

**Figure 1** Analysis of difficulty in carrying out each basic activity of daily living item after 2 years.

**Table 3** Relationship between variables of geriatric functions and difficulty in basic activities of daily living after 2 years

	Analysis with adjustment for age and sex <sup>†</sup>			Multivariate analysis <sup>‡</sup>		
	Odds ratio	95% confidence interval	<i>P</i> -value	Odds ratio	95% confidence interval	<i>P</i> -value
Aged ≥85 years	4.38 <sup>§</sup>	1.66–11.56 <sup>‡</sup>	0.003 <sup>‡</sup>	4.59	1.35–15.63	0.015
Habitual physical exercise	0.44	0.20–0.95	0.037	–	–	–
Knee pain	4.18	1.66–10.50	0.002	4.67	1.71–12.77	0.003
Serum creatinine (male ≤0.6 mg/dL, female ≤0.5 mg/dL)	8.86	1.61–48.79	0.012	–	–	–
Functional Reach <20 cm	2.92	1.09–7.83	0.033	–	–	–
Timed Up and Go test ≥15 s	4.19	1.91–9.19	<0.001	2.74	1.14–6.58	0.015
Button score >17 s	6.62	2.45–17.83	<0.001	4.56	1.62–12.86	0.004
Mini-Mental State Examination ≤25	3.11	1.43–6.76	0.004	–	–	–
Kohs block design test ≤16	2.41	1.09–5.37	0.031	–	–	–
TMIG-IC ≤12	2.57	1.14–5.76	0.023	–	–	–

<sup>†</sup>Logistic regression analysis was used. Covariates considered were age and sex. <sup>‡</sup>The model was simplified in a stepwise fashion by removing variables which were either negatively associated with the outcome or those with a *P*-value >0.05. <sup>§</sup>Covariate considered was sex. TMIG-IC, Tokyo Metropolitan Institute of Gerontology Index of Competence.

predictive value and specificity. In contrast, choosing cut-off points of three or more positive findings out of the four variables increased positive predictive value and specificity, resulting in decreased negative value and sensitivity (Table 4). Choosing a cut-off of two or more positive findings out of the four variables predicted difficulties in performing basic ADL after 2 years, with a positive predictive value of 52.0%, negative predictive value of 90.2%, sensitivity of 70.3% and specificity of 80.8% (Table 4).

## Discussion

The main finding of the present study was that the probability of an individual developing difficulties in carrying out basic ADL during a 2-year period could be predicted by using four simple and practical items. Of our study population, 22.1% of those aged ≥75 years were impaired in their performance of basic ADL at 2 years. As such, the positive predictive value that would be expected by chance was 22.1% and the negative

**Table 4** Prediction of difficulty in basic activities of daily living with the four items after 2 years according to the algorithms

Algorithm ID	Variables (criterion)		Button score (>17 s)	Knee pain (existence)	Applicable case (%)	Positive predictive value (%)	Negative predictive value (%)	Accuracy (%)	Sensitivity (%)	Specificity (%)	Sensitivity plus Specificity (%)
	Age (≥85 years)	Up and Go test (≥15 s)									
Cut-off: a variables with a check mark (✓) was positive											
1	✓				11.6	50.0	81.6	77.9	26.3	92.5	118.9
2		✓			33.1	40.4	87.0	71.5	60.5	74.6	135.2
3			✓		18.8	46.9	83.3	76.5	39.5	87.1	126.6
4				✓	56.1	32.6	90.3	57.9	81.1	51.2	132.3
Cut-off: either of two variables with a check mark (✓) was positive											
5	✓	✓			39.0	38.8	88.6	69.2	68.4	69.4	137.8
6	✓		✓		26.5	44.4	85.6	74.7	52.6	81.1	133.7
7	✓			✓	59.8	32.7	92.4	56.7	86.5	48.0	134.5
8		✓	✓		41.5	39.4	90.0	69.0	73.7	67.7	141.4
9		✓		✓	52.3	30.4	93.3	52.3	89.5	41.8	131.3
10			✓	✓	62.9	29.9	90.5	52.4	84.2	43.2	127.4
Cut-off: both two variables with a check mark (✓) were positive											
11	✓	✓			5.8	70.0	80.9	80.2	18.4	97.8	116.2
12	✓		✓		3.5	83.3	80.0	80.1	13.2	99.2	112.4
13	✓			✓	8.5	57.1	80.7	78.7	21.6	95.3	116.9
14		✓	✓		10.6	55.6	81.6	78.8	26.3	93.9	120.3
15		✓		✓	22.6	51.4	85.8	78.0	51.4	85.8	137.2
16			✓	✓	9.9	81.3	83.6	83.3	35.1	97.6	132.7
Cut-off: at least one of three variables with a check mark (✓) was positive											
17	✓	✓	✓		46.8	37.5	91.2	66.1	78.9	62.4	141.4
18	✓	✓		✓	68.0	29.9	94.5	50.6	92.1	38.8	130.9
19	✓		✓	✓	66.1	29.2	91.4	50.3	86.8	39.8	126.7
20		✓	✓	✓	73.0	29.4	95.5	47.2	94.6	33.3	127.9
Cut-off: at least two of three variables with a check mark (✓) were positive											
21	✓	✓	✓		13.5	60.9	83.7	80.6	36.8	93.2	130.0
22	✓	✓		✓	26.2	51.2	87.6	78.0	59.5	83.5	142.9
23	✓		✓	✓	15.9	69.2	86.2	83.5	48.6	93.7	142.3
24		✓	✓	✓	26.8	50.0	87.5	77.4	59.5	82.7	142.1
Cut-off: all three variables with a check mark (✓) were positive											
25	✓	✓	✓		2.9	80.0	79.4	79.4	10.5	99.2	109.8
26	✓	✓		✓	5.5	66.7	80.0	79.3	16.2	97.6	113.9
27	✓		✓	✓	3.0	80.0	79.2	79.3	10.8	99.2	110.0
28		✓	✓	✓	7.9	76.9	82.1	81.7	27.0	97.6	124.7
Cut-off: at least one of four variables was positive											
29	✓	✓	✓	✓	75.3	28.7	95.0	45.1	94.6	30.4	125.0
Cut-off: at least two of four variables were positive											
30	✓	✓	✓	✓	30.9	52.0	90.2	78.4	70.3	80.8	151.1
Cut-off: at least three of four variables were positive											
31	✓	✓	✓	✓	9.9	75.0	82.9	82.1	32.4	96.8	129.2
Cut-off: all four variables were positive											
32	✓	✓	✓	✓	3.1	80.0	79.0	79.0	10.8	99.2	110.0

Basic ADL of the old-old

predictive value expected by chance was 77.9%. However, those with at least two positive findings out of the four variables (age  $\geq 85$  years, TUG test time of  $\geq 15$  s, button score of  $> 17$  s and presence of knee pain) were likely to have impaired performance of basic ADL during a 2-year period, with a positive predictive value of 52.0% and negative predictive value of 90.2%. The algorithm based on a combination of four variables showed potential utility for identifying old-old patients who should take precautions toward developing impaired performance. Notably, this result does not mean that the items other than the four aforementioned items are less important as components of comprehensive geriatric assessment. Our present study only focused on predictors of newly acquired difficulties in carrying out basic ADL during a 2-year period. Univariate analysis showed that low serum creatinine (men  $\leq 0.6$  mg/dL, women  $\leq 0.5$  mg/dL), MMSE  $\leq 25$ , Kohs Block Design test score  $\leq 16$  and TMIG-IC  $\leq 12$  were significant predictors of developing difficulties in carrying out basic ADL after 2 years, after adjusting for age and sex. Odden *et al.* reported a J-shaped association between serum creatinine and functional limitation among the elderly.<sup>27</sup> We did not observe significant relationships between functional parameters in the elderly and hypertension, diabetes, dyslipidemia, smoking habits, and obesity. However, several reports have shown that these factors can impact disability, and preventive measures against these items are important.<sup>6–9</sup>

Limitations of the present study include the short follow-up period and limited sample size. In addition, it is possible that instruction on lifestyle modifications by doctors and referral to local practitioners for follow-up care might have preventive benefits, but this was not examined here. Age  $\geq 85$  years was a significant predictor of difficulties in carrying out basic ADL. Functional limitations and disability might be extended alongside increases in life expectancy.<sup>28</sup> Furthermore, the implications of an age of  $\geq 85$  years could vary according to time, area and genetic background, among others.

Although the ideal algorithm should depend on parameters such as time, area, genetic background, manpower and the number of patients to be focused on, if the old-old are examined with regard to those four items in a Japanese town, at a given time, and two or more items are positive, precautionary measures should be taken, as half of the elderly individuals could likely be impaired in their capacity to carry out basic ADL within the next 2 years. Only a few minutes of time would be required to inquire about their age and the presence of knee pain, and most patients do not require more than 20 min to complete the TUG test and button test, including the time required to listen to instructions. Although validity and reliability should be considered, the ability to determine an individual's risk for developing difficulties in carrying out basic ADL after 2 years

should help doctors provide appropriate management suggestions.

Among the various geriatric objectives, it has been reported that elderly patients have reportedly prioritized “reducing disability” and “improving QOL” over “reducing mortality.”<sup>29</sup> We conclude that assessment of age, TUG test results, manual dexterity (button score), and the presence of knee pain were significant and important indicators that could be used to predict disability. Notably, these comprise only a portion of comprehensive geriatric services, which should “treat not a disability, but a person.”<sup>30</sup>

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## Disclosure statement

No potential conflicts of interest were disclosed.

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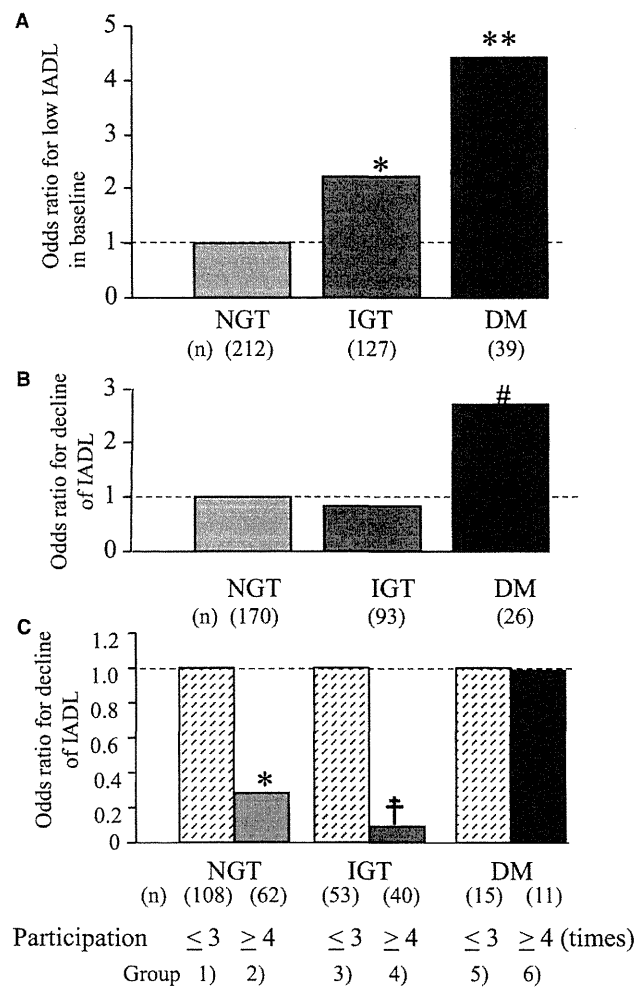
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### EFFECT OF EARLY DIAGNOSIS AND LIFESTYLE MODIFICATION ON FUNCTIONAL ACTIVITIES IN COMMUNITY-DWELLING ELDERLY ADULTS WITH GLUCOSE INTOLERANCE: 5-YEAR LONGITUDINAL STUDY

To the Editor: Older people with diabetes mellitus frequently have functional impairment,<sup>1-4</sup> but there are few reports of the protective effects of longitudinal interventions on functional decline in older people newly diagnosed according to an oral glucose tolerance test (OGTT).<sup>5</sup> The association between glucose intolerance and decline in instrumental activities of daily living (IADL) was examined to verify the hypothesis that annual education on lifestyle modification can help prevent IADL decline in people with glucose intolerance in a 5-year longitudinal study.

Community-dwelling people aged 60 and older were screened using an OGTT (World Health Organization criteria) for the first time in 2006 in Tosa, Japan<sup>6</sup> (N = 378; 212 with normal glucose tolerance (NGT), 127 with impaired glucose tolerance (IGT), 39 with diabetes mellitus (DM)). The prevalence at baseline of disability in IADLs ( $\leq 4$  of five of the IADL items in the Tokyo Metropolitan Institute of Gerontology index),<sup>6,7</sup> was 9.0% for NGT, 15.7% for IGT, and 30.8% for DM ( $P < .001$ , chi-square test). DM (odds ratio (OR) = 4.42, 95% confidence interval (CI) = 1.62-12.08,  $P = .004$ ) and IGT (OR = 2.23, 95% CI = 1.03-4.82,  $P = .04$ ) were associated with IADL disability as assessed using multiple logistic regression after adjusting for dependent basic activities of living (ADL) (OR = 5.12, 95% CI = 1.99-13.18,  $P < .001$ ),<sup>8</sup> age, sex, depression,<sup>9</sup> body mass index (BMI), and falling (Figure 1A).

Of the 289 participants who were independent in IADLs (score of 5) at baseline, who could be followed up during the 5-year study, the incidence of IADL disability was 15.6% for NGT, 11.8% for IGT, and 23.1% for DM groups. DM (OR = 2.70, 95% CI = 0.87-8.39 vs NGT,  $P = .09$ ) was mildly associated with decline in IADL ability, but IGT was not, as indicated by multiple logistic regression after adjusting for dependence in ADLs (OR = 3.01, 95% CI = 1.03-8.82,



**Figure 1.** (A) Cross-sectional association between glucose intolerance and instrumental activity of daily living (IADL) disability at baseline (N = 378).  $P < .05$ ,  $**0.01$  using multiple logistic regression. (B) Longitudinal association between glucose intolerance and IADL decline over 5 years (n = 289). # $P < .10$  using multiple logistic regression. (C) Protective effect of participation of follow-up on IADL decline over 5 years in impaired glucose tolerance (IGT) and normal glucose tolerance (NGT) groups (n = 289). \* $P < .05$  (NGT), † $P < .05$  (IGT) using multiple logistic regression. DM = diabetes mellitus.

$P = .04$ ), depression (OR = 2.77, 95% CI = 0.94-8.15,  $P = .06$ ), age, sex, falling, and BMI (Figure 1B).

All subjects were invited to participate in the five annual glucose intolerance and geriatric functional analyses and education about lifestyle modification during the 5-year study period.<sup>5,10</sup> To analyze the preventive effect of follow-up participation of participants with NGT, IGT and DM on IADL decline, all subjects were assigned to one of two groups: more participation ( $\geq 4$ ) or less participation ( $\leq 3$ ).

- 1 NGT with less participation (n = 108, 16.7% with IADL decline).
- 2 NGT with more participation (n = 62, 14.5% with IADL decline).

- 3 IGT with less participation (n = 53, 15.1% with IADL decline).
- 4 IGT with more participation (n = 40, 7.5% with IADL decline).
- 5 DM with less participation (n = 15, 15.1% with IADL decline).
- 6 DM with more participation (n = 11, 36.4% with IADL decline).

In each NGT, IGT, and DM group, the odds of more participation compared with less participation were calculated for IADL decline during the 5 years (Figure 1C). In NGT and IGT, more participation had a protective effect on IADL decline (group 2 vs 1: OR = 0.28, 95% CI = 0.09–0.86,  $P = .03$ ; group 4 vs 3: OR = 0.093, 95% CI = 0.011–0.780) vs group 3,  $P = .03$ ) after adjustment for age, sex, ADL dependence, and depression. With DM, there was no significant difference between the groups with less and more participation.

At baseline, no subject was taking anti-DM medication, but during the following 5-year study period, 11 in the DM or IGT group started taking anti-DM medication. The results showed no difference in the incidence of IADL disability between those taking and not taking medication. In the analysis of subjects not taking anti-DM medication during the study, the significant protective effect on IADL decline in the group with more participation was preserved in IGT group.

Despite the strong association between DM and IGT and IADL disability at baseline, IADL decline during the 5-year study period was mildly associated with DM but not with IGT. Lifestyle modifications were associated with less IADL decline in people with IGT in annual follow-up visits. Improvement in DM indicators was made using nonpharmaceutical intervention through lifestyle modification in the community.<sup>5</sup> Diligent dieting and exercise in the groups with more participation might have preserved IADLs during the 5-year period.

In conclusion, early diagnosis and annual follow-up using nonpharmaceutical interventions for lifestyle modification in elderly adults with glucose intolerance may be effective in the longitudinal preservation of functional abilities.

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## HIGH PREVALENCE OF UNDIAGNOSED EYE DISEASES IN INDIVIDUALS WITH DEMENTIA

*To the Editor:* With the world's population aging, dementia and eye diseases pose a growing burden.<sup>1,2</sup> However, persons with dementia may be less likely to complain of visual symptoms and report early impairment in vision, and thus, many vision-threatening eye diseases may be underdiagnosed and undertreated. Data are limited regarding the prevalence of eye diseases in individuals with dementia and the proportion of these eye diseases that are underdiagnosed. Some studies suggest that individuals with underdiagnosed or undertreated visual problems are more likely to develop cognitive decline.<sup>3</sup> Such data will not only allow better understanding of the needs of individuals with dementia but also improve the design of effective eye disease screening programs in these individuals. The current study explored the use of a simple retinal photograph to detect four major age-related eye diseases in a cohort of individuals with dementia and the prevalence of these diseases that are undiagnosed.

## METHODS

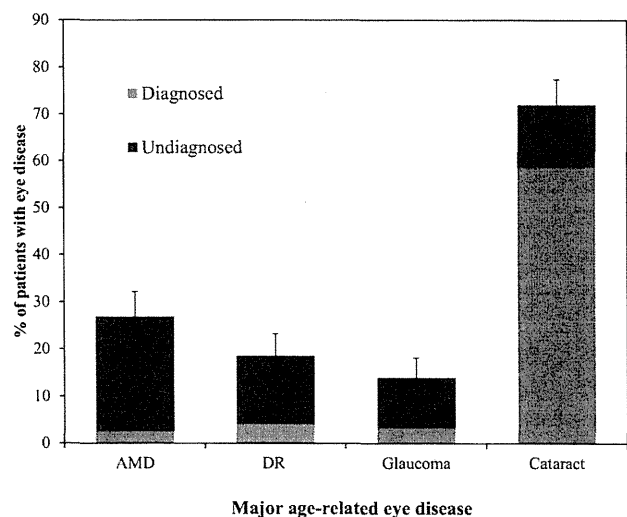
Individuals diagnosed with dementia aged 60 and older were consecutively recruited from July 2009 to December

2012 from three tertiary hospitals in Singapore. All underwent clinical, neurological, and neuropsychiatric assessments. Dementia was diagnosed based on *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) criteria,<sup>4</sup> and the severity was assessed using the Clinical Dementia Rating (CDR).<sup>5</sup> Digital retinal photographs were taken using a standard retinal camera, after pupil dilation using tropicamide 1% and phenylephrine hydrochloride 2.5%. Two retinal fundus photographs of each eye were obtained, centered at the optic disc and at the fovea. Ophthalmologists and trained graders assessed the photographs for the presence of eye pathology. Of the major age-related eye diseases studied, qualified graders assessed age-related macular degeneration (AMD) and diabetic retinopathy (DR) using standard grading systems,<sup>6,7</sup> and an ophthalmologist reviewed the photographs to identify glaucoma (defined as having optic disc features of glaucoma) and cataracts (defined based on media opacity).<sup>8</sup>

An interviewer-administered questionnaire was used to ascertain past history of AMD, DR, or previous laser photocoagulation treatment, cataracts, or glaucoma from participants or caregivers. Undiagnosed eye disease was defined in participants who were not aware that they had the eye diseases but with eye pathology identified from retinal photographs.

## RESULTS

Two hundred sixty-eight individuals with dementia were recruited, 264 of whom had gradable retinal photographs. Of these, 239 (90.5%) had at least one eye disease, 160 of whom (66.9%) had previously undiagnosed conditions. Figure 1 shows the frequency of undiagnosed and diagnosed age-related eye diseases in the cohort with dementia. AMD was the most frequent eye condition that was undiagnosed (90.1%), followed by DR (77.6%) and glaucoma (75.7%), whereas cataract had a much lower frequency as an undiagnosed eye condition (18.4%), even though it was the most prevalent eye disease in the dementia cohort.



**Figure 1.** Frequency of undiagnosed and diagnosed age-related eye diseases (age-related macular degeneration (AMD), diabetic retinopathy (DR), glaucoma, and cataract) in the cohort with dementia.

A major reason why PRE does not increase physical activity may be because the determinants of physical activity differ from those of physical functioning in older adults. The determinants of physical activity include psychological factors such as self-efficacy and confidence<sup>9</sup> in addition to lower extremity strength.<sup>10</sup> Hence, the findings of the current suggest that other modifiable factors, such as self-efficacy, may need to be targeted to increase physical activity in older adults. An important limitation to consider is the lack of a control group to compare natural changes in physical functioning and physical activity with those in the PRE group over time, but these factors are unlikely to have declined substantially over the short duration of the study.

In conclusion, PRE improved physical function in older adults with functional limitation but did not change physical activity. These findings indicate that factors other than muscular strength may need to be targeted to promote physical activity in older adults with functional limitation.

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**Author Contributions:** Laussen, White: data analysis and interpretation, preparation of manuscript. Chalé, Hau: acquisition of subjects and data, review and editing of manuscript. Fielding: concept and design, data analysis and interpretation, review and editing of manuscript.

**Sponsor's Role:** The investigators had complete control over all aspects of the conduct of the study, data analysis, and manuscript preparation.

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#### EFFECT OF EARLY DIAGNOSIS AND LIFESTYLE MODIFICATION ON DEPRESSIVE SYMPTOMS IN COMMUNITY-DWELLING ELDERLY ADULTS WITH GLUCOSE INTOLERANCE: 5-YEAR LONGITUDINAL STUDY

*To the Editor:* Kimbro et al.<sup>1</sup> showed that older people with diabetes mellitus (DM) should be considered a high priority for depression screening and treatment because their mortality rate is high. The association between glucose intolerance and depression and the effect of annual



education on lifestyle modification was examined in a 5-year longitudinal study in Japanese older people newly diagnosed with diabetes mellitus according to an oral glucose tolerance test (OGTT).

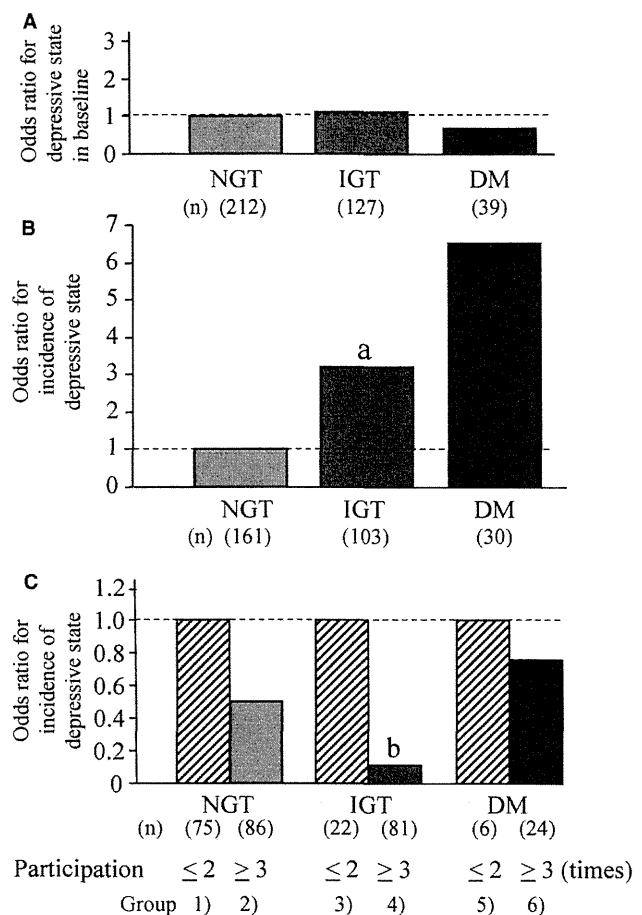
Screening of 378 community-dwelling people aged 60 and older using OGTT (World Health Organization criteria) took place for the first time in 2006 in Tosa, Japan.<sup>2,3</sup> There were 212 people with normal glucose tolerance (NGT), 127 with impaired glucose tolerance (IGT), and 39 with DM. Depressive state was defined as a Geriatric Depression Scale (GDS-15) score of 10 or greater and depressive tendency as score of 6 to 9.<sup>4,5</sup> Depressive state was diagnosed in 11.3% with NGT, 10.2% with IGT, and 7.7% with DM at baseline. Glucose intolerance was not associated with the prevalence of depressive state (DM, odds ratio (OR) = 0.68, 95% confidence interval (CI) = 0.19–2.50; IGT, OR = 1.08, 95% CI = 0.51–2.29) as assessed using multiple logistic regression after adjusting for sex (female, OR = 5.26, 95% CI = 1.61–17.12,  $P = .006$ ), dependence in activities of daily living (ADLs) (OR = 2.46, 95% CI = 1.01–6.00,  $P = .048$ ),<sup>6</sup> history of a fall in the past year (OR = 2.31, 95% CI = 1.12–4.77,  $P = .02$ ), age, and dependence in instrumental ADLs (IADLs)<sup>3</sup> (Figure 1A).

The ethics committees of Kyoto University and the Research Institute approved this study for humanity and nature.

Of the 294 participants not in a depressive state at baseline (GDS < 10) who could be followed during the study, the incidence of depressive state at 5 years was 4.3% for NGT, 9.7% for IGT, and 13.3% for DM (chi-square test,  $P = .10$ ). DM (OR = 6.47, 95% CI = 1.48–28.35,  $P = .01$ ) and IGT (OR = 3.20, 95% CI = 1.06–9.64,  $P = .04$ ) were associated with the incidence of depressive state as assessed using multiple logistic regression after adjusting for depressive tendency in baseline (OR = 4.32, 95% CI = 1.59–11.71,  $P = .004$ ), dependence in IADLs (OR = 2.93, 95% CI = 0.86–10.03,  $P = .09$ ),<sup>5</sup> age, sex, and dependence in ADLs (Figure 1B).

All subjects were invited to participate in the five annual glucose intolerance and geriatric functional analyses and education about lifestyle modification during the 5-year study period.<sup>3,7</sup> To analyze the preventive effect of follow-up participation of subjects with NGT, IGT, and DM on the incidence of depressive state, all subjects were assigned to one of two groups: more ( $\geq 3$ ) or less ( $\leq 2$ ) participation. The incidence of depressive state was 6.7% for NGT with less participation ( $n = 75$ ), 2.3% for NGT with more participation ( $n = 86$ ), 13.6% for IGT with less participation ( $n = 22$ ), 8.6% for IGT with more participation ( $n = 81$ ), 16.7% for DM with less participation ( $n = 6$ ), and 12.5% for DM with more participation ( $n = 24$ ).

The OR of more participation compared with less participation was calculated in the NGT, IGT, and DM groups for incidence of depressive state during the 5 years (Figure 1C). In IGT, more participation had a protective effect against depressive state (OR = 0.11, 95% CI = 0.01–0.96,  $P = .045$ ), as assessed using multiple logistic regression after adjusting for depressive tendency in baseline (OR = 7.34, 95% CI = 1.27–42.37,  $P = .02$ ), dependence in IADLs (OR = 6.10, 95% CI = 0.82–45.60,  $P = .08$ ), age, and sex. There was no significant protective effect of more participation in NGT (OR = 0.51, 95%



**Figure 1.** (A) Cross-sectional association between glucose intolerance and depressive state at baseline ( $n = 378$ ). (B) Longitudinal association between glucose intolerance and incidence of depressive state over 5 years ( $n = 294$ ). <sup>a</sup> $P < .05$  vs normal glucose tolerance (NGT) group using multiple logistic regression. (C) Protective effect of more participation in follow-up on incidence of depressive state for 5 years in impaired glucose tolerance (IGT;  $n = 294$ ). <sup>b</sup> $P < .05$  vs less participation according to multiple logistic regression in IGT group. DM = diabetes mellitus.

CI = 0.08–3.14) or DM (OR = 0.78, 95% CI = 0.03–17.94).

At baseline, no subject was taking antidiabetes medication, but 11 people in the DM or IGT group started taking antidiabetes medication during the 5 years of the study. In the analysis of subjects not taking antidiabetes medication, the significant protective effect against a depressive state of more participation was preserved in the IGT group.

Despite no association between glucose intolerance and depressive symptoms at baseline, depressive symptoms increased in IGT and more in DM during the 5 years. Although there was a protective effect against depression in IGT of more participation, the effect was limited, and depressive symptoms apparently increased longitudinally in IGT and DM, as contrasted with the preventive effect against dependence in IADLs in the recent report.<sup>3</sup> More attention should be paid to depression in older adults with

glucose intolerance.<sup>1,8,9</sup> Not only early diagnosis and annual follow-up, but also participation in group programs such as music or exercise therapy<sup>10</sup> and other activities in social network may be effective in stopping the cycle of depression, housebound status, and deterioration in glucose tolerance.

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## Social cohesion and health in old age: a study in southern Taiwan

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### ABSTRACT

**Background:** Previous studies have found that social cohesion and trust (SCT) were associated with psychological well-being and physical health. In this study, we investigated the associations between SCT and mental and physical health among community-dwelling elderly in a town in southern Taiwan.

**Methods:** The study population consisted of 149 community-dwelling elderly aged 65 years and older (68 men, 81 women; mean age, 75.4 ± 6.1 years) residing in the town of Dashe in southern Taiwan. Activities of daily living (ADL), SCT, depression, subjective quality of life (QOL), current medical status, past medical history, and health behaviors were assessed in face-to-face interviews. Objective neurobehavioral functions were assessed using the timed up & go (TUG) test, functional reach test, and handgrip test.

**Results:** Scores for ADL and Geriatric Depression Scale (GDS) were significantly correlated with SCT, and SCT was significantly correlated with all subjective QOL items. In addition, a strong correlation was observed between SCT and relationship with friends. Values for SCT (median ≥ 20) were significantly associated with both subjective sense of health (median ≥ 68) and subjective happiness (median ≥ 73) after adjusting for age, sex, and ADL.

**Conclusion:** SCT is an important variable that influences self-rated health and happiness, independently of ADL, age, and sex. When assessing geriatric psychological function, SCT should be examined more carefully, given its association with subjective sense of health and happiness, depression, and physical function.

**Key words:** social cohesion and trust, ADL, GDS, QOL, elderly, health, happiness, Taiwan

### Introduction

Challenges that accompany the emergence of aging populations are becoming more prevalent worldwide, and Taiwan is no exception. As of 2011, the percentage of people aged 65 years and older in Taiwan was 7.9%, and this percentage of the population is projected to double by 2025. Thus, Taiwan will likely become one of the countries characterized by dramatic aging (National Statistics, 2013). While a continued increase in

life expectancy is a major achievement, newer challenges such as keeping older adult active and maintaining their well-being have emerged. In recent decades, more interest has developed in linking social cohesion to trust in communities where the elderly reside. Social cohesion is defined as a state of affairs concerning both the vertical and the horizontal interactions among members of society, and is characterized by a set of attitudes and norms that includes trust, a sense of belonging, the willingness to participate and help, and related behavioral manifestations (Chan *et al.*, 2006).

Congruently, health research from a variety of disciplines such as sociology (Kawachi, 1999), health geography, community psychology, geriatric medicine (Phongsavan *et al.*, 2006), and social

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epidemiology (Ziersch *et al.*, 2005) have focused on how community cohesion and trust affect health indicators from different perspectives. Their results indicated that SCT are associated with psychological well-being as well as physical health. Social cohesion may be especially valuable among the elderly with regard to active aging, given that neighborhood cohesion and well-being were reportedly more strongly correlated in older people than in younger people (Elliott *et al.*, 2014).

Communities with higher levels of social cohesion show better health outcomes including lower mortality rates and higher self-rated health (Ichida *et al.*, 2009; Inoue *et al.*, 2013). One study (Inoue *et al.*, 2013) reported that individual perceptions of community cohesion were associated with a reduced risk of all-cause mortality (HR, 0.78; 95% CI, (0.73, 0.84)). However, whether or not boosting individual perceptions of community social cohesion can improve population health is still unknown. Another study reported that high social cohesion was significantly associated with good self-rated health (Ichida *et al.*, 2009). Social cohesion and a sense of belonging in one's neighborhood are vital elements of a support system for older adults contending with poor health, limited mobility, financial constraints, lack of transportation, and accompanying social isolation (Russell *et al.*, 1998; Young *et al.*, 2004). Although these studies show that SCT is highly associated with psychological and physical health, only one study (Kandula *et al.*, 2009) has examined the association between social cohesion and health in Asian countries, where cohesive social networks embody more cultural value than individualism, which is more common in Western countries. The relationship between SCT and health behaviors, which may influence SCT, has not yet been examined.

Active aging requires physical health, mental health, functional independence, economical stability, social participation, and spiritual identification (Matsubayashi and Okumiya, 2012). A close relationship has been found between SCT and social participation/spiritual identification in Taiwan. In Taiwan, people have been educated in the principles of Confucianism, a widespread value system composed of the five virtues of benevolence, justice, courtesy, wisdom, and trust. Confucianism aims to realize and emphasize these five virtues in human relationships, not only between individuals, but also within the family, society, and the nation. In addition, it teaches that human beings can maintain spiritual contentment and ideal happiness. Confucianism pursues human happiness with the philosophy of social connection and trust, and Confucian values underlie the dominant moral doctrine and guiding

principles in many forms of social interaction (Huang *et al.*, 2003). The primary socialization characteristics of a Confucian society are filial piety, strong family relations, benevolent paternalism, and social harmony. However, industrialization and globalization have rapidly transformed the social structure of Taiwan into a multicultural one. Consequently, societal and community structures have changed dramatically and the practice of filial piety has been challenged (Ku *et al.*, 2012).

The aim of this study is to investigate the associations between SCT and health status among community-dwelling elderly in a rural town in southern Taiwan, with a particular focus on comprehensive geriatric functions such as quantitative subjective QOL, depression, ADL, living situation, and health behaviors.

## Materials and methods

### Participants

The study population consisted of 149 community-dwelling elderly aged 65 years and older (68 men, 81 women; mean age,  $75.4 \pm 6.1$  years) residing in the town of Dashe, Tainan City, Taiwan, who had agreed to undergo the comprehensive geriatric assessment (CGA) and had completed applicable portions in 2012. The total population of community-dwelling elderly aged 65 years and older in Dashe was 548 (10.9% of the total population of 5,003 people in 2012). The village leader of Dashe announced that health checks would be offered to all those aged 65 years or older. The author visited nearly 200 households with elderly individuals to inform them of the survey and recommend that elderly individuals volunteer to participate. Ultimately, 149 elderly people (27.2% of the eligible population of 548 elderly) agreed to participate. Dashe is an aging town with a population of 5,003, with 10.9% of the population aged 65 years or older in 2012. The demographic structure of elderly population in Dashe is similar to the percentage of the nationwide Taiwan in the same year.

### Social cohesion and trust (SCT)

We used the SCT scale by Sampson *et al.* (1997). The SCT scale proposes that the differential ability of neighborhoods to recognize residents' common values and maintain public order is a determinant of neighborhood variation in violence. Consequently, it measures "collective efficacy," which is defined as social cohesion among neighbors combined with their willingness to intervene on behalf of the common good. The SCT comprises five items that respondents rated on a 5-point Likert scale ranging

from 5 (strongly agree) to 1 (strongly disagree). Items included: “people in this neighborhood can be trusted,” “this is a close-knit neighborhood,” “people around here are willing to help their neighbors,” “people in this neighborhood generally don’t get along with each other,” and “people in this neighborhood do not share the same values” (the last two statements were reverse coded) (Sampson *et al.*, 1997). Scores were added, resulting in SCT scores ranging from 5 to 25, with high scores indicating high SCT. Cronbach’s  $\alpha$  for the present study instrument was 0.83.

#### **Items on the comprehensive geriatric assessment (CGA)**

The CGA consisted of assessment of ADL, depression, current medical situation, medical history, daily lifestyle, neurobehavioral function, quantitative subjective QOL, and social background including factors such as health behavior.

#### **Activities of daily living (ADL)**

In the ADL assessment, participants rated their status for seven items (walking, ascending and descending stairs, eating, dressing, using the toilet, bathing, grooming) with regard to required assistance level, which ranged from 3 to 0 (3: completely independent, 2: some help required, 1: much help required, 0: completely dependent). The scores were added, resulting in ADL scores ranging from 0 to 21, with low scores indicating disability (Matsubayashi *et al.*, 1999; Ho *et al.*, 2002)

#### **Depression**

Depression was screened using the Chinese version of the 15-item geriatric depression scale (GDS-15) (Sheikh and Yesavage, 1986; Yesavage, 1988; Mui, 1996). Each item contributes 1 point, with final scores ranging from 0 to 15. The validated Chinese version of GDS-15 using the cut-off point of 5 showed that prevalence of depression in community-dwelling elderly was 26% (Mui, 1996). As such, we used this cut-off to identify depression in our study population.

#### **Neurobehavioral function**

Objective neurobehavioral function was assessed using three tests, including the TUG test (Podsiadlo and Richardson, 1991), functional reach test (Weiner *et al.*, 1992), and handgrip test (Aoyama *et al.*, 2011). The TUG test was performed by recording the time required for the participant to rise from an arm chair, walk a 3 m distance across the room, turn around, walk back to the chair, and sit back down. The functional reach test

was used to assess balance and body flexibility in elderly persons. Each participant stood with their fist extended alongside a wall. Leaning forward as far as possible, the participant was instructed to move their fist along the wall without taking a step or losing stability. The length of fist movement was measured. Grip strength was measured by a handheld dynamometer, and we analyzed the maximum strength in both hands.

#### **Quality of life (QOL)**

Quantitative subjective QOL was assessed using a 100 mm visual analogue scale (with the lowest QOL on the left end of the scale, and the highest on the right) (Morrison, 1983). Subjective sense of health was assessed by the question, “How would you rate your current health status?” Participants were classified into two groups according to the median subjective sense of health score (68). Subjective happiness was assessed with the question, “How would you rate your level of subjective happiness?” Participants were classified into two groups according to the median value of subjective happiness (73). Three other indicators of QOL were measured, including relationship with family, relationship with friends, and financial satisfaction. Visual analogue scales for evaluation of self-rated happiness were also reported to be useful as CGA tools for community-dwelling individuals (Matsubayashi *et al.*, 1997; Hirotsuki *et al.*, 2011; Sakamoto *et al.*, 2011; Chen *et al.*, 2013).

#### **Health behaviors, current medical status, and past medical history**

Data were also collected on other baseline characteristics such as living conditions (living alone or not), current medical status, health behaviors (current exercise, smoking and alcohol consumption), and past medical histories. Hypertension was defined as 140 mmHg or higher in systolic blood pressure, 90 mmHg or higher in diastolic blood pressure or taking antihypertensive medication. Diabetes mellitus was defined according to the criteria of the World Health Organization: diabetes (fasting blood sugar (FBS)  $\geq 126$  mg/dL) or taking antidiabetic medication.

#### **Ethical considerations**

This study was approved by the ethics committee of the Faculty of Medicine, Kyoto University, Kyoto, Japan (E-1190). Written informed consent was obtained from each participant.

**Table 1.** Gender comparisons of baseline characteristics of comprehensive geriatric functions

	MALEn = 68	FEMALEn = 81	p-VALUE <sup>†</sup>
Age, mean ± SD	75.2 ± 5.6	75.7 ± 6.5	0.618
ADL (range 0–21)	20.5 ± 1.9	20.5 ± 1.4	0.947
SCT (range 5–25)	20.0 ± 2.9	19.9 ± 2.6	0.803
GDS (range 0–15)	4.2 ± 2.7	4.8 ± 3.1	0.240
GDS ≥ 5 (%)	38.2	46.9	0.321
QOL, mean ± SD (range 0–100)			
Subjective sense of health	69.4 ± 15.8	64.7 ± 14.7	0.066
Relationship with family	80.1 ± 11.8	77.7 ± 12.9	0.240
Relationship with friends	80.5 ± 14.1	76.5 ± 14.7	0.094
Financial satisfaction	63.1 ± 10.7	58.9 ± 10.9	0.018
Subjective happiness	74.5 ± 11.0	70.6 ± 11.4	0.038
Neurobehavioral functions			
Hand grip (Kg)	28.2 ± 9.7	18.0 ± 6.2	< 0.001
Timed up & go (s)	12.7 ± 3.4	14.6 ± 4.5	0.007
Functional reach (cm)	25.3 ± 8.6	20.1 ± 9.4	0.002
Current medical situation			
Taking antihypertensive medicine (%)	48.7	63.8	0.192
Taking anti-diabetes medicine (%)	30.8	14.9	0.116
Taking anti-depressant medicine (%)	0.0	4.3	0.498
Taking sleeping medicine (%)	7.7	2.1	0.325
Medical history			
History of stroke (%)	17.6	17.3	1.000
History of arthropathy or bone fracture (%)	45.6	72.8	0.001
History of heart disease (%)	32.4	32.1	1.000

<sup>†</sup>P-values were calculated using the Student's *t*-test for continuous variables and the  $\chi^2$ -test for categorical variables; SD, standard deviation; ADL, activities of daily living; SCT, social cohesion and trust scale; GDS, geriatric depression scale; QOL, quality of life.

### Data analysis

Statistical analyses were performed using SPSS 19.0. The Student's *t*-test was used for continuous variables, while logistic regression and the  $\chi^2$  test were used for categorical variables. The relationship between SCT, health-related factors, and subjective sense of health, and happiness were evaluated by univariate and multivariate logistic regression. Associations between SCT and subjective health or happiness were analyzed in Model 1 by multiple logistic regression, adjusting for ADL, age, and sex. Associations between GDS and subjective health or happiness were analyzed by multiple logistic regression in Model 2, adjusting for ADL, age, and sex. Associations between SCT and subjective sense of health or happiness were analyzed in Model 3 by multiple logistic regression, adjusting for GDS, ADL, age and sex.

### Results

The present study population comprised 149 community-dwelling elderly aged 65 years and older (68 men, 81 women; mean age, 75.4 ± 6.1 years) among 548 elderly individuals who were notified of the health check (27.2% of the

eligible population participated). Table 1 compares the baseline characteristics of the health status of elderly participants by gender. Mean ages for male and female participants were 75.2 ± 5.6 years and 75.7 ± 6.5 years, respectively. Mean SCT score was 19.9 ± 2.7 for the entire study population, with mean SCT scores in males and female of 20.0 ± 2.9 and 19.9 ± 2.6, respectively. No significant gender-dependent differences were identified for ADL, GDS-15, and SCT scores. Scores for the subjective sense of financial satisfaction and happiness were significantly higher in males than females. Males had significantly higher scores for neurobehavioral function than females according to the handgrip test ( $P < 0.001$ ) and functional reach test ( $P = 0.002$ ). Relative to females, males had significantly lower times for the TUG test ( $P = 0.007$ ), and the percentage of those with a history of osteoarthritis or bone fracture was significantly higher in females compared to males ( $P = 0.001$ ). In contrast, we found no significant gender-dependent difference in the percentage of those with medical issues. Table 2 compares SCT scores by health behavior and medical situation. We observed no significant difference in SCT scores between those with and without health behaviors or other medical issues, except for a significant difference between

**Table 2.** Association among SCT, health behaviors and medical situation

	SCT	p-VALUE
Health behaviors		
Exercising once a week or more (+)	20.0 ± 2.7	0.737
(-)	19.8 ± 2.8	
Living alone (+)	19.2 ± 3.5	0.371
(-)	20.0 ± 2.6	
Smoking (+)	20.4 ± 2.7	0.524
(-)	19.9 ± 2.7	
Drinking alcohol (+)	19.9 ± 2.5	0.997
(-)	19.9 ± 2.7	
Medical situation		
Hypertension (+)	20.1 ± 2.8	0.179
(-)	19.3 ± 2.2	
Diabetes (+)	20.8 ± 2.4	0.053
(-)	19.7 ± 2.8	
Stroke (+)	19.0 ± 3.0	0.041
(-)	20.2 ± 2.6	
Arthropathy or bone fracture (+)	19.9 ± 2.8	0.923
(-)	20.0 ± 2.5	
Heart disease (+)	19.6 ± 3.1	0.296
(-)	20.1 ± 2.5	

P-values were calculated using the Student's *t*-test for continuous variables; SCT, social cohesion and trust scale.

**Table 3.** Correlation coefficients between SCT and geriatric functions

	SCT	p-VALUE
Age	-0.003	0.968
ADL (range 0-21)	0.212	0.009
GDS (range 0-15)	-0.248	0.002
QOL (range 0-100)		
Subjective sense of health	0.228	0.005
Relationship with family	0.321	< 0.001
Relationship with friends	0.518	< 0.001
Financial satisfaction	0.229	0.005
Subjective happiness	0.338	< 0.001
Neurobehavioral functions		
Timed up and go test (s)	-0.012	0.892
Handing grip test (kg)	0.040	0.655
Functional reach test (cm)	-0.017	0.853

\* $P < 0.05$ ; \*\* $P < 0.001$  (two-tailed); P-values were calculated using Pearson correlation coefficient; ADL, activities of daily living; GDS, geriatric depression scale; SCT, social cohesion and trust scale; QOL, quality of life.

those with and without past history of stroke. No significant correlation was observed between SCT scores and age (Table 3) or between SCT scores and neurobehavioral function. Scores for ADL and GDS as well as all subjective QOL items

showed significant correlations with SCT scores, and a strong correlation was observed between SCT scores and relationship with friends. Table 4 shows odds ratios (OR) for age, sex, ADL, GDS, and SCT for subjective sense of health as well as subjective happiness, as determined by univariate logistic regression analysis. Significant associations were identified between subjective sense of health (median  $\geq 68$ ) and age (OR: 0.95;  $P = 0.047$ ), ADL of 21 (OR: 3.22 vs. ADL  $< 21$ ,  $P = 0.008$ ), GDS  $\geq 5$  (OR: 0.24 vs. GDS  $< 5$ ,  $P < 0.001$ ), and SCT  $\geq 20$  (OR: 2.06 vs. SCT  $< 20$ ,  $P = 0.031$ ). Similarly, subjective happiness (median  $\geq 73$ ) was significantly associated with GDS  $\geq 5$  (OR: 0.43 vs. GDS  $< 5$ ,  $P = 0.014$ ) and SCT  $\geq 20$  (OR: 2.90 vs. SCT  $< 20$ ,  $P = 0.002$ ).

Table 5 also shows associations between SCT and subjective sense of health and subjective happiness as analyzed by multivariate logistic regression, after adjusting for possible confounding factors. In Model 1, SCT ( $\geq 20$ ) was significantly associated with subjective sense of health (median  $\geq 68$ ) as well as subjective happiness (median  $\geq 73$ ), after adjusting for age, sex, and ADL. In Model 2, depression (GDS  $\geq 5$ ) was significantly and negatively associated with subjective sense of health (median  $\geq 68$ ) as well as subjective happiness (median  $\geq 73$ ), after adjusting for ADL, age, and sex. In Model 3, SCT  $\geq 20$  was not significantly associated with subjective sense of health (median  $\geq 68$ ) with the confounding factor of GDS  $\geq 5$  (OR: 0.29 vs. GDS  $< 5$ ,  $P = 0.001$ ) but associated with subjective happiness (OR: 2.54 vs. SCT  $< 20$ ,  $P = 0.009$ ) independently of GDS, ADL, age and sex.

## Discussion

The present study revealed that SCT is associated with self-rated happiness and health, even after adjusting for ADL, age, and sex in a community-dwelling elderly population in a rural town in southern Taiwan. The present study is the first to investigate the association between SCT and subjective QOL in community-dwelling elderly in eastern countries, and did so in the rural and depopulated town of Dashe in southern Taiwan, where the spirit of Confucianism prevails and the concept of SCT is highly respected.

In a previous study from 1995, the authors surveyed 8,782 residents of 343 neighborhoods in Chicago and found similar results to those of the present study with regard to SCT assessment (Sampson *et al.*, 1997). While these studies cannot be easily compared, both studies reported that community social cohesion was associated with

**Table 4.** Odds ratios of age, sex, ADL, GDS, and SCT for subjective sense of health and subjective happiness determined by univariate logistic regression analysis

INDEPENDENT VARIABLES	SUBJECTIVE SENSE OF HEALTH ( $\geq 68$ : MEDIAN)			SUBJECTIVE HAPPINESS ( $\geq 73$ : MEDIAN)		
	OR	95% CI	p-VALUE	OR	95% CI	p-VALUE
Age	0.95	0.90–1.00	0.047	1.00	0.95–1.06	0.915
Sex (female)	0.62	0.32–1.19	0.148	0.55	0.29–1.07	0.076
ADL( $\geq 21$ )	3.22	1.36–7.62	0.008	1.33	0.60–2.97	0.486
GDS( $\geq 5$ )	0.24	0.12–0.48	<0.001	0.43	0.22–0.84	0.014
SCT ( $\geq 20$ : median)	2.06	1.07–3.97	0.031	2.90	1.48–5.66	0.002

OR, odds ratio; CI, confidence interval; ADL, activities of daily living; GDS, geriatric depression scale; SCT, social cohesion and trust scale.

community friendship in this Western community and affected self-rated health and happiness. In our study population, we found significant associations between SCT, self-rated happiness, and health, even after adjusting for ADL, age, and sex. The present study supports the idea that SCT influences self-rated health and happiness independently of ADL, age, and sex.

SCT reflects the relationship between individuals and their communities, and social cohesion among neighbors may lead to higher levels of well-being among older adults (Cramm *et al.*, 2013). Cohesive communities may be healthier and happier either because residents are psychologically healthier and express trust toward their neighbors or because the community social environment promotes health via group-level processes such as the ability to undertake collective actions (e.g. mobilizing local volunteers to participate in health promotion activities) (Inoue *et al.*, 2013). The present study also found an association between SCT and mental health. Specifically, GDS and SCT scores were significantly and negatively correlated. The present study findings are consistent with those of a previous study that indicated that having a strong sense of kinship and non-kin ties, as well as belonging and living in a socially cohesive neighborhood are inversely related to depression among older people (Young *et al.*, 2004). Older adults who did not feel safe or trust in their community may be more likely to stay in their homes, leading to a higher risk of social isolation, depression, and reduced physical activity (Young *et al.*, 2004). Particularly later on in life, elderly individuals experience changes in factors such as social function (e.g. retirement), social relations (e.g. death of a spouse and friends), and physical condition (e.g. chronic disease and disability) (Rowe and Kahn, 1997). In such a transitional period, elderly persons with stronger social networks might be able to access a wider

variety of resources, enhance mental condition, and prevent the onset of depression.

One study found an association between social cohesion and smoking prevalence among Asian Americans (Kandula *et al.*, 2009). However, no significant difference was found among SCT, health behaviors, and medical issues in our study. This discrepancy may be due to a difference in smoking rates, because none of the females in our study population smoked. We surmise that the cohesive social network in this rural town in southern Taiwan might have helped promote these health behaviors as a byproduct of some important and significant cultural pressures.

Our study also found a positive correlation between ADL and SCT, which is consistent with previous studies (Russell *et al.*, 1998; Young *et al.*, 2004). Maintaining healthy relationships within a community may stimulate physical function and protect against decline in neurobehavioral function. For elderly individuals with low SCT, participation in group work activities (e.g. exercise therapy, music therapy, or other social networking activities) is recommended to prevent disability and depression and improve QOL (Okumiya *et al.*, 1996). The reminiscence therapy composed by different generations and healthcare program by young and old people based on Confucianism which was carried out in Dashe might be supposed to be useful.

The present study has several limitations. First, the response rate was fairly low, and the non-response bias may have influenced our study findings. Second, the study setting was a single town in southern Taiwan, and thus our results may not be directly applicable to other, more urban communities. However, the relationship we identified between SCT and self-rated health was consistent with that reported in previous studies. As such, we would consider the present study



**Table 5.** Associations between SCT and subjective sense of health and subjective happiness as analyzed by multivariate logistic regression, after adjusting for possible confounding factors

INDEPENDENT VARIABLES	SUBJECTIVE SENSE OF HEALTH ( $\geq 68$ : MEDIAN)						SUBJECTIVE HAPPINESS ( $\geq 73$ : MEDIAN)					
	MODEL 1		MODEL 2		MODEL 3		MODEL 1		MODEL 2		MODEL 3	
	OR(95% CI)	P	OR(95% CI)	P	OR(95% CI)	P	OR(95% CI)	P	OR(95% CI)	P	OR(95% CI)	P
Age	0.96(0.90–1.02)	0.159	0.96(0.90–1.02)	0.137	0.95(0.90–1.01)	0.127	1.01(0.95–1.07)	0.800	1.01(0.95–1.07)	0.785	1.01(0.95–1.07)	0.833
Sex (female)	0.67(0.34–1.32)	0.241	0.71(0.35–1.45)	0.346	0.71(0.35–1.45)	0.344	0.56(0.28–1.09)	0.089	0.58(0.30–1.14)	0.113	0.57(0.29–1.13)	0.109
ADL( = 21)	2.61(1.06–6.45)	0.038	2.17(0.85–5.55)	0.108	2.15(0.84–5.51)	0.112	1.22(0.51–2.91)	0.661	1.11(0.46–2.64)	0.821	1.09(0.45–2.64)	0.854
GDS ( $\geq 5$ )	–	–	0.26(0.13–0.53)	<0.001	0.29(0.14–0.59)	0.001	–	–	0.45(0.23–0.90)	0.023	0.56(0.28–1.14)	0.109
SCT $\geq 20$ :median	2.06(1.04–4.08)	0.038	–	–	1.56(0.76–3.23)	0.228	2.89(1.47–5.69)	0.002	–	–	2.54(1.26–5.10)	0.009

OR, odds ratio; CI, confidence interval; –, not used in the model; ADL, activities of daily living; GDS, geriatric depression scale; SCT, social cohesion and trust scale.

results to be reliable and generalizable to some extent. Third, our study was the first to apply the Chinese version of the SCT assessment, but the Chinese SCT scale has not yet been validated. Thus, direct comparisons between our study and previous studies may be difficult. That said, our SCT scale showed a significant association with self-rated family relationships and friend relationships. Therefore, our results were likely valid, even if comparisons with other studies would yield imprecise results.

In conclusion, the present study showed that SCT is an important factor that influences self-rated health and happiness independently of ADL, age, and sex in a community in Taiwan, where SCT i.e. individual perception of trust, sense of belonging, willingness to participate, and help neighborhood are held in high regard. When assessing geriatric psychological function, SCT should be more heavily considered, given its association with self-rated health and happiness, depression, and physical function.

### Conflict of interest

None.

### Description of authors' roles

WC performed statistical analyses and wrote the paper. KM, KO, TW, RS, and HI assisted with the statistical analyses and contributed to manuscript revisions. YI, YK, EF, and MF assisted with the statistical analyses and data collection. H-I Shih and C-M Chang helped with the literature review and data collection.

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## ラダーク高所農・牧民と市街移住者における、 うつと QOL の健康関連要因の比較

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キーワード：ラダーク、うつ、QOL

### 1. はじめに

高所住民は低所住民と比較して、うつが少なく、主観的 QOL が高いことが、高所プロのこれまでの研究より報告された<sup>1-3)</sup>。さらに、都市に住む近代的な生活を営む高所住民は、農村や牧畜地域の高所住民に比較して、生活習慣病が多く、生活機能や QOL の劣化、うつ症状の高いことも報告された<sup>4-12)</sup>。

今回は、うつが少なく、主観的 QOL が高いラダーク高所牧民と、市街部へ移住し職業の異なる市街在住者を比較し、うつや主観的 QOL の劣化に関連する要因を明らかにするために、高齢者の総合的健康指標を横断的に比較検討した。また、辺境の谷に暮らす農民の健康包括指標とも比較し、うつや QOL に関連する総合的健康指標の地域的な違いや共通点についても考察した。

### 2. 方法

#### 1) 対象

50 歳以上の、ドムカル在住民、レー市街在住民、チャンタン高原牧畜民の 3 地域住民を対象とした。以下に対象数、平均年齢、男女数、民族を示した。レーでは移住者の内訳を示した。

- ① ドムカル在住民 (2009 年)  
213 人 (63.1 歳 ± 9.3 歳、男 / 女 : 87/126) :  
全員 Ladakhi
- ② レー市街在住民 (2010 年)  
227 人 (64.4 歳 ± 9.8 歳、男 / 女 : 98/129)  
Tibetan 移住者 : 196 人  
Ladakhi 移住者 : 23 人  
Leh 在住 Ladakhi : 8 人
- ③ チャンタン高原牧畜民 (2011 年)  
133 人 (61.4 ± 9.0 歳、男 : 女 = 71 : 62)  
Tibetan 牧民 : 47 人  
Ladakhi 牧民 : 86 人

#### 2) 高齢者の総合的健康指標の評価

総合的な健康度は、医学的診察、身体計測とともに ADL、うつや主観的な QOL の評価を総合して行った。評価表を英語版から通訳を介して、チベット語あるいは、ラダーク語に翻訳し、各自に問診した。

##### a) 高血圧と耐糖能異常の診断

自動血圧計 (HEM、Omron 社製) を用いて座位により 2 回血圧測定を行い、平均値を求めた。また、早朝空腹時に、総コレステロール値、HDL