). In the mild disability group, every one of the 6 items of social engagement had some attendants. The groups with moderate and severe disability participated only in community events such as local festivals (Table 1).

3.2. Factors Associated with Social Engagement in the Disabled Elderly. Table 2 shows the results of the univariate analyses. Psychological independence and social networks were significantly associated with social engagement, whereas instrumental self-maintenance (Instrumental activity of daily life), frequency of going out, and self-rated health were associated with social engagement with marginal significance.

Table 3 shows that multiple logistic regression analysis in Model 1 revealed that self-rated health (odds ratio 4.79, 95% CI = 1.11–20.70, $P = 0.036$) and psychological independence (odds ratio 1.19, 95% CI = 1.03–1.38, $P = 0.020$) were significantly associated with social engagement. In Model 2, self-rated health (odds ratio 4.79, 95% CI = 1.10–20.98, $P = 0.037$) and psychological independence (odds ratio 1.19, 95% CI = 1.03–1.38, $P = 0.021$) were significantly associated with social engagement.

4. Discussion

The proportion of the disabled elderly involved in social engagement was 26.7%. A report by Jung et al. [11] stated that 22.4% of the elderly with physical disability and 23.0%

TABLE 1: Contents of social engagement in the disabled elderly (multiple answer).

	Participation in community events	Neighborhood or residents' association activity	Golden age club activity	Group activities such as hobby groups	Activity to show special skills and share experiences with other people	Volunteer activities
Mild disability (n = 17)	8	11	7	9	7	10
Moderate disability (n = 4)	4	0	0	0	0	0
Severe disability (n = 2)	2	0	0	0	0	0

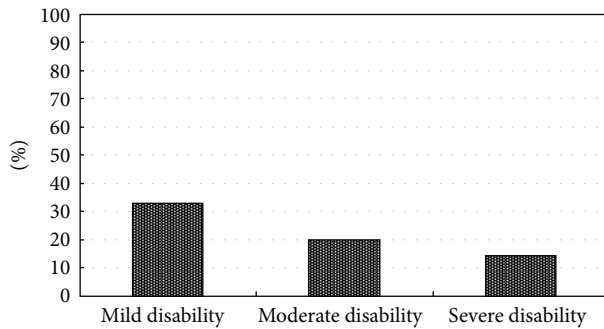


FIGURE 2: Proportion of the elderly involved in social engagement for each disability status level.

of the elderly who had chronic illness were involved in social activities. We generally obtained a similar proportion in this study. This seems not to be influenced by any cultural differences that separate Japan from the rest of the world. In our study, the proportion of those involved in social engagement was lower as the disability level became more severe. It is considered that elderly with functional decline are more likely to decrease the level of social engagement [26]. However, we revealed that there were elderly with severe disability who were able to socially engage in Japan.

The social engagement that the elderly with moderate and severe disability participated in was only community events such as the Japanese local festivals. In another study overseas, Zimmer et al. [18] investigated the relationship between disability status and social engagement. The content of social engagement at each disability status, however, was not reported. Our study obtained new findings on the content of social engagement in the disabled elderly. In addition, Bukov et al. [27] reported that as mental and physical health declined with age, the types of social participation changed. In this study, the elderly with severe disability participated in passive forms of social engagement such as the Japanese local festivals held in their community. Therefore, if there is an increase in the contents of social engagement that the elderly with severe disability can take part in, the number of participants may increase.

Social engagement in the elderly with severe disability requires someone to be alongside the elderly during a community event (e.g., the Japanese Bon festival or local festivals). Yamazaki et al. [28] suggested that a direct support

system for the homebound elderly is effective; therefore, the possibility of the elderly with severe disability participating in social activities would be enhanced if a support system is established.

4.1. Factors Related to Social Engagement. This study has shown that self-rated health and psychological independence were significantly associated with social engagement in the disabled elderly.

The elderly who were aware of their good health more significantly involved themselves in the social activities. Self-rated health of the elderly is a major factor defining mental health, such as subjective well-being and life satisfaction, and is found in association with physical activity [29]. In particular, active social engagement in the independent elderly without disability has positive associations with high self-rated health [10, 13, 30, 31]. In this study, we obtained similar results from the disabled elderly. Mitoku et al. [10] pointed out that self-rated health reflects the attitude of the mind which subjectively recognizes the state of health of oneself, regardless of the presence or absence of disease or disability. Previous studies defined the state of the elderly who assumed their own health was good regardless of health problems as “discrepancy [32]” or “disability paradox [33].” We also infer that self-rated health in the disabled elderly is influenced by mental health rather than physical and functional health. Considering the above, we imply that positive self-rated health even when having disability relates to a positive assessment of oneself and self-confidence in life, leading to involvement in social activities.

Psychological independence in this study was significantly associated with social engagement in the disabled elderly, which consisted of 2 subscales: a purposefulness in life or enjoyment and personal accountability for their opinions or conduct. That is, a person with psychological independence has a purpose in life, the ability of self-determination, and initiative in life. Model 1 and Model 2, which used disability level as an explanatory variable, bore similar results. This result indicates that psychological independence was significantly associated with social engagement regardless of disability status. We assume that the elderly with high psychological independence try to find purpose in life and fulfillment without giving up enjoyment of life and self-determination, despite having a disability status. High psychological independence, therefore, was significantly associated with social engagement in the disabled elderly in this study.

TABLE 2: Factors associated with social engagement in the disabled elderly (univariate analysis).

Variables	Social engagement ^b (<i>n</i> = 23) ^c	No social engagement ^b (<i>n</i> = 63) ^c	<i>P</i> value ^a
Sex			
Male	9 (39.1)	23 (36.5)	0.824
Female	14 (60.9)	40 (63.5)	
Age structure			
65–74 years	7 (30.4)	18 (29.0)	0.900
75–84 years	16 (69.6)	44 (71.0)	
Disability level			
Mild disability	17 (73.9)	35 (55.6)	0.285
Moderate disability	4 (17.4)	16 (25.4)	
Severe disability	2 (8.7)	12 (19.0)	
Household composition			
Living alone	4 (19.0)	10 (16.1)	0.744
Not living alone	17 (81.0)	52 (83.9)	
Years of residence			
<10 years	8 (36.4)	13 (21.0)	0.152
≥10 years	14 (63.6)	49 (79.0)	
Years of education			
≤9 years	9 (40.9)	30 (50.0)	0.465
≥10 years	13 (59.1)	30 (50.0)	
Paid employment			
Yes	2 (9.1)	2 (3.3)	0.285
No	20 (90.9)	59 (96.7)	
Livelihood status			
Good-Normal	17 (77.3)	37 (59.7)	0.139
Bad	5 (22.7)	25 (40.3)	
Visits to medical institutions			
≥1/month	20 (90.9)	51 (82.3)	0.498
<1/month	2 (9.1)	11 (17.7)	
Instrumental activities of daily living			
0 point	5 (25.0)	31 (50.0)	0.050
1~5 point	15 (75.0)	31 (50.0)	
Frequency of going out			
≥1/week	16 (69.6)	29 (46.0)	0.053
<1/week	7 (30.4)	34 (54.0)	
Health-related QOL (SF-8)			
Physical aspects	38.27 ± 8.64	34.99 ± 10.43	0.207
Mental aspects	44.22 ± 9.20	41.26 ± 10.93	0.278

TABLE 2: Continued.

Variables	Social engagement ^b (<i>n</i> = 23) ^c	No social engagement ^b (<i>n</i> = 63) ^c	<i>P</i> value ^a
Self-rated health			
Good	9 (39.1)	13 (20.6)	0.082
Poor	14 (60.9)	50 (79.4)	
Psychological independence	23.63 ± 5.49	18.36 ± 5.33	<0.001
Social network (LSNS-6)	13.41 ± 8.32	8.82 ± 5.37	0.023
Someone to consult with when in trouble			
Yes	19 (90.5)	55 (91.7)	1.000
No	2 (9.5)	5 (8.3)	
Someone to consult with when sick			
Yes	18 (85.7)	56 (93.3)	0.368
No	3 (14.3)	4 (6.7)	
Someone to assist with everyday life such as housework			
Yes	18 (85.7)	54 (90.0)	0.689
No	3 (14.3)	6 (10.0)	
Someone to take the subject to a hospital when he/she is unhealthy			
Yes	19 (90.5)	55 (91.7)	1.000
No	2 (9.5)	5 (8.3)	
Someone to take care of the subject when he/she is laid up			
Yes	18 (85.7)	53 (88.3)	0.714
No	3 (14.3)	7 (11.7)	

^aCategorical variables were assessed using chi-square test or Fisher's exact test.

Continuous variables were assessed using Mann-Whitney *U*-test or Student's *t*-test.

^bOne point or more is defined as "social engagement" and zero point as "no social engagement."

^cThe sum of the numbers in some items is not equal to the total mentioned in the top row because of missing data.

TABLE 3: Factors associated with social engagement in the disabled elderly (multiple logistic regression analysis).

		Model 1		Model 2	
		OR	95% CI	OR	95% CI
Instrumental activities of daily living	(0/1–5)	0.41	0.08–2.21	0.27	0.03–2.90
Frequency of going out	(No/Yes)	1.09	0.25–4.85	1.04	0.23–4.63
Self-rated health	(Poor/Good)	4.79	1.11–20.70	4.79	1.10–20.98
Social network (LSNS-6)	(by 1 point up)	1.07	0.94–1.21	1.07	0.95–1.21
Psychological independence	(by 1 point up)	1.19	1.03–1.38	1.19	1.03–1.38
Disability status level		—	—	0.87	0.50–1.51

OR: Odds ratio, 95% CI: 95% confidence interval.

Model 1: with adjustment for variables of sex and age.

Model 2: with addition of disability status level.

In previous studies, physical independence has been an important factor to maintain social engagement [34]. In addition, instrumental activities of daily living were related to the frequency of interaction with others [35], and the restriction of instrumental activities of daily living gave negative impact on social engagement [14]. However, in this

study, instrumental activities of daily living, which are functional capacities required for an independent social life, were not significantly associated with social engagement in the disabled elderly. Thus, it can be considered that psychological factors, and not physical factors that support functional capacities such as instrumental activities of daily living, are

associated with social engagement, and psychological aspects require support for maintenance and promotion of social engagement. This is consistent with the report by Suzuki et al. [36], which states that a major factor that disturbs the elderly to engage in social events is not disease or deterioration of physical functions but the deterioration of mental functions. Accordingly, support for the psychological aspects of the disabled elderly, to enhance self-rated health and psychological independence, is suggested to be effective in order to promote their social engagement.

In addition, as Jang et al. [7] reported, social engagement in the disabled elderly has been strongly associated with their life satisfaction compared to that in the nondisabled elderly. We consider that social engagement has more psychological impact on the disabled elderly than those without disability. The causal relationship could not be clarified in this study; however, there may be a reciprocal and mutual relationship between social engagement and psychological factors. Therefore, when the disabled elderly try to achieve self-realization, the role of social engagement is important. Hereafter, participation of social engagement among the disabled elderly needs to be promoted while making efforts to increase recognition of social activities among their families and communities.

4.2. Limitations of This Study. We could not mention the causal relationship between social engagement and self-rated health status or psychological independence, because of cross-sectional studies. In addition, since these results are from the small sample size and a restricted geographic area in Japan, it cannot be generalized.

5. Conclusion

In this study, we have explored the prevalence of social engagement and related factors in the disabled elderly. Summarizing the results of this study, the following 2 points were clarified. First, the prevalence of the social engagement of the disabled elderly was 26.7%. Furthermore, the proportion of the elderly with severe disability involved in social engagement was 14.3%. Second, from the multiple logistic regression analysis, self-rated health status and psychological independence were significantly associated with social engagement in the disabled elderly. This result did not change even after adjusting for disability status level. From these, we suggest that psychological factors are related with social engagement, and it is important to support the psychological aspects of the disabled elderly for the maintenance and promotion of social engagement. Furthermore, a longitudinal study would be needed to clarify the causal relationship between the correlation factors and social engagement in the disabled elderly.

Conflict of Interests

The authors declared no potential conflict of interests with respect to the authorship and publication of this paper.

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References

- [1] S. J. McLaughlin, C. M. Connell, S. G. Heeringa, L. W. Li, and J. S. Roberts, "Successful aging in the United States: prevalence estimates from a national sample of older adults," *Journals of Gerontology B*, vol. 65, no. 2, pp. 216–226, 2010.
- [2] W. J. Strawbridge, M. I. Wallhagen, and R. D. Cohen, "Successful aging and well-being: self-rated compared with Rowe and Kahn," *Gerontologist*, vol. 42, no. 6, pp. 727–733, 2002.
- [3] J. W. Rowe and R. L. Kahn, "Successful aging," *Gerontologist*, vol. 37, no. 4, pp. 433–440, 1997.
- [4] V. H. Menec, "The relation between everyday activities and successful aging: a 6-year longitudinal study," *Journals of Gerontology B*, vol. 58, no. 2, pp. S74–S82, 2003.
- [5] N. S. Park, "The relationship of social engagement to psychological well-being of older adults in assisted living facilities," *Journal of Applied Gerontology*, vol. 28, no. 4, pp. 461–481, 2009.
- [6] E. A. Greenfield and N. F. Marks, "Formal volunteering as a protective factor for older adults' psychological well-being," *Journals of Gerontology B*, vol. 59, no. 5, pp. S258–S264, 2004.
- [7] Y. Jang, J. A. Mortimer, W. E. Haley, and A. R. B. Graves, "The role of social engagement in life satisfaction: its significance among older individuals with disease and disability," *Journal of Applied Gerontology*, vol. 23, no. 3, pp. 266–278, 2004.
- [8] S. S. Bassuk, T. A. Glass, and L. F. Berkman, "Social disengagement and incident cognitive decline in community-dwelling elderly persons," *Annals of Internal Medicine*, vol. 131, no. 3, pp. 165–173, 1999.
- [9] S. Hashimoto, R. Aoki, A. Tamakoshi et al., "Development of index of social activities for the elderly," *Japanese Journal of Public Health*, vol. 44, no. 10, pp. 760–768, 1997 (Japanese).
- [10] K. Mitoku, T. Takahashi, and T. Hoshi, "Health relation factors of elderly people and subjective feelings of health," *Kawasaki Journal of Medical Welfare*, vol. 15, no. 2, pp. 411–421, 2006 (Japanese).
- [11] Y. Jung, T. L. Gruenewald, T. E. Seeman, and C. A. Sarkisian, "Productive activities and development of frailty in older adults," *Journals of Gerontology B*, vol. 65, no. 2, pp. 256–261, 2010.
- [12] T. A. Glass, C. Mendes de Leon, R. A. Marottoli, and L. F. Berkman, "Population based study of social and productive activities as predictors of survival among elderly Americans," *British Medical Journal*, vol. 319, no. 7208, pp. 478–483, 1999.
- [13] J. E. Kincaide, D. J. Rabiner, S. L. Bernard et al., "Older adults as a community resource: results from the national survey of self-care and aging," *Gerontologist*, vol. 36, no. 4, pp. 474–482, 1996.
- [14] L. A. Strain, C. C. Grabusic, M. S. Searle, and N. J. Dunn, "Continuing and ceasing leisure activities in later life: a longitudinal study," *Gerontologist*, vol. 42, no. 2, pp. 217–223, 2002.
- [15] H. Okamoto, "Productive activities and well-being among community-dwelling elderly," *Japanese Journal of Public Health*, vol. 56, no. 10, pp. 713–723, 2009 (Japanese).

- [16] C. F. Mendes de Leon, T. A. Glass, and L. F. Berkman, "Social engagement and disability in a community population of older adults: the New Haven EPESE," *American Journal of Epidemiology*, vol. 157, no. 7, pp. 633–642, 2003.
- [17] M. C. McDonnall, "The effect of productive activities on depressive symptoms among older adults with dual sensory loss," *Research on Aging*, vol. 33, no. 3, pp. 234–255, 2011.
- [18] Z. Zimmer, T. Hickey, and M. S. Searle, "Activity participation and well-being among older people with arthritis," *Gerontologist*, vol. 35, no. 4, pp. 463–471, 1995.
- [19] M. Mano, "The significance and promotion of seniors' participation in society in the U.S.: examination through AARP's community activities," *Bulletin of the Graduate School of Education the University of Tokyo*, vol. 42, pp. 429–437, 2002 (Japanese).
- [20] Ministry of Health, Labour and Welfare in Japan, "The revision manual of long-term care," 2012, <http://www.mhlw.go.jp/topics/2009/05/tp0501-1.html>.
- [21] W. Koyano, H. Shibata, K. Nakazato, H. Haga, and Y. Suyama, "Measurement of competence in the elderly living at home: development of an index of competence," *Japanese Journal of Public Health*, vol. 34, no. 3, pp. 109–114, 1987 (Japanese).
- [22] Y. Suzuki and S. Sakihara, "Measurement of psychological independence: scale validity and reliability," *Journal of Health and Human Ecology*, vol. 69, no. 2, pp. 47–56, 2003 (Japanese).
- [23] J. Lubben, E. Blozik, G. Gillmann et al., "Performance of an abbreviated version of the lubben social network scale among three European community-dwelling older adult populations," *Gerontologist*, vol. 46, no. 4, pp. 503–513, 2006.
- [24] Y. Muraoka, A. Oiji, and K. Ihara, "The physical and psychological and social background factor of elderly depression in the community," *Japanese Journal of Geriatric Psychiatry*, vol. 7, no. 4, pp. 397–407, 1996 (Japanese).
- [25] A. Kurimoto, S. Awata, T. Ohkubo et al., "Reliability and validity of the Japanese version of the abbreviated Lubben Social Network Scale," *Japanese Journal of Geriatrics*, vol. 48, no. 2, pp. 149–157, 2011 (Japanese).
- [26] H. Sato, K. Nakajima, and H. Haga, "Factors related to the social activities in elderly people," *The Hokkaido Journal of Physical Therapy*, vol. 14, pp. 54–59, 1997 (Japanese).
- [27] A. Bukov, I. Maas, and T. Lampert, "Social participation in very old age: cross-sectional and longitudinal findings from BASE," *Journals of Gerontology B*, vol. 57, no. 6, pp. P510–P517, 2002.
- [28] S. Yamazaki, S. Yasumura, A. Goto et al., "Factors associated with reducing the Tojikomori for potentially dependent elderly," *Japanese Journal of Gerontology*, vol. 32, no. 1, pp. 23–32, 2010 (Japanese).
- [29] P. Katz, A. Morris, S. Gregorich et al., "Valued life activity disability played a significant role in self-rated health among adults with chronic health conditions," *Journal of Clinical Epidemiology*, vol. 62, no. 2, pp. 158–166, 2009.
- [30] T. Yasuda, "Human relations and community participation among the elderly population living in suburban housing complexes," *Japanese Journal of Gerontology*, vol. 28, no. 4, pp. 450–463, 2007 (Japanese).
- [31] S. Croezen, A. Haveman-Nies, V. J. Alvarado, P. van't Veer, and C. P. G. M. de Groot, "Characterization of different groups of elderly according to social engagement activity patterns," *Journal of Nutrition, Health and Aging*, vol. 13, no. 9, pp. 776–781, 2009.
- [32] V. H. Menec and J. G. Chipperfield, "The interactive effect of perceived control and functional status on health and mortality among young-old and old-old adults," *Journals of Gerontology B*, vol. 52, no. 3, pp. P118–P126, 1997.
- [33] M. von Faber, A. Bootsma-van der Wiel, E. van Exel et al., "Successful aging in the oldest old: who can be characterized as successfully aged?" *Archives of Internal Medicine*, vol. 161, no. 22, pp. 2694–2700, 2001.
- [34] M. van Willigen, "Differential benefits of volunteering across the life course," *Journals of Gerontology B*, vol. 55, no. 5, pp. S308–S318, 2000.
- [35] K. Nakamura and K. Yamada, "Factors determining frequency of social interaction in frail elderly individuals. A study of the elderly in urban environments," *Japanese Journal of Public Health*, vol. 58, no. 4, pp. 282–291, 2011 (Japanese).
- [36] T. Suzuki, H. Iwasa, H. Yoshida et al., "Comprehensive health examination ("Otasha-Kenshin") for the prevention of geriatric syndromes and a bed-ridden state in the community elderly. 1. Differences in characteristics between participants and non-participants," *Japanese Journal of Public Health*, vol. 50, no. 1, pp. 39–48, 2003 (Japanese).

