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Original Article

Social Activity and Functional Decline among Community-Dwelling Older Adults in Thailand and Japan: A Comparative Cohort Study

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SUMMARY

Background: Social activity has long been recognized as an essential component of active aging. However, an overlooked dimension is cross-national comparison within Asia on social activity and its relationship to the functional decline. This study examined functional decline among older Thai and Japanese adults over a two-year period and compared associated social and other factors.
Methods: We collected data from two waves of a longitudinal cohort survey administered in Nakhon Pathom, Thailand and the city of Tosa, Japan, covering community-dwelling adults aged ≥ 65. The data cover basic activities of daily living (ADL), sociodemographic traits, health status, depression, and social activities. A total of 338 Thai and 869 Japanese participants with no functional limitations participated at baseline, and 216 Thai and 480 Japanese participants completed the follow-up study after two years.
Results: At follow-up, Thai participants reported a higher percentage of functional decline than Japanese participants (22.2% vs. 13.5%). Risk factors associated with functional decline in Thai participants were increased age, female gender, low economic satisfaction, and low social activity levels. Functional decline among Japanese participants was associated with increased age, low social activity levels, and arthropathy. Low social activity was a strong predictor of decline in ADL, and the association was significant even after adjusting for related factors in Thai and Japanese individuals.
Conclusion: Although there were differences in the variables associated with ADL decline between Thai and Japanese participants, our results support the promotion of social activities for older adults to preserve a healthy functional status.

1. Introduction

A demographic transition toward an aging population is currently underway in Asia, which will soon become the "oldest" region in the world, with each country advancing at a different pace and under diverse conditions.[1] Older adults in well-off countries are more likely to have disability-free life expectancies than those in middle- and low-income nations, where the rapid aging process has occurred under premature levels of infrastructure and economic growth.[2] This context may pose different challenges for maintaining functional independence for the aging populations in these countries.

Factors contributing to functional decline have been identified in many cross-sectional and longitudinal studies;[3] however, they mainly focus on physical facets. Existing studies show that participation in social activities is significantly related to a reduced risk of decline in activities of daily living (ADL)[4] and in instrumental ADL in older adults.[5] However, few studies have conducted a cross-national comparison of social activity and its relationship to functional decline in Asia, where most societies are predominantly collectivistic in nature but have become more individualistic over time.[6] These cultural shifts may impact social engagement and participation in older adults and their functional ability.

Comparing the levels of functional decline and associated factors between respective regions in Thailand and Japan could provide diverse insights regarding how to enhance the functional health of older adults due to different stages of development and undergoing cultural changes. These regions were selected as Japan is at the forefront of a super-aging society with a high rate of economic growth and changes in family and social structures.[7] Thailand became a fully aged society in 2021 under a low level of economic development and premature welfare to support its aging process, which entails growing "old" before getting "rich."[8] In addition, the social and structural contexts of social participation in Thailand and Japan vary. Japanese culture has shifted toward greater individualism such that the family has become more individually based, with increasing rates of people living alone, divorced, and in nuclear (versus extended) families.[7] Although Thailand has also gradually experienced the rise

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of individualism,[6] Buddhist beliefs and faith-based norms and practices are still prominent. Thai people have traditionally enjoyed community and family support networks that have had a substantial influence on the social activities of Thai older adults.[8,9]

Therefore, this study compares functional decline among older Thai and Japanese adults over a two-year follow-up period, and examines the relationship among functional status, health risk factors, lifestyle practices, and social activities.

2. Materials and methods

2.1. Study population

This was a longitudinal cohort study based on two waves of the Longitudinal Aging Study conducted in Nakhon Pathom (LAS-NP), Thailand, and the Tosa Longitudinal Aging Study (TLAS) carried out in Tosa, Japan. The two settings reflect several characteristics of Thailand and Japan in terms of the proportion of ageing people, living arrangement and social milieu. The TLAS is an annual community-based longitudinal study covering people aged ≥ 65.8 Tosa Town is a rural farming community representative of a "super-aged" town, with an aging rate of 41.3%. The LAS-NP is a longitudinal community-based study conducted in the central zone of the municipal area of Nakhon Pathom (NP) Province in the western vicinity of Bangkok. Details of the LAS-NP study design are available from previous studies.[9]

The details of the participants are shown in Figure 1. The first survey (T1), conducted in 2014 in NP and 2013 in Tosa, comprised 338 participants randomly sampled from NP, representing 20% of the total population of the 13 communities in NP's central area,[9] in addition to 869 participants from Tosa, with a participation rate of 47.8% of the population aged ≥ 65.

After two years, the same survey (T2) was carried out in both NP (2016) and Tosa (2015). We followed up with participants with no functional limitations (i.e., those who obtained a full score in basic ADL) at baseline; thus, 216 participants from NP and 480 from Tosa were administered a physical examination and a questionnaire after two years.

2.2. Functional decline

Functional decline was determined considering basic ADL evaluation using a questionnaire. The participants were assigned a score of 0 ("completely dependent") to 3 ("completely independent") based on seven tasks: walking, ascending/descending stairs, feeding themselves, dressing, using the toilet, bathing, and grooming.[10] Numerous previous studies confirmed that the assessment has high reliability, as indicated by high predictive validity.[11,12] Individual scores were added to obtain a basic ADL total score ranging from 0 to 21, with lower scores indicating greater disability. Those with a full score (21) were considered to have no functional decline.

2.3. Social activity level

Social activity refers to activities that involve communication and social interaction with family, friends, or others. With the focus on competence to achieve social activities, we applied the social roles index (0–4) of the Tokyo Metropolitan Institute of the Gerontology Index of Competence (TMIG-IC) scale[13] to measure social activity level. The scale has four items: "Do you visit friends' homes?" "Are you sometimes called on for advice?" "Are you able to visit sick friends?" and "Do you sometimes initiate conversations with young people?" Question scores were added up, with higher scores indicating a higher level of social activities. Scores < 4 were considered low.

2.4. Lifestyle characteristics

To obtain data on lifestyle characteristics, the participants were asked questions about their education, economic status, and living arrangements. Subjective feelings of economic satisfaction were assessed using a 100 mm visual analogue scale (lowest on the left end and highest on the right) ranging from 0 to 100.[14]

2.5. Prevalence of chronic disease and mental status

The participants were asked if they had any chronic diseases, including diabetes, hypertension, heart disease, cardiovascular disease, and arthropathy. Body mass index (BMI) was calculated using height and weight measured at one's health check-up. Obesity was defined as a BMI of > 25 kg/m^2. The presence of depressive symptoms was established using the 15-item Geriatric Depression Scale (GDS-15),[15] with a cut-off point of ≥ 6 as previously reported.[16]

2.6. Statistical analysis

Statistical analysis was performed using SPSS version 19.0 for Windows (IBM Corp, Armonk, NY, US). To compare the two groups, Student's *t*-tests were used for continuous variables, and the chi-square test for categorical variables. Univariate analysis was performed using logistic regression to identify associations between ADL decline and each variable (social activity, sociodemographic traits, and medical history). Covariates that were significantly associated with ADL decline were included along with social activity in a multiple logistic regression model predicting ADL decline. A *p*-value of < 0.05 was deemed statistically significant.

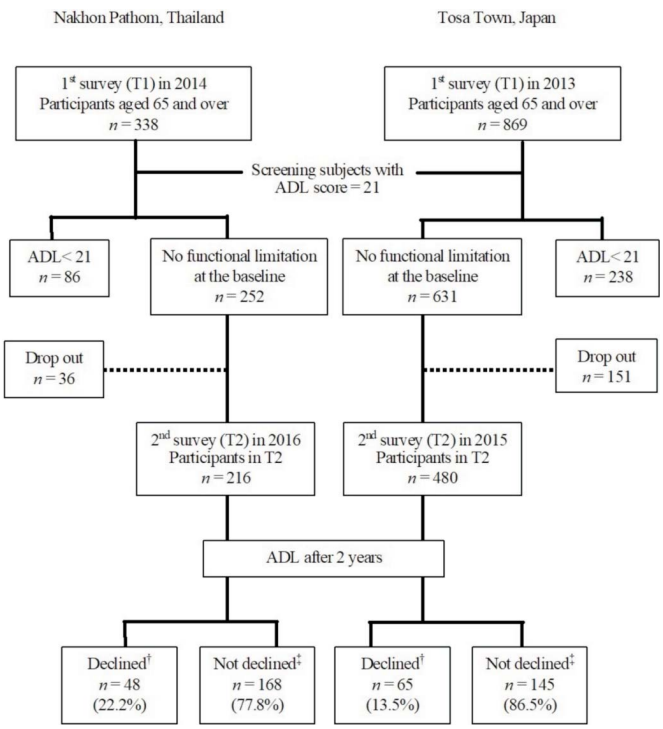

Figure 1. Flow chart of the two-year follow-up survey of older adults aged 65 and over. ADL: activities of daily living. † ADL < 21; ‡ ADL = 21.

2.7. Ethics statement

The study protocol was approved by the Committee for Research Ethics at Mahidol University in Thailand (COA No. 2016/017. 2601) and the Ethical Committee of the Faculty of Medicine at Kyoto University in Japan (E-514). Written informed consent was obtained from all the participants. All procedures were carried out in compliance with the Declaration of Helsinki.

3. Results

Table 1 presents the baseline characteristics of the participants in NP and Tosa at T1. Their mean age was higher in Tosa than in NP (74.6 ± 6.7 years vs. 72.3 ± 5.6 years; $p < 0.001$). Although the mean duration of education was longer in Tosa than in NP (10.0 ± 2.0 years vs. 8.6 ± 3.6 years; $p < 0.001$), subjective economic satisfaction was greater in NP than in Tosa (67.3 ± 18.7 vs. 59.2 ± 23.7; $p < 0.001$). These differences are in line with the socioeconomic factors in these two countries.

Regarding chronic diseases, participants from NP had higher rates of diabetes than those from Tosa (22.7% vs. 11.8%; $p < 0.001$). The prevalence of arthropathy was higher in Tosa than in NP (33.7% vs. 14.9%; $p < 0.001$). In terms of social activity, 39.8% of NP and 48.0% of Tosa participants had low (score < 4) values ($p < 0.046$), suggesting that older adults in NP engage in more social activities. The mean GDS-15 score was higher in Tosa, thus indicating a greater prevalence of depression (GDS-15 ≥ 6; NP 9.7% vs. Tosa 21.5%; $p < 0.001$).

At the two-year follow-up (T2) survey, Thai participants reported a greater percentage of functional decline than the Japanese participants did (22.2% vs. 13.5%; $p < 0.05$; Figure 1). Although the mean baseline age of the NP participants was lower, they experienced greater functional decline.

Table 2 presents the results of a univariate analysis on the relationship between ADL decline and the hypothesized predictors. ADL decline after two years was the independent variable and the baseline predictors were the dependent variables. Risk factors associated with functional decline among older Thai participants were increased age (odds ratio [OR] = 1.13, 95% confidence interval [CI] = 1.06–1.20), female gender (OR = 0.46, 95% CI = 0.22–0.99), years of education (OR = 0.90, 95% CI = 0.82–0.99), low economic satisfaction (OR = 2.56, 95% CI = 1.25–5.02), and low social activity (OR = 2.75, 95% CI = 1.25–6.05). Functional decline among older Japanese adults was associated with increased age (OR = 1.11, 95% CI = 1.07–1.16),

Table 1
Baseline characteristics (T1) of older adults aged 65 and over who were independent (ADL = 21).

	Nakhon Pathom	Tosa	*p*-value
	Thailand (*n* = 216)	Japan (*n* = 480)	
Age (mean ± SD)	72.3 ± 5.6	74.6 ± 6.7	< 0.001
Female gender (%)	67.1	56.5	0.008
Year of education (mean ± SD)	8.6 ± 3.6	10 ± 2.0	< 0.001
Living alone (%)	7.4	17.3	0.001
Subjective economic satisfaction (0–100, mean ± SD)	67.3 ± 18.7	59.2 ± 23.7	< 0.001
Low economic satisfaction (below mean score) (%)	53.3	48.8	0.280
Low social activity (below full score of 4) (%)	39.8	48.0	0.046
Chronic disease (%)			
Diabetes	22.7	11.8	< 0.001
Hypertension	50.9	56.0	0.031
Heart disease	8.8	13.9	0.014
Cerebrovascular disease	1.9	5.4	0.009
Arthropathy	14.9	33.7	< 0.001
Obesity (BMI ≥ 25 kg/m^2)	35.3	25.7	0.012
GDS-15 Score (0–15, mean ± SD)	2.7 ± 2.1	3.2 ± 3.1	0.020
Depressive mood (GDS-15 ≥ 6) (%)	9.7	21.5	< 0.001

ADL: activities of daily living; BMI: body mass index; CI: confidence interval; GDS-15: 15-item Geriatric Depression Scale; SD: standard deviation.

Table 2
Association between hypothesized covariates and ADL decline: Univariate analysis.

Predictors	NP, Thailand (*n* = 216)			Tosa, Japan (*n* = 480)		
	OR	(95% CI)	*p*-value	OR	(95% CI)	*p*-value
Age	1.13	(1.06-1.20)	0.000	1.11	(1.07-1.16)	< 0.001
Female gender	0.46	(0.22-0.99)	0.047	0.79	(0.46-1.34)	0.375
Year of education	0.90	(0.82-0.99)	0.035	0.76	(0.65-0.89)	0.001
Living alone	1.66	(0.55-5.03)	0.371	1.87	(0.99-3.50)	0.452
Low economic satisfaction	2.56	(1.25-5.02)	0.01	1.42	(0.83-2.44)	0.199
Low social activity	2.75	(1.25-6.05)	0.012	3.01	(1.67-5.46)	< 0.001
Chronic disease						
Diabetes	1.02	(0.47-2.18)	0.965	1.31	(0.62-2.83)	0.49
Hypertension	1.32	(0.69-2.51)	0.404	1.72	(0.98-2.98)	0.059
Heart disease	1.08	(0.34-3.42)	0.898	1.89	(0.97-3.65)	0.06
Cerebrovascular disease	1.17	(0.12-1.51)	0.893	1.53	(0.56-4.22)	0.408
Arthropathy	1.19	(0.50-2.86)	0.694	2.67	(1.56-4.58)	< 0.001
Obesity (BMI ≥ 25 kg/m^2)	1.43	(0.71-2.88)	0.311	1.84	(0.83-4.08)	0.132
Depressive mood (GDS-15 ≥ 6)	1.24	(0.40-3.81)	0.713	3.80	(1.94-7.44)	< 0.001

ADL: activities of daily living; BMI: body mass index; CI: confidence interval; GDS-15: 15-item Geriatric Depression Scale; OR: odds ratio.
Student's *t*-tests were used for continuous variables, and the chi-square test for categorical variables.

years of education (OR = 0.76, 95% CI = 0.65–0.89), low social activity (OR = 3.01, 95% CI = 1.67–5.46), arthropathy (OR = 2.67, 95% CI = 1.56–4.58), and depressive mood (GDS-15 score ≥ 6) (OR = 3.80, 95% CI = 1.94–7.44).

Table 3 presents the outcomes of a multivariate analysis conducted to confirm the independent association between low social activity and ADL decline. In Model 1, this relationship was significant among both NP and Tosa participants (NP: OR = 3.77, 95% CI = 1.56–9.07; Tosa: OR = 3.13, 95% CI = 1.67–5.86) after adjusting for age and gender. In Model 2, years of education and low economic satisfaction were added to Model 1; low social activity was found to be significantly related to ADL decline among both NP and Tosa participants (NP: OR = 3.56, 95% CI = 1.43–8.90; Tosa: OR = 2.97, 95% CI = 1.41–6.26). Arthropathy and depressive mood (GDS-15 ≥ 6) were added in Model 3; the relationship between low social activity and ADL decline was found to be significant among both NP and Tosa participants (NP: OR = 3.69, 95% CI = 1.45–9.39; Tosa: OR = 3.39, 95% CI = 1.30–8.30).

4. Discussion

We performed the current research in response to a lack of cross-national comparative studies on functional decline in older people, especially in Thailand, where there are less longitudinal data compared to other Asian countries. Notably, the increase in the number of older Thai adults with functional decline was almost double compared to their Japanese counterparts, although the mean baseline age of the NP population was lower. Our findings are concordant with *the World report on disability* (WRD), which shows that the disability prevalence among older adults in well-off countries is lower than that in economically developing nations.[17]

Our predictive model revealed similarities and differences in factors predictive of functional decline between the two cohorts. Low social activity was found to be a very strong predictor of functional decline in both older Thai and Japanese persons, with a statistically significant increased odds ratio (OR) for ADL decline, ranging from 1.45 to 9.39 and from 1.30 to 8.30, respectively. Social changes and living arrangements may be crucial in explaining the effects of social activity on functional decline in both countries. Referring to our measurement of social activity, which includes questions about giving advice and having conversations with younger generations, living patterns among older adults have shifted dramatically from living with children to living alone, especially in Japan, where the rate of living alone rose from 19.7% in 2000 to 26.4% in 2017.[18] Likewise, the living pattern of older Thais has gradually changed. The percentage of those living with their children has fallen by approximately 20% over the past 25 years and Thais now live with their spouse or live alone.[8] The proportion of older Thai adults who live alone increased from 8.6% in 2011 to 10.8% in 2017.[19] In addition, the perceived value toward older persons has been on the decline, particularly among teenagers.[20] This change could potentially reduce older adults' opportunities to converse with and advise younger generations. Our finding of the association between low social activity and functional decline is in agreement with previous results. Gao et al.[4] also recently confirmed that frequent participation in organized social activities is significantly related to a reduced risk of functional decline. Similarly, research among older Chinese adults suggests that participants who engage in social activities have a significantly lower risk of frailty than those who do not.[21]

Female gender and low economic satisfaction were also found to be predictors of functional decline in older Thai adults, while arthropathy, a common age-related disease, was a critical predictor in the Japanese participants. This outcome is consistent with those of previous studies that found that women are more likely to have a greater level of functional impairment than men.[22] Some mechanisms may account for this observation among older Thais. First, older Thai women have a lower educational and economic status compared to men, which leads to increased risk of functional impairment.[23] Second, chronic diseases are risk factors of functional decline.[24] Based on the Thai National Health Examination Survey in 2009, Apinonkul et al.[25] observed that females had a higher prevalence of chronic disease compared to males. Moreover, lower socioeconomic circumstances among older women may cause health inequalities and increase the risk of developing chronic diseases.

Economic status is also widely indicated as a key risk factor for the decline of functional status in the literature. A comparative study across six low- and middle-income countries by Lestari et al.[26] verified that financial status is significantly associated with ADL disability in China, India, and Mexico. In the present study, a strong association between low economic satisfaction and ADL decline was only found

Table 3
Predictors of ADL decline: Models of multivariate analysis.

Predictors	Nakhon Prathom, Thailand (*n* = 216)			Tosa, Japan (*n* = 480)		
	OR	(95% CI)	*p*-value	OR	(95% CI)	*p*-value
Model 1						
Age	1.16	(1.09-1.24)	0.000	1.11	(1.06-1.16)	0.000
Female gender	0.25	(0.11-0.62)	0.002	0.69	(0.39-1.23)	0.210
Low social activity	**3.77**	**(1.56-9.07)**	**0.003**	**3.13**	**(1.67-5.86)**	**0.000**
Model 2						
Age	1.16	(1.07-1.24)	0.000	1.10	(1.04-1.16)	0.001
Female gender	0.3	(0.12-0.76)	0.011	0.82	(0.42-1.59)	0.561
Low social activity	**3.56**	**(1.43-8.90)**	**0.006**	**2.97**	**(1.41-6.26)**	**0.004**
Year of education	0.96	(0.87-1.07)	0.439	0.89	(0.76-1.06)	0.194
Low economic satisfaction	2.37	(1.10-5.10)	0.028	1.70	(0.87-3.32)	0.119
Model 3						
Age	1.16	(1.06-1.25)	0.000	1.10	(1.02-1.18)	0.012
Female gender	0.32	(0.13-0.79)	0.015	0.86	(0.37-2.01)	0.724
Low social activity	**3.69**	**(1.45-9.39)**	**0.006**	**3.39**	**(1.30-8.30)**	**0.008**
Year of education	0.96	(0.86-1.08)	0.408	0.93	(0.75-1.15)	0.489
Low economic satisfaction	2.45	(1.13-5.30)	0.023	1.42	(0.59-3.45)	0.433
Arthropathy	1.64	(0.59-4.57)	0.343	2.45	(1.07-5.64)	0.035
Depressive mood	1.50	(0.41-5.57)	0.541	2.18	(0.88-5.39)	0.091

ADL: activities of daily living; CI: confidence interval; GDS-15: 15-item Geriatric Depression Scale; OR: odds ratio.

among NP participants. Besides differences in household wealth, in Japan, the government provides long-term care insurance and various types of public support to prevent dependency, whereas in Thailand, the welfare system for the older population is not well established.[27] Although the Thai government currently provides several programs as part of the country's social safety net to guarantee a certain income level in old age, almost of older Thai adults have no retirement pension, and only 34.6% have savings.[28] Most rely on their adult children and their savings to cover expenses. Additionally, household debt in Thailand is extremely high at 84.7% of the gross domestic product (GDP).[29] Low levels of subjective satisfaction about one's economic situation among the NP participants may be due to difficulties in meeting basic daily living, healthcare, and other medical expenses not covered by the universal healthcare scheme (the 30-baht scheme).

Arthropathy was a strong predictor of functional decline in the Tosa participants, but it was inconclusive in the NP participants. The strong association remained even after adjusting for other variables in the multivariate analysis in Table 3 (OR = 2.45, see Model 3). This outcome is consistent with prior reports suggesting that knee pain is associated with ADL decline.[12] The difference in (previous and current) occupations of older study participants might help explain the higher rate of arthropathy in Tosa. The majority of the Tosa participants were farmers or farm laborers at working age, and many continue to participate in subsistence farming in their old age, while most NP participants were traders, self-employed, or wage earners. Agricultural workers are at particular risk of arthritis-related disabilities.[30]

Depressive mood was related to ADL decline only in the Japanese participants; however, it was not a significant predictor of decline. Many previous studies have suggested a relationship between depression and ADL decline.[31] A cross-country comparison of Indonesia, Vietnam, and Japan also found that depression was related to low ADL scores in the study communities across the three countries.[32]

Several limitations of the study should be noted. First, the sample size, especially that of the Thai cohort, was limited. Some participants dropped out of the study as they moved out of the study area or died during the two-year follow-up. Second, economic satisfaction was assessed by self-report, which may have had an impact on comparisons between the two groups due to culturally different ways of reporting. In addition, some variables related to ADL decline such as stroke, dementia, and fractures were not included in this study. Finally, the follow-up period of two years was fairly short. Longer follow-up periods may help detect differences in outcomes for groups varying in chronic conditions, age, income, and across diverse healthcare systems.[33]

In sum, our cross-national comparison study identified common and specific risk factors for functional decline in two countries with dissimilar levels of demographic and economic development. To prevent or delay functional decline, health-related actions and social welfare in Thailand must primarily target older people experiencing substandard financial conditions, while arthropathy and depression issues should be addressed much more substantially in policies and intervention programs for older Japanese adults. In addition, our results strongly support the implementation of interventions promoting social activity among older adults in both countries to preserve a healthy functional status.

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Declaration of conflicts of interest

There are no conflicts of interest to declare.

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