

## Does social participation by the elderly reduce mortality and cognitive impairment?

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### Abstract

**Purpose:** This longitudinal study examines the effect of social participation on mortality and cognitive impairment for the elderly in Taiwan. **Methods:** Data were from an elderly population panel in Taiwan 'The Survey of Health and Living Status of the Elderly' 1993–1999. Social participation was defined as paid/unpaid job and participating in volunteer and social groups. Logistic regression analysis was used for predicting the influence of social participation to 6-year mortality and cognitive function impairment, by controlling of socioeconomic status and health-related variables. **Results:** The elderly with continuous paid work were more likely to participate in social groups. Having paid or unpaid work at the baseline year could lower the risk of mortality six years later, especially for men. Having unpaid work was associated with a higher risk of impaired cognitive function compared to that of non-workers. Participating in a religious group reduced the risk of mortality for women and participating in political groups reduced the risk of impaired cognitive function for men. **Discussion:** Participating in some types of social activities may reduce mortality or cognitive function impairment in the elderly. However, different activities, gender roles and uneven opportunities for work and social group participation may affect the risk of these endpoints.

### Introduction

Both concepts of successful ageing (Rowe & Kahn, 1997) and active ageing (WHO, 2002) emphasize independence and participation in productive activities as being good for elder health. Although there are some findings about the association between participating in productive activities and health, the relationship between social participation and health of the elderly in Asian countries has received little attention, and the effects of different kinds of social activities on mortality and cognitive function were not confirmed. In this study, we used longitudinal data to explore the effect that participating in different kinds of social activities has on mortality and cognitive function in an elderly Taiwanese population.

#### *Definitions and concept explanations*

Productive activities, social participation and leisure activities have been defined in some studies. Kahn (1984) categorized paid employment, unpaid employment, voluntary organizational activity, mutual help and self-care as productive behaviours. Some researchers have focused only on the economic or sociological meaning of productive activities,

rather than including psychological or physiological meanings (O'Reilly & Caro, 1994). Currently the most prevalent definition of productive activities includes their economic value at the individual and societal levels, and considers gender role and life course (Herzog, Kahn, Morgan, Jackson, & Antonucci, 1989). By this definition any activity that produces goods or services, whether paid or not, is productive, and these activities cover three domains: paid work (regular and irregular), unpaid work at home (housework, care provided to children living in one's household, home maintenance) and unpaid assistance provided to others (informal help to friends, relatives, neighbours or formal volunteer work in an organisation).

Bukov, Mass, & Lampert (2002) defined social participation as socially oriented sharing of individual resources. According to this definition, social participation covers a wide range of activities related to sharing one's time, money, effort, or any participation with family, friends, social groups or the public. In contrast with productive activities and social participation, leisure activities are not based on obligation of work, family and society, but as purposive behaviour designed for self-enhancement,

such as reading newspapers or books, listening to radio or watching TV, or involvement in sports or hobbies (Hermalin, Chan, Biddlecom, & Ofstedal, 2002). A recent trend is an increasing interest in using 'social participation' as a wider concept in related studies.

Age, gender, education, race, marital status, health, hospital admission and previous participation were related to participation in social activities in elderly populations (Bukov et al., 2002; Danigelis & McIntosh, 1993; Glass, Seeman, Herzog, Kahn, & Berkman, 1995; Klumb & Baltes, 1999; Strain, Grabusic, Searle, & Dunn 2002). Social participation was cumulative, and individuals who engaged in political activities were likely to also participate in productive and collective activities (Bukov et al., 2002). Educational and occupational resources were related to social participation, but changes in social participation were mostly due to health and age. Available resources could explain the variation of participating in productive and consumptive activities (Klumb & Baltes, 1999).

#### *Effects of social participation on health*

The effect of elderly participation in productive activities on mortality, cognitive function or well-being has been studied previously. More participation in paid work or productive activities, solitary activities, or volunteer work for more than 100 hours per year may reduce the risk of mortality (Glass, de Leon, Marottoli, & Berkman, 1999; Lennartsson & Silverstein, 2001; Luoh & Herzog, 2002; Mence 2003). Frequent engagement in mental, social, and productive activity could be protective against dementia (Fabrigoule et al., 1995; Kondo, Niino, & Shido, 1994). However, the effect of physical and recreational/leisure activities or solitary activities on cognitive function was insignificant in another study (Wang, Karp, Winbland, & Fratiglioni 2002); and solitary activities were only related to happiness (Mence, 2003). Social participation also predicted life satisfaction and better function (Jang, Mortimer, Haley, & Graves, 2004; Mence, 2003). Formal religious participation may decrease the negative affect, and volunteering may increase the positive affect and decrease the negative affect (Danigelis & McIntosh, 1993). Also volunteering was protective for good self-rated health (Luoh & Herzog, 2002).

Research has found some risk factors for mortality and cognitive impairment among the Chinese elderly. Age, institutionalisation and history of multiple falls were associated with an increased relative risk of mortality (Leung, Tang, & Lue, 1997). Being older, female, institutionalised, with no formal education and financial dependency, lack of exercise, lower Instrumental Activities of Daily Living (IADL) functions, were risk factors for cognitive impairment (Ho, Woo, Sham, Chan, &

Yu, 2001; Yeh & Liu, 2003). On the other hand, increased social support and participation in social activities were associated with higher cognitive function in studies of Taiwanese community elderly (Yeh & Liu, 2003; Yen, Yang, Shih, & Lung, 2004). However the effect of social support and social participation has not been examined in a longitudinal study.

These studies have investigated the relationship between health and participating in productive activities and in leisure or social groups, but few have considered all of these activities at the same time, or which activities could be more beneficial for different dimensions of health. In addition, these past studies were conducted on elderly populations in the West. However, culture differences exist in social participation, which means that past findings may not be generalized to Asian countries.

#### *Background in Taiwan*

Traditional Taiwan was a patrilineal society in which women of the elderly cohort were not allowed to be educated and often were discouraged from joining the labour force. Among this cohort, most women were expected to do housework or take care of children. Unpaid work in the household, such as house maintenance or taking care of children, would not be viewed as an activity of economic value, but rather as a family obligation. When a family had grown female offspring or daughters-in-law, they assumed the responsibilities of childcare and housework so the elderly could do less of that work (Hsu & Chang, 2005). In the traditional Taiwanese society the chance to participate in social groups is also different for males and females. Taiwanese elderly have various concepts toward leisure activities as well. Some elderly do arrange leisure activity in their old age. But others think that leisure activity is more of a luxury, good to have it but not necessary.

In this study, 'social participation' is defined as paid or unpaid work for a family business or farm, volunteer work and other social group participation. The definition of social participation is the integration of productive activity and regular social group participation, but leisure activity is excluded. The consideration is as follows: first, the elderly in Taiwan usually engage themselves in paid or unpaid jobs. Second, volunteer work and participating in social groups is allowed, and even encouraged, for both elderly men and women, although there is a difference between the genders. Third, the concept of leisure activity is not widely accepted as a norm in old age life for the current older generations in Taiwan, and the effect of leisure activity on health is inconsistent in past studies. Therefore leisure activity is excluded in the definition of 'social participation' in this study. The purpose of this longitudinal study was to explore the effect of social participation on mortality and cognitive function for the Taiwanese

elderly. The hypothesis of this study is: if the elderly engaged themselves more in social participation, they will have reduced mortality and reduced cognitive impairment. Our results will contribute to successful-ageing literature and will have implications for health policy.

## Methods

### Data and samples

Data were obtained from the 'Survey of Health and Living Status of the Elderly in Taiwan', which was first conducted in 1989. Face-to-face interviews were conducted with a random sample of individuals (60 or more years old) derived from the entire Taiwanese elderly population, including those in institutions. A three-stage proportional-to-size probability sampling technique was used (see Figure 1). The first stage consisted of a stratified sample of the administrative units (townships); the second consisted of blocks in the selected townships; and the third consisted of two respondents selected systematically from the register in each selected neighbourhood. The initial interviews in this study were followed by subsequent face-to-face interviews in 1993 ( $n = 3,155$ ), 1996 ( $n = 2,669$ ) and 1999 ( $n = 2,310$ ). The lost cases were because of death or loss to follow-up. Incomplete cases were not analysed in the study. Participant deaths were linked and verified through official death registration records, even for non-participants. By the goodness-of-fit test of gender and age, the death or lost follow-up cases were older and mostly males.

### Measures

*Social participation.* Social participation included continuous paid work, unpaid work and attendance of meetings of social groups/clubs. Continuous paid work meant that an individual

was employed or actively farming. Unpaid work meant childcare, housework and home maintenance. Social groups or clubs included any religious group, union or occupational organization, social service or volunteer work, political group, community action or service group, clan association, elderly club, etc. Because the effect of various leisure activities on health is inconclusive and the attitudes toward leisure activity among Taiwanese elderly are various, leisure activity alone was excluded from social participation in this study.

In the 1993 interviews, paid work, unpaid work, and no work were the work-status options from which the respondents could choose, whereas in the 1996 and 1999 interviews, with or without work were the only options. Because participation in volunteer work was quite low for the elderly in Taiwan (only 4.4%), volunteer work was combined into social group activities.

*Outcome: Death and cognitive function.* Participants' deaths were recorded and verified with official death registration records. Cognitive function was not assessed in the 1989 survey, so the baseline to determine change in cognitive function came from the 1993 data. Cognitive function was measured with the Short Portable Mental Status Questionnaire (SPMSQ; Pfeiffer, 1975) using ten items in 1993 and six items in 1996 and 1999. The measures included: where are you located now; your home address; what are the day, month, year; how old are you; who is the current president and the last president; count backward from 20 by 3's; reiterate some words or reiterate numbers in reverse; what is your mother's maiden name. Each item scored one, and the scores ranged from 0–10. For at least high school educational level, a score of 6–7 was mildly impaired, a score of 3–5 was moderately impaired and a score of 0–2 indicated severely impaired. However, most of the elderly in Taiwan were

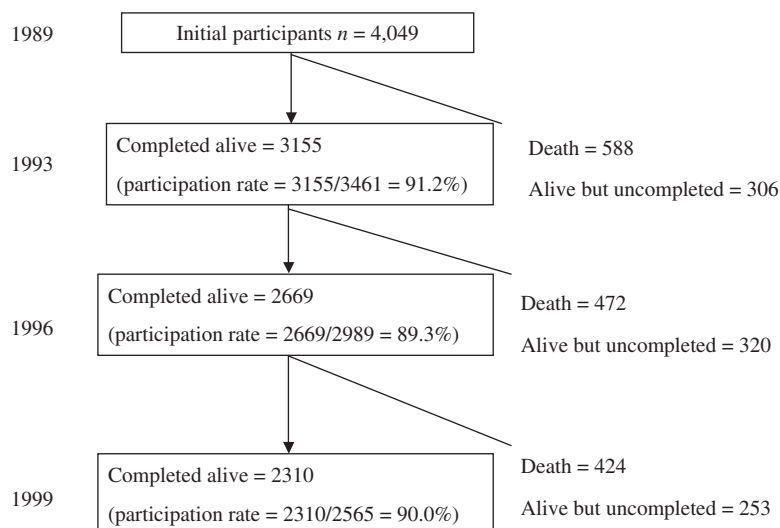


Figure 1. Flow chart of study samples and participation.

illiterate or had limited education, so the criteria of cognitive functioning status (normal or impaired) was adjusted by educational level (Wu & Chang, 1997). For example, normal cognitive function was defined by a score more than six for illiterate elderly, a score more than seven for elementary school educated elderly, and a score more than eight for junior high school or higher educated elderly. The items of SPMSQ are slightly different among the surveys, so the cut-point of cognitive function impairment was adjusted according to the rule of interpolation.

*Demographics, socioeconomic status (SES) and health-related variables.* Demographic variables used in this study included ethnic group, marital status, gender, age, education and personal income (current personal income or amount of retirement pension for the last job).

Physical function was assessed primarily by measurements of activities of daily living (ADL). Six items were assessed: eating, dressing, getting in and out of a bed or chair, walking in the house, going to the toilet and having a bath. 'Normal' was defined as having no difficulty or having impairment for less than three months. The prevalence of self-reported chronic diseases were included in the analysis, such as hypertension, diabetes, heart disease, stroke, respiratory disease, digestive disease, kidney disease and cancer.

### Analysis

Logistic regression analysis was conducted for the risk odds ratio (OR) of engagement of productive activity at baseline to predict mortality and cognitive function impairment six years after. The controlling variables included demographic and socioeconomic status and health-related variables. The specific roles of gender and different kinds of productive activities were also analysed, because gender was related to social participation, mortality and cognitive function for the Taiwanese elderly. The correlation of matrix was examined, and most of the correlation coefficients between any two independent variables were less than 0.3. The higher correlations showed in education and gender ( $r=0.415$ ), and education and income ( $r=0.423$ ). By Chi-square analysis of ethnic group and education, Fuchien people had a higher proportion of being illiterate, and Mainlanders had a higher educational level. No multi-colinearity was found among the independent variables.

### Results

The characteristics of the elderly Taiwanese population examined in this study are described in Table I. Table II shows how the elderly in this population engaged in social participation: In 1993, 60% still had paid work, 20% did unpaid work and 20% did not work at all. Many of the respondents (40.4%)

Table I. Distribution of productive activity participation at baseline year (1993).

Baseline characteristics	%	Baseline characteristics	%
Age		Marital status	
60-64	6.1	With spouse	68.5
65-69	40.7	No spouse	31.5
70-74	27.1	Income	
75-79	15.0	Low (<NT10,000)	58.0
80+	11.0	Middle (NT 10,000-19,999)	22.9
Gender		High (NT 20,000+)	19.1
Men	56.4	Numbers of chronic disease	
Women	43.6	0	37.3
Education		1	31.6
Illiteracy	40.4	2	19.8
Elementary school/ non-formal education	41.0	3+	11.3
Junior high school	8.2	ADL disability	8.0
Senior high school or over	10.4	Normal	92.0
Ethnic groups		Cognitive impaired	12.2
Fuchien	61.1	Normal	87.8
Hakka	15.6		
Mainlanders	21.7		
Others	1.6		

$n = 3,155$ , cases were less than 3155 due to missing values.

Numbers of chronic diseases include the prevalent numbers of hypertension, diabetes, heart disease, stroke, respiratory disease, digestive disease, kidney disease and cancer.

Cognitive function was measured by SPMSQ, score ranged 0-10. The cut-point of cognitive function impairment as following: Score <6 for the illiterate elderly, score <7 for the elementary school educated elderly, and score <8 for the primary high school or over educated elderly.

participated in social groups, but few (4.4%) participated in volunteer work. In the latter three columns, participation in social groups and volunteer work was stratified by work status and was examined by Chi-square test. For those elderly who still had paid work, their participation in social groups or volunteer work was significantly higher than those elderly who did unpaid work or none at all. The lower part of Table II shows participation by gender. The proportion of participation in any social group for elderly men (49.5%) was greater than that for elderly women (28.7%). Few women participated in occupational groups (4%) and political groups (0.7%), whereas participation by men in these types of activities was far greater (13.1% and 12.9%, respectively).

Table III shows the results of the logistic regressions to determine how social participation influences mortality (Models A and B) and cognitive function impairment (Models C and D) six years after the baseline measurements. Model A shows the OR for all participants. Model B adds work status and social group participation in 1996 and 1999. In Model A, those with either paid or unpaid work in 1993 had a lower probability of death in 1999 (OR=0.693 for paid work, OR=0.715 for unpaid work). Participation in any kind of social group was not significant in predicting mortality. In Model B, when adding the status of productive activities for 1996 and including only survivors for 1996, only those elderly who still had work in 1996 had a lower risk of mortality in 1999 (OR=0.477). In addition, those with the following characteristics were more likely to die: male, older, low educational level, no spouse, disabled by ADL, having more chronic diseases and cognitive function impaired.

Model C shows that engaging in productive activities had inconsistent effects. Compared to

those who did not work at all, having paid work did not affect cognitive function; however, doing unpaid work at baseline was associated with a higher probability of losing cognitive function after six years (OR=1.410). Participation in social groups was not significantly related to cognitive function. When analysing the survivors and considering their productive activities in 1996 and 1999, Model D shows that only those doing unpaid work at the baseline year had a higher probability of losing their cognitive function (OR=1.416). Other variables that might predict impaired cognitive function included being female, older, less educated, of certain ethnic groups (e.g. Fuchien) and ADL disabled.

Table IV shows the effects of participating in different social groups by gender. For men, only having paid work lowered the risk of mortality (OR=0.679), but for women participating in religious groups lowered the risk of mortality (OR=0.471). The work status at baseline did not influence the cognitive function for men, but those who participated in political groups were less likely to show impaired cognitive function (OR=0.536). Elderly women with unpaid work at baseline were more likely to have impaired cognitive function in the follow-up (OR=1.652). Participating in any kind of social group was not significantly related to cognitive function for women, although participating in volunteer work seemed to indicate lower risk of impaired cognitive function for both genders.

## Discussion

This longitudinal study investigated the impact of social participation on mortality and cognitive function among the elderly in Taiwan. Those with paid work participated more in social activities. Those with either paid or unpaid work had a lower

Table II. Engagement in social groups by work status and gender at 1993.

Work status	Total	Participating rate in social groups					
		Any social group	Retired elderly group	Religious group	Occupational group	Political group	Volunteer group
Total ( <i>n</i> = 3155)	100.0	40.4	19.2	9.9	9.1	7.6	4.4
Paid work	20.0	53.1	20.4	11.9	20.9	11.3	6.5
Unpaid work	20.0	38.6	19.1	13.6	18.1	4.0	3.1
None	60.0	36.8	18.9	8.0	5.5	7.6	4.1
Chi-square test		**		**	**	**	*
By gender							
Women ( <i>n</i> = 1375)	100.0	28.7	18.4	9.8	4.0	0.7	1.7
Paid work	9.5	35.4	22.3	9.2	9.2	1.5	2.3
Unpaid work	33.2	32.4	18.2	13.6	4.4	0.7	1.6
None	57.3	25.4	17.9	7.7	2.9	0.5	1.7
Men	100.0	49.5	19.9	9.9	13.1	12.9	6.4
<i>n</i> = 1780							
Paid work	28.2	57.7	20.0	12.6	24.0	13.8	7.6
Unpaid work	9.8	54.9	21.7	13.7	18.3	12.6	7.0
None	62.0	45.0	19.6	8.2	7.3	12.6	5.7

Missing cases were excluded list-wise in analysis.  
Chi-square test: \**p*<0.01; \*\**p*<0.001.

Table III. Odds ratio of mortality by productive activity participation.

Related factors	Mortality		Cognitive impairment	
	Model A	Model B	Model C	Model D
Gender: female	0.399***	0.370***	1.720***	1.657**
Age 75+	2.416***	2.053***	2.672***	2.645***
Education: illiterate	1.373*	1.448	0.963	0.933
Education: elementary school/informal education	1.141	1.189	0.446***	0.444***
Ethnic group: Hakka	1.120	1.147	0.712	0.724
Ethnic group: Mainlanders	0.711	0.640*	0.706*	0.685*
Ethnic group: others	1.259	0.618	5.984***	6.026***
Marital status 1993: no spouse	1.263*	1.394*	0.947	0.944
Income: low 1993	1.303	1.335	1.335	1.331
Income: middle 1993	1.327	1.344	1.264	1.258
ADL impaired 1993	2.415***	1.535	3.347**	3.276**
Chronic disease numbers 1993	1.275***	1.244***	1.100	1.108
Cognitive impaired 1993	1.979***	1.704**	–	–
Paid work 1993	0.693**	1.184	0.888	1.091
Unpaid work 1993	0.715*	0.856	1.410*	1.416*
Social group 1993	0.842	0.890	0.818	0.927
Paid work 1996	–	0.477**	–	0.595
Social group 1996	–	0.819	–	0.919
Paid work 1999	–	–	–	1.074
Social group 1999	–	–	–	0.779
<i>N</i>	2885	2368	1601	1590
–2 LL of the model	2798.985	1754.772	1645.820	1624.009
Chi-square (df)	344.791(16)	139.314(18)	175.886(15)	184.789(19)

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Proxy or missing cases were excluded by case wise. Deaths cases were also excluded in cognitive impairment models C and D.

–2LL = –2 Log Likelihood.

The reference groups of independent variables are: age (<75), gender (male), education (junior high school or over), ethnic group (Fuchien), marital status (with spouse), personal income (higher), ADL disability (normal), chronic disease numbers (as continuous variables), paid work 1993/1996 (none), participation in social groups 1993/1996/1999 (no).

Estimation of constant is omitted in the Table.

risk of mortality over the six years after baseline, but those doing unpaid work had a higher risk of impaired cognitive function. This was especially significant when comparing men doing paid work with women doing unpaid work. Women who attended religious groups had a lower risk of mortality, and men who attended political groups had a lower risk of cognitive impairment.

Activities that accompany economic security or spiritual well-being may be related to longevity. Having paid work means having more individual/social resources, which may help to maintain good health; in this study, this was especially true for the men with paying jobs. This result is consistent with that of other research that found that individual or social resources might be helpful in maintaining good health (Danigelis & McIntosh, 1993; Bukov et al., 2002). A paid job assures economic security as well as a social network related to life opportunities and social support; it may also help maintain physical and intellectual stimulation.

The effect of participation in productive activities or social groups on an elderly person may depend on the nature of the activity as well as on the person's opportunities to participate. On one hand,

differences in physical containment, social interaction or intellectual stimulation in social groups results in different effects on health. For example, doing unpaid work was related to lower risk of mortality but higher risk of impaired cognitive function. Unpaid work was more physically demanding but less intellectually stimulating, so doing unpaid work could not protect cognitive function. This result suggests that the mechanism for maintaining cognitive function might be more related to social connections rather than simply the self-concept of usefulness. Political group activity might be more related to intellectual stimulation than is the simple social interaction provided by elderly group activities. Religious group activity might improve spiritual well-being and therefore be beneficial to longevity. However, to classify activities and their effects clearly is not easy because most activities contain multiple qualities (Riddoch, 2000).

On the other hand, the individuals had different opportunities to participate in social groups. The elderly who participated in paid jobs, occupational groups or political groups were more likely to be men, healthy people or those of higher socio-economic status. For example, the protective effect

Table IV. Odds ratio of mortality and impaired cognitive function by different types of productive activity participation.

Related factors 1993	Mortality		Impaired cognitive function	
	Men	Women	Men	Women
Age 75+	2.137***	3.396***	3.179***	2.377**
Education: illiterate	1.205	10.202*	0.650	1.334
Education: elementary school/non-formal education	1.096	8.325*	0.417***	0.484
Ethnic group: Hakka	0.895	1.650*	0.432**	0.912
Ethnic group: Mainlanders	0.651**	0.730	0.733	0.621
Ethnic group: others	1.691	1.023	2.757	8.474*
Marital status: no spouse	1.336*	1.284	1.209	0.860
Income: low	1.344	1.206	0.837	2.725**
Income: middle	1.376	1.179	1.198	2.119*
ADL impaired	1.943*	2.025*	4.297**	3.674
Chronic disease numbers	1.186**	1.462***	1.117	1.070
Cognitive function impaired	1.645	1.984***	–	–
Working: paid work	0.679*	0.804	0.751	1.135
Working: unpaid work	0.703	0.770	1.135	1.652*
Retired elderly groups	0.934	0.818	0.765	1.145
Religious groups	1.047	0.471*	1.199	0.975
Occupational groups	0.951	0.838	1.510	1.225
Political groups	1.178	0.036	0.536*	1.051
Clan groups	0.890	0.420	0.805	0.176
Volunteer work	0.785	2.996	0.445	0.341
N	1647	1178	931	661
–2 LL of the model	1731/985	967.147	810.805	768.516
Chi-square (df)	127.453(20)	193.269(20)	74.227(19)	88.210(19)

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Deaths, proxy or missing cases were excluded list-wise.

–2LL = –2 Log Likelihood.

The reference group of independent variables are: age (<75), gender (male), education (junior high school or over), ethnic group (Fuchien), marital status (with spouse), personal income (higher), ADL disability (normal), chronic disease numbers (as continuous variables), paid work (none), participation in retired elderly groups (no), religious groups (no), occupational groups (no), political groups (no), clan groups (no), volunteer work (no).

Estimation of constant is omitted in the Table.

of participating in political groups on cognitive function was only significant in elderly men in Taiwan. The reason is that the Taiwanese elderly who participate in political groups are more likely to be male and highly educated, which in turn is related to cognitive function performance. These privileged groups have more social resources and a more stable life, and so they have more chances to participate in social groups.

Gender is another social group characteristics related to social participation. For elderly women, being part of a religious group was beneficial for longevity, perhaps because attending religious activities may promote their spiritual and emotional health. Most of the Taiwanese women were not allowed to or were unable to participate in paid work, but they were supposed to help in the family business, farm work, taking care of children or doing housework. They were not encouraged to participate in most social groups other than religious groups, in which many members are elderly women. Thus, the potential effect of participating in other social groups on the well-being of elderly women needs further investigation in a more gender-equal environment.

The result shows that the risk of cognitive impairment is higher when getting older, but the increase in risk to cognitive impairment of getting older is higher for men (OR = 3.179) than for women (OR = 2.377). Although women show a higher cognitive impairment prevalence than men, for older men (aged 75 or over) the decrease in cognitive function is more obvious. Whether the ceasing or pattern of social participation for men and women is associated with the mechanism of cognitive impairment needs further exploration.

There are some limitations of this study. First, the data were collected in three waves over the course of six years, and the exact time of death or of impairment of cognitive function was unavailable. Thus, we could only estimate ORs in this study rather than relative risks; the lost follow-up or death cases were excluded in the analysis. If the lost follow-up or death cases were more likely to be the frail respondents, then our estimation of the effects of social participation may have been underestimated. Second, the data of participating history of work, unpaid work or social groups of the respondents during their youth were

unavailable, so we could not examine the cumulative effect of participation in productive activities. Third, social support is possibly related to cognitive function or mortality but was not used as a controlling variable in the analysis. Social support information was only available for those healthier participants who could answer by themselves. To avoid screening out the frail elderly cases in the data, the effect of social support to cognitive function or mortality was not estimated. Fourth, participation in volunteer groups was not very popular among the elderly in the 1990s. Thus, participation in volunteer work was combined with participation in other social group activities instead of being analysed on its own so that we could compare our data with other research. The OR of volunteer work participation, although not significant, was lower than one, implying a lower risk of mortality or cognitive impairment. This suggests the need for further analysis of the relationship of quantity and quality of volunteer work to successful ageing.

The results suggest that social participation can improve health and contribute to successful ageing. Activities related to economic security or spiritual well-being might be related to longevity, whereas activities with greater social interaction and intellectual stimulation might be beneficial to cognitive function. The elderly should be encouraged to maintain their social participation, whether working at a paid job or participating in social groups. Social resources may also be related to resources or opportunities for social participation, and therefore affect the health of the elderly. Thus, whether all of the elderly are equally encouraged to social participation should be noticed.

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### References

Bukov, A., Mass, I., & Lampert, T. (2002). Social participation in very old age: Cross-sectional and longitudinal findings from BASE. *Journal of Gerontology: Psychological Sciences*, *57*, P510-P517.

Danigelis, N. L., & McIntosh, B. R. (1993). Resources and the productive activity of elders: Race and gender as contexts. *Journal of Gerontology: Social Sciences*, *48*(Suppl.), S192-S203.

Fabrigoule, C., Letenneur, L., Dartigues, J. F., Zarrouk, M., Commenges, D., & Barberger-Gateau, P. (1995). Social and leisure activities and risk of dementia: A prospective longitudinal study. *Journal of American Geriatric Society*, *43*, 485-490.

Glass, T. A., de Leon, C. M., Marottoli, R. A., & Berkamn, L. F. (1999). Population based study of social and productive activities as predictors of survival among elderly Americans. *British Medical Journal*, *319*, 478-483.

Glass, T. A., Seeman, T. E., Herzog, A. R., Kahn, R., & Berkman, L. F. (1995). Change in productive activity in late adulthood: MacArthur Study of Successful Aging. *Journal of Gerontology: Social Science*, *50*, S65-S76.

Hermalin, A. I., Chan, A., Biddlecom, A., & Ofstedal, M. B. (2002). Work, retirement and leisure. In A. I. Hermalin (Ed.), *The well-being of the elderly in Asia: A four country comparative study* (pp. 231-293). Ann Arbor, MI: The University of Michigan Press.

Herzog, A. R., Kahn, R. L., Morgan, J. N., Jackson, J. S., & Antonucci, T. C. (1989). Age differences in productive activities. *Journal of Gerontology: Social Sciences*, *44*, S129-S138.

Ho, S. C., Woo, J., Sham, A., Chan, S. G., & Yu, A. L. (2001). A 3-year follow-up study of social, lifestyle and health predictors of cognitive impairment in a Chinese older cohort. *International Journal of Epidemiology*, *30*, 1389-1396.

Hsu, H. C., & Chang, M. C. (2005). *Research report of the project of 'Successful Aging of the Taiwan Elderly (II)'* (NSC 93 2320 B 468 001). Taipei, Republic of China: National Science Council.

Jang, Y., Mortimer, J. A., Haley, W. E., & Graves, A. R. B. (2004). The role of social engagement in life satisfaction: Its significance among older individuals with disease and disability. *Journal of Applied Gerontology*, *23*, 266-278.

Kahn, R. L. (1984). Productive behavior through the life course: An essay on the quality of life. *Human Resource Management*, *23*, 5-22.

Klumb, P. L., & Baltes, M. M. (1999). Time use of old and very old Berliners: Productive and consumptive activities as functions of resources. *Journal of Gerontology: Social Sciences*, *54*, S271-S278.

Kondo, K., Niino, M., & Shido, K. (1994). A case-control study of Alzheimer's disease in Japan: Significance of life-styles. *Dementia*, *5*, 314-326.

Lennartsson, C., & Silverstein, M. (2001). Does engagement with life enhance survival of elderly people in Sweden? The role of social and leisure activities. *Journal of Gerontology: Social Sciences*, *56*, S335-S342.

Leung, K. K., Tang, L. Y., & Lue, B. H. (1997). Self-rated health and mortality in Chinese institutional elderly persons. *Journal of Clinical Epidemiology*, *50*, 1107-1116.

Luoh, M. C., & Herzog, A. R. (2002). Individual consequences of volunteer and paid work in old age: Health and mortality. *Journal of Health and Social Behavior*, *43*, 490-509.

Mence, V. H. (2003). The relation between everyday activities and successful aging: A 6-year longitudinal study. *Journal of Gerontology: Social Sciences*, *58*, S74-S82.

O'Reilly, P., & Caro, F. G. (1994). Productive aging: An overview of the literature. *Journal of Aging & Social Policy*, *6*, 39-71.

Pfeiffer, E. (1975). A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. *Journal of American Geriatric Society*, *23*, 433-441.

Riddoch, C. (2000). Social and productive activities in elderly people: Activities have been confused. *British Medical Journal*, *320*, 184.

Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *Gerontologist*, *37*, 433-440.



- Strain, L. A., Grabusic, C. C., Searle, M. S., & Dunn, N. J. (2002). Continuing and ceasing leisure activities in later life: A longitudinal study. *Gerontologist, 42*, 217–223.
- Wang, H. X., Karp, A., Winbland, B., & Fratiglioni, L. (2002). Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: A longitudinal study from the Kungsholmen Project. *American Journal of Epidemiology, 155*, 1081–1087.
- World Health Organization (2002). *Active ageing: A policy framework*. Geneva, Switzerland: World Health Organization.
- Wu, S. C., & Chang, M. C. (1997). *Health care for the elderly in Taiwan. Taiwan elderly research* (series 6). [in Chinese] Taipei, Taiwan: Institute of Public Health, National Taiwan University.
- Yeh, S. C., & Liu, Y. Y. (2003). Influence of social support on cognitive function in the elderly. *BMC Health Services Research, 3*, 9.
- Yen, Y. C., Yang, M. J., Shih, C. H., & Lung, F. W. (2004). Cognitive impairment and associated risk factors among aged community members. *International Journal of Geriatric Psychiatry, 19*, 564–569.

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