

# Social Interaction and Dementia Prevention: Six-year Follow-up Study

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**Abstract-** This six-year follow-up study was designed to analyse the relationship between social interaction and the prevention of dementia. All participants (aged 65 years and above) lived in farming communities near major urban centers in Japan. The contents of the questionnaire covered social interaction (using an index of social interaction constituting 18 items), health status, physical function, age, and gender. Residents who needed care and had disease at baseline survey were excluded from analysis. After the baseline survey, 35 participants among 593 were diagnosed as dementia within the six-year period. Results showed that: (1) baseline age was related to dementia; (2) greater social interaction was positively related to reduced dementia; (3) the multiple logistic regression analysis adjusted for baseline age, gender indicated that high frequency of newspaper reading, health motivation, life style motivation, and active approach were related to dementia prevention. These findings highlight the importance of social interaction in dementia prevention.

**Keywords-** *Social Interaction; Dementia Prevention; Follow-Up Study*

## I. INTRODUCTION

Dementia prevention is one of the challenging issues for public health researchers and practitioners in this progressing ageing society all over the world. Williams investigated 25 systematic reviews and identified the factors associated with increased risk of cognitive decline were diabetes, epsilon, 4 allele of the apolipoprotein E gene (APOE e4), smoking, and depression [1]. Also he mentioned the cognitive engagement and physical activities showing a fairly consistent association with decreased risk of cognitive decline.

As life expectancy increases around the world, dementia ratio also increases. Studies over the past 20 years have demonstrated the relationship between various dimensions of social networks, social support, and social interaction, and outcomes related to mental deterioration, as well as morbidity, physical deterioration, and mortality among older adults [2]-[9]. These results indicate that the greater the amount of social support and/or interaction (especially when positive), the better the physical and mental health.

Also some researches indicate either the breadth (how many roles or how many ways a person is integrated into a rich network) as well as the depth (the quality of the relationships) are key to more positive mental and physical health. Such as the breadth of social networks, and the quality or depth of social networks is the key to the positive impact they have on physical and mental health [10]. Others have proposed that having multiple roles in one's life is what increases one's sense of integration into one's community or society, and that the outcome of such integration helps to improve mental health and the ability to contribute in a positive way to one's community and develop as an individual [11]. Fratiglioni et al. found that being single and living alone was associated with an increased risk of Dementia, but being widowed, divorced, or married but living alone did not significantly increase risk of Dementia [12].

Other researchers have looked more broadly at the concept of "social participation", which defined as "an active involvement in society and embeddedness in a social system, a way of life that is characterized by social competence and active social interaction in general." In a longitudinal study in Japan a direct effect of social participation on mortality has been found [13, 14].

The current study examines these relationships between social participation and dementia in a Japanese sample, across a six-year period, hypothesizing that the greater the degree of social participation, as measured by the Index of Social Interaction (ISI), the lower the dementia rates among older people.

## II. METHODS

### A. Participants

Tobishima is a typical farming community in a suburban area of Japan, with a population of 4,625. Beginning in 1991, The Tobishima Study sought to investigate factors associated with longevity in elders, with the goal of creating a health-promoting program that would maximize quantity and quality of life for residents. All of the residents were invited to participate, and all agreed. Of the sample in 2002, the 882 persons aged 65 or older were included in analyses that looked at 6-year dementia rates.

Of those 882 persons, 781 were actually answered, with a response rate of 88.5%. There were no significant gender or age differences between the participants and non-participants. Residents who needed care and had disease at baseline survey were excluded from analysis. 35 participants among 593 were diagnosed as dementia within the six-year period.

## B. Measures

### 1) Independent Variables:

Three types of independent variables were examined: socio-demographics, disability and health status, and social interactions. The socio-demographics include age and gender. Income and education background were not reported as two factors in the research work here for the reason that: a) people are very reluctant to report specific income and education background; and b) the homogeneity of financial and educational status in this community meant income and education would not have had great variability anyway in this sample. The disability and health conditions measure included mobility, sensory function (vision or auditory impairment), activities of daily living, and disease status (either with none or with any number of diseases, such as diabetes, high blood pressure, and heart disease). Marital status was also not recorded due to the fact that whether people were married or single, all elders in this community lived with family members, including children.

Social interaction was measured using the “Index of Social Interaction” (ISI). This scale was developed for evaluating social interactions of various types and includes 18 items. Factor analysis revealed 5 subscales: 1) Independence, which includes having a motivation to live an active lifestyle, taking an active approach towards one’s life, being motivated to live a healthy life, and having a regular or routine lifestyle; 2) Social curiosity, which comprised reading newspapers, reading books, trying to use new equipment, having a hobby, and having a feeling of importance; 3) Interaction, composed of communication within the family, communication with non-family persons, and interactions with non-family persons; 4) Participation in society, made up of participation in social groups, participation in neighbourhood affairs, watching television and having an active role in society; and 5) Feelings of safety, meaning having counsel, and having someone to give support in an emergency (see Table I). Cronbach’s alpha for the subscales ranged from .78-.81 [15,16].

TABLE I INDEX OF SOCIAL INTERACTION (ISI)

<b>1. Independence</b>	Motivation to live an active lifestyle
	“Do you have motivation to live an active lifestyle?”
	Taking an active approach
	“Do you take an active approach towards your life?”
	Being motivated to live a healthy life
<b>2. Social curiosity</b>	“Are you motivated to live a healthy life?”
	Having regular lifestyle
	“Do you have a regular or routine lifestyle?”
	Reading newspapers
	“Do you read newspapers regularly?”
<b>3. Interaction</b>	Reading books
	“Do you read books or magazines regularly?”
	Try to use new equipments
	“Do you try to use new equipments like a video?”
	Having a hobby
<b>4. Participation in the society</b>	“Do you have any hobby?”
	Feeling of importance
	“Do you have feeling of importance in the society?”
	Communication within the family
	“Do you often communicate with your family members?”
<b>5. Feeling of safety</b>	Communication with non-family persons
	“Do you communicate with non-family persons regularly?”
	Interaction with non-family persons
	“Do you interact with non-family persons regularly?”
	Participation in social groups
	“Do you have chance to participate in social groups?”
	Participation in neighborhood affairs
	“Do you have chance to participate in your neighborhood affairs?”
	Watching television
	“Do you watch television?”
	Having an active role in society
	“Do you have an active role in the society or social affairs?”
	Having counsel
	“Do you have someone to counsel with in difficult situation?”
	Having someone to give support in emergency
	“Do you have someone to support you in emergency?”

\*Items divided into five subscales by factor analysis. \*Cronbach .78 reliability .81

Each item's score was rated one point for a positive response (yes, I do this or yes, I have this) and zero for a negative response. Thus, both subscale scores and the total ISI score were calculated simply by summing the positive responses. For missing data, the mean score of the rest of the items was used to replace the missing score.

## 2) Dependent Variable:

The dependent variable was simply whether a person was diagnosed dementia by medical doctor or not during the 6-year follow-up time.

## 3) Analysis Plan:

First, the relationship between the socio-demographic variables and dementia was analysed. Second, the relationship between ISI score and dementia were analysed using simple logistic regression analysis. Finally, multiple logistic regression analysis was performed to predict dementia from the ISI score, controlling for age, and gender. All analyses were conducted using the PC-SAS program.

# III. RESULTS

## A. Demographics and Dementia

Table II displays the results of the analysis of the socio-demographic variables and dementia rates. Dementia was significantly higher among persons over 75 years of age (13.2%) versus those under 75 (2.5%) ( $p<.001$ ). Dementia rates were not significantly different for women (6.5%) and men (5.2%).

TABLE II DEMOGRAPHIC BACKGROUND AND DEMENTIA (N=593)

		N	%	N	%	N	%
age	<75	403	68.0	10	2.5	393	97.5
	74<	190	32.0	25	13.2	165	86.8
gender	male	270	45.5	14	5.2	256	94.8
	female	323	54.5	21	6.5	302	93.5

## B. Social Interaction and Dementia

An analysis of each item on the ISI, as shown in Table III, revealed the following: "being motivated to live a healthy life" (odds 3.98), "trying to use new equipment" (3.26), "motivation to live an active lifestyle" (3.21), "taking an active approach toward life" (2.98), "reading books" (2.86), "reading newspapers" (2.85), "having a hobby" (2.57), "having regular life style" (2.25), and "having an active social role" (2.01) were each significantly related to dementia prevention.

TABLE III SOCIAL INTERACTION AND DEMENTIA AFTER 6 YEARS (N=593)

item	odds	range	p
Reading newspapers	2.85	1.43-5.68	**
Reading books	2.86	1.28-6.41	*
Having active role	2.01	1.01-4.00	*
Having a hobby	2.57	1.29-5.10	**
Curiosity for using new equipments	3.26	1.45-7.29	**
Health motivation	3.98	1.99-7.98	***
Regular life style	2.25	1.09-4.67	*
Life style motivation	3.21	1.60-6.43	**
Active approach	2.98	1.49-5.97	**
***: $p<0.001$ **: $0.001 \leq p<0.01$ *: $0.01 \leq p<0.05$			

## C. Multidimensional Analysis of ISI and Dementia

Using multidimensional logistical regression, an analysis was done to predict dementia prevention after 6 years from the ISI score, after controlling for age and gender. Table IV shows the results of this analysis. "Lack of reading newspapers", "being motivated to live a healthy life", "motivation to live an active lifestyle", and "taking an active approach toward life" were odds 1.14 and significantly related to dementia prevention excluding the effect of age and gender.

TABLE IV ODDS FOR DEMENTIA BY SOCIAL INTERACTION AND CONTROLLED FACTORS

item	<u>Reading newspapers</u>		<u>Health motivation</u>		<u>Life style motivation</u>		<u>Active approach</u>	
	odds	range	odds	range	odds	range	odds	range
age	1.14***	1.08-1.20	1.14***	1.08-1.20	1.14***	1.08-1.20	1.14***	1.08-1.20
gender	0.96	0.46-2.02	1.07	0.51-2.25	1.03	0.49-2.15	1.02	0.49-2.12
social interaction	2.14*	1.02-4.48	3.58***	1.73-7.40	2.70**	1.30-5.62	2.40*	1.15-4.99
Intercept	-12.5961		-13.1652		-12.9120		-12.8315	
H-L test	0.2193		0.8102		0.6988		0.7887	
***. $p<0.001$ ***. $0.001 \leq p<0.01$								

#### IV. DISCUSSION

This study has several strengths. First, the response rate and ability to follow a sizable proportion (88.5%) of a specific community allows for greater insight into the long-term relationship between social interaction and participation, and dementia prevention. The data collected through both survey and interview methods, as well as from health center diagnosed records (for dementia), were highly reliable. Also, given the stability of the community, dropout rates were negligible (only 16 persons moved from the community during the six year period). In addition, the construct of social interaction was measured in a multidimensional manner, with five subscales on the Index of Social Interaction (ISI), providing a rich picture of various dimensions of social interactions, and capturing the dynamic nature of an older person's daily life. The limitations of this study are that there was only one community studied, and there is an unanswered question as to whether six years is an adequate length of time to accurately assess the relationship of social interaction to dementia. However, the interesting results do contribute to a growing literature on understanding the factors that contribute to not just quantity, but also quality of life.

There is preliminary evidence that a higher degree of loneliness, dissatisfaction with social contacts, and decreased social networks might be risk factors for Dementia. Wilson found that a person with a high degree of loneliness was about 2.1 times more likely to develop dementia during follow up when compared with a person with a low degree of loneliness [17]. Also, the risk of Dementia associated with loneliness decreased after adjusting for social network. In the studies that looked at social network and engagement, poor or limited social networks were associated with a higher risk of dementia, and participants who were not satisfied with social contact with children were also at a higher risk [12]. Time is also a matter; a decline in social interaction from mid- to late-life was associated with an increased risk of Dementia, although social interaction at midlife was not significantly associated with it [18].

A change from high to low social interaction from mid- to late-life was associated with a higher risk of Dementia compared to consistently low or consistently high social interaction. It is possible that the decrease in social interaction may be associated with changes due to early Dementia.

While there were unsurprising overall age differences found in 6-year dementia rates, with those over 75 having higher dementia rates, the simple gender analysis did not reveal the gender differences that tend to be found in dementia rates.

The results of this study for this sample did clearly demonstrate a positive relationship between social interaction, as measured by the ISI, and dementia prevention over a 6-year period. Antonucci, et al found that Japanese women with greater resource deficits and negative social relationships had higher depression than those with less negative relationships and fewer resource deficits [19]. These findings may also support Cheng & Chan's hypothesis [6] that if women value relatedness more than men, then the impact of relationships may have different effects on them. Similarly, Reitzes & Mutran (2006) posit that women and men may focus on different roles and social support to maintain and enhance their self-concepts [20].

One of the main factors for preventing dementia were reading books and newspapers, and having an active role. While it may not be that having an active role translates into participation in social networks or neighbourhood affairs, as it seems to need to feel active and engaged – all fundamental human needs at any age, but perhaps most importantly in late life. Thus, practitioners who want to assist older persons in establishing and maintaining active roles may need to spend some time clarifying what that means for each person.

#### V. CONCLUSION

This study of older persons in one community in Japan clearly demonstrates the centrality of social participation in longevity that comes from having an active role and participation to the society.

Further research in various communities and countries can help further clarify the complex relationship between various types of social interactions and their relationship to dementia prevention.

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