

INFLUENCE OF SELF EFFICACY FOR HEALTH PROMOTION ON FUNCTIONAL DECLINE OF ELDERLY LIVING IN A RURAL COMMUNITY IN JAPAN

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Objective To clarify whether self efficacy for health promotion is associated with functional ability among elderly inhabitants of a rural community in Japan.

Methods The research was a longitudinal study of inhabitants aged 65 and over in a community in Nagano, Japan, who completed a questionnaire at the baseline in 1998 and at follow-up in 1999. The questionnaire included 1) Self Efficacy Scale for Health Promotion measuring the belief in task performance on health, 2) health behavior, 3) a functional ability scale consisting of instrumental activities of daily living, effectance, and social role (Tokyo Metropolitan Institute of Gerontology Index of Competence: TMIG Scale), and 4) demographic factors such as age and sex.

Results At the baseline, 477 subjects completed the questionnaire by themselves and achieved full marks on the TMIG Scale. Of these, 457 responded again 12 months later. Low self efficacy for health promotion at baseline was a significant correlate for functional decline during the 12-month period.

Conclusion Self efficacy for health promotion is a predictive factor for functional ability and can be important as an intervention target for elderly people.

Key words : functional ability, self efficacy for health promotion, longitudinal design

I. Introduction

Verbrugge and Jette conceptualized functional ability as the gap between the capacity of individuals and the social and physical demands of the surrounding environment¹⁾. The hierarchical model developed by Lawton, with seven sublevels for health status of the elderly, consists of life maintenance, functional health, perception and cognition, physical self-maintenance, instrumental self-maintenance, effectance, and social role, in ascending order of complexity²⁾. According to this model, functional ability corresponds to higher levels of health status than the physical self-maintenance level (i.e., the latter three of the seven sublevels)³⁾. Instrumental self-maintenance was termed as instrumental ADL and defined as the ability to adapt to one's social environment. Effectance was defined as the ability to practice intellectual activity in daily life, for instance,

reading newspaper. Social role was defined as the ability to play formal and informal activities in community. Several studies have reported that functional ability is associated with various health-related outcomes such as mortality, physical impairment, and the number of chronic diseases, suggesting its utility as an indicator for health of the elderly^{4~11)}.

One of the socio-psychological factors that influence health status is self efficacy. It is defined as an individual's assessment of his or her ability to perform behavior in a specific situation¹²⁾. In a cross-sectional study by Grembowski et al, older adults with high self efficacy regarding exercise, dietary fat, and weight control were more likely to manage their behavior and show good health-related quality of life, mental health, and self-rated health than those with low self efficacy¹³⁾. In a longitudinal study by Kempen et al, older persons with high self efficacy showed no significant increase of disability, in contrast to those with low self efficacy¹⁴⁾. In another longitudinal study by Mendes de Leon et al, community living elders with high self efficacy kept doing basic self care tasks 18 months later¹⁵⁾. Head and neck carcinoma patients with high self-efficacy for physical abilities were more likely to survive and less likely to develop a recurrence¹⁶⁾.

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Up to now, however, there have been no studies investigating the effect of self efficacy on functional ability longitudinally. The purpose of the present study was therefore to determine whether self efficacy for health promotion influences functional ability in a one-year follow-up study among elderly inhabitants of a rural community in Japan. Our hypothesis was that self efficacy would lead to better functional ability.

II. Methods

Subjects

The subjects were all inhabitants aged 65 and over in a rural community in Nagano Prefecture in 1998.

Data collection and measures

A self-administered questionnaire was distributed in a baseline study in 1998 ($n=1,856$) and in a follow-up study in 1999. The subjects received the questionnaire through village health volunteers and were informed they had liberty not to participate in the survey.

The questionnaire consisted of the following. Socio-demographic variables included age, gender, household composition, educational background, and job. Baseline health-related variables were self-rated health, health behaviors, and functional ability. Since both self-rated health and health behaviors were health-related variables influencing functional ability, they were entered as predictive factors for functional ability.

Self-rated health was measured in four grades: Excellent, Good, Poor, and Bad.

Health behavior was ascertained using questions derived from a previous study by Tohnai & Hata¹⁷⁾, in which they validated a health belief model by using a scale of the health behavior as a dependent variable. Thirteen questions are asked whether subjects were taking regular meals, eating vegetables and drinking milk everyday, avoiding sweets, animal fat, and salty food, refraining from drinking, smoking, and snacks, sleeping more than seven hours, resting whenever feeling physical or mental fatigue, exercising everyday, and relaxing on holidays. The response to each item was dichotomized, with a score of 1 representing always performing the task and a score of 0 representing sometimes or never. The scores were summed, creating a scale ranging from 0 to 13, with a higher score indicating more desirable behavior. Cronbach's alpha coefficients for internal consistency were 0.74 and 0.70 for females and males, respectively, in the present sample.

Functional ability was assessed with the Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG Scale), developed to evaluate

the functional capacity of community-dwelling elderly^{18,19)}. This scale consists of 13 items and three subscales according to Lawton's model: Instrumental Self-Maintenance, Effectance and Social Role⁴⁾. The response to each item is designed simply to be 'yes' (able to do) or 'no' (unable), scored 1 and 0, respectively. Koyano reported that the reliability coefficient alpha was 0.91, the one-year test-retest reliability coefficient was 0.86, and discriminant validity was confirmed utilizing age and sex as criterion variables.

In keeping with the efficacy theory, we developed a domain-specific definition of self efficacy, defining it in our previous study as the degree of confidence subjects reported in performing health promoting behavior²⁰⁾. We refer to this type of self efficacy as the Self Efficacy for Health Promotion (SEHP). It measures self efficacy concerning 15 activities (Appendix): 12 items for protective behavior (e.g., exercise, diet, social communication, information seeking, and stress coping) and three for controlling behavior (e.g., weight control and drug use). Subjects are asked to rate his or her confidence in performing each item on a 4-point scale, from 1-Not at all confident, to 4-Completely confident. In our previous study²⁰⁾, a factor analysis showed the structure of a single factor, which accounted for 55.4% of total variance. We then summed the ratings into a total score (ranging from 15 to 60). The integrated scale had excellent internal consistency (Cronbach's alpha=0.90) and test-retest reliability ($r=0.64$). In terms of concurrent validity, the scale was significantly associated with general self efficacy.

The dependent variable was decline TMIG after one year. We recoded the change as a binary variable: those who maintained their independent status one year later ($=0$) and those who experienced decline in one or more out of the 13 items ($=1$).

Analysis

We limited the analysis to elderly who answered the questionnaire by themselves and who got full marks in TMIG in the first survey. The rationale for this restriction was to ensure the validity of the responses and to control the health status at the baseline as much as possible. Descriptive statistics were used for socio-demographic data such as age, sex, self-rated health, education, and job at the baseline. The χ^2 test was used for categorical variables. Logistic regression was employed to obtain odds ratios (OR) and 95 percent confidence intervals (CI) for analyzing how sex, age, self-rated health, self efficacy, and health behavior were associated with TMIG decline. Health behavior and self-rated health were used as control variables because they are expected to be related to both self efficacy and TMIG.

III. Results

The follow-up chart of the present study is shown in Fig 1. Of the total of 1,856 subjects, 1,379 (74.3%) were excluded in the first survey: Three hundred fifty-six subjects marked TMIG score below 13. Nine hundred eighty-three responses were non-analyzable because of refusal or incomplete answers (i.e., not self-administered), and forty subjects were dead or no longer living in the area.

The characteristics of the 477 subjects who answered the questionnaire by themselves and got a full score for the TMIG are presented in Table 1. The mean \pm SD for self efficacy, health behavior, and age were 43.7 ± 5.8 , 9.4 ± 2.2 , and $71.9 \text{ years} \pm 4.8$, respectively. Of these, 32.5% lived with the spouse, 72.8% rated their health as excellent or good, 49.3% had graduated from secondary school, and 56.4% were engaged in farm labor.

In the follow-up study, 20 of the original cohort were lost: 11 did not complete the questionnaire by themselves and for nine the responses were non-analyzable. We received analyzable responses from 95.8% of the subjects in the follow-up survey (Fig 1). Compared with the 457 subjects with complete data, 20 subjects who were not eligible were more likely to be old and reported poor health behavior (Table 1).

In the follow-up study, we compared the 376 independent subjects with the 81 dependent subjects. The latter were more likely to be old, living alone and reporting poor self efficacy and self-rated health (Table 2).

Odds ratios and confidence intervals for predictors of functional decline are shown in Table 3. Advanced age (OR = 1.10, CI = 1.04–1.16) increased the risk, while high self efficacy (OR = 0.92, CI = 0.88–0.97) and good self-rated health (OR = 0.47, CI = 0.30–0.76) were shown to decrease the risk of decline. Health behavior, however, was not correlated to TMIG decline.

IV. Discussion

The purpose of this study was to examine longitudinally whether SEHP could predict TMIG among the elderly. Our results showed that SEHP and self-rated health were indeed predictive factors for TMIG after a period of one year.

SEHP is defined as an assessment by the elderly of their own effectiveness or competence to perform successfully health promoting behavior. Previous studies have demonstrated that self efficacy beliefs are important mediators of various health status^{14–16,21}. Based on a cross-sectional study,

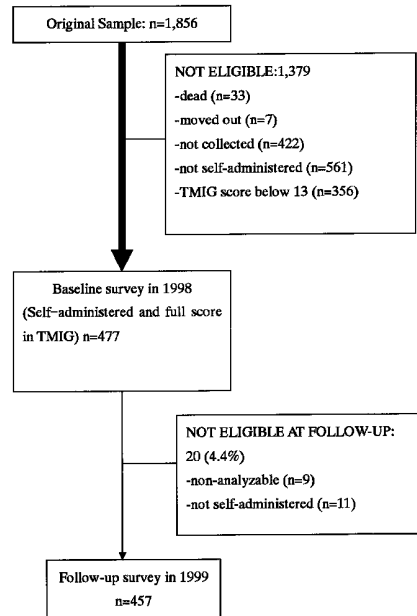


Figure 1. Flow chart for the present study using a sample of elderly people living at home independently.

Grembowski et al concluded that elderly persons with high self efficacy for performing preventive behaviors had better physical and mental health than individuals with low efficacy¹³. Our results using a longitudinal design confirm their findings, with functional ability as a dependent variable. Thus SEHP appears effective not only for promoting health activities but also for maintaining functional ability of the elderly. However, the mechanisms are not clear at present.

Contrary to our expectations, health behavior was not associated with change of TMIG. One might hypothesize health behavior is an intermediate variable between SEHP and functional ability: SEHP leads to better health behavior, which in turn leads to better functional ability. Our results suggest that this is not the case. SEHP influenced change of TMIG directly in the present follow-up study, even after controlling health behavior. One possible explanation why health behavior was not related with TMIG in our sample was that we limited our analysis to healthier and health conscious elderly, in order to control the initial health status of the subjects.

Our study also showed that self-rated health to be associated with maintenance of TMIG one year later, consistent with the results of previous reports showing the variable as a predictive factor for health status such as mortality^{22,23}.

Self efficacy is an important factor in practice for

Table 1. Characteristics of subjects at the baseline study in 1998

Breakdown by follow-up status in 1999 (n = 477)			
Variable	Total (n = 477)	Self- administered (n = 457)	Not eligible (n = 20)
SEHP	43.7 ± 5.8	43.7 ± 5.9	45.5 ± 4.6
Health behavior*	9.4 ± 2.2	9.5 ± 2.1	8.4 ± 3.7
Age**	71.9 ± 4.8	72.8 ± 4.7	75.1 ± 5.5
Sex			
Female	257 (53.9%)	242 (53.0%)	15 (75.0%)
Male	220 (46.1%)	215 (47.0%)	5 (25.0%)
Household composition			
Alone	27 (5.7%)	26 (5.7%)	1 (5.0%)
With spouse	155 (32.5%)	147 (32.2%)	8 (40.0%)
With unmarried child (ren)	93 (19.5%)	91 (19.9%)	2 (10.0%)
With child couple	44 (9.2%)	41 (9.0%)	3 (15.0%)
With child couple and grandchild (ren)	141 (29.6%)	136 (29.7%)	5 (25.0%)
No answer	17 (3.5%)	16 (3.5%)	1 (5.0%)
Self-rated health			
Excellent	58 (12.2%)	56 (12.3%)	2 (10.0%)
Good	289 (60.6%)	279 (61.0%)	10 (50.0%)
Poor	119 (24.9%)	115 (25.2%)	4 (20.0%)
Bad	11 (2.3%)	7 (1.5%)	4 (20.0%)
Education			
No education	1 (0.1%)	1 (0.1%)	0
Elementary	67 (14.1%)	67 (14.6%)	0
Secondary	235 (49.3%)	228 (50.1%)	7 (35.0%)
College	111 (23.3%)	102 (22.4%)	9 (45.0%)
University	43 (9.0%)	40 (8.8%)	3 (15.0%)
Others	19 (4.1%)	18 (3.9%)	1 (5.0%)
No answer	1 (0.1%)	1 (0.1%)	0
Job			
Farm labor	269 (56.4%)	254 (55.6%)	15 (75.0%)
Self-employed	34 (7.1%)	34 (7.4%)	0
Office worker	48 (10.1%)	46 (10.1%)	2 (10.0%)
Housewife	84 (17.6%)	82 (17.9%)	2 (10.0%)
Others	33 (6.9%)	32 (7.0%)	1 (5 %)
No job	9 (1.9%)	9 (2.0%)	0

* $P < 0.05$ ** $P < 0.01$

maintaining and changing not only health behavior but also functional ability²⁴⁻²⁷). In future, interventions to improve SEHP should be carried out, as im-

provement in self efficacy may have broad applicability in the improvement of health status among the elderly.

Table 2. Characteristics of subjects by follow-up result

Breakdown by follow-up result in 1999 (n = 457)		
Variable	Independent group (n = 376)	Dependent group (n = 81)
SEHP***	44.1 ± 5.9	41.7 ± 5.5
Health behavior	9.5 ± 2.1	9.5 ± 2.2
Age***	71.4 ± 4.6	79.8 ± 5.2
Sex		
Female	199 (52.9%)	43 (53.1%)
Male	177 (47.1%)	38 (46.9%)
Household composition*		
Alone	20 (5.3%)	6 (7.4%)
With couple	121 (32.2%)	26 (32.1%)
With child (ren)	81 (21.5%)	10 (12.4%)
With (child couple)	34 (9.0%)	7 (8.6%)
With child couple and grandchild (ren)	112 (29.8%)	24 (29.6%)
No answer	8 (2.2%)	8 (9.9%)
Self-rated health***		
Excellent	49 (13.0%)	7 (8.6%)
Good	231 (61.4%)	48 (59.3%)
Poor	92 (24.5%)	23 (28.4%)
Bad	4 (1.1%)	3 (3.7%)
Education		
No education	1 (0.1%)	0
Elementary	50 (13.3%)	17 (21.0%)
Secondary	186 (49.6%)	42 (51.9%)
College	85 (22.7%)	17 (21.0%)
University	38 (10.1%)	2 (2.4%)
Others	15 (4.1%)	3 (3.7%)
No answer	1 (0.1%)	0
Job		
Farm labor	210 (55.9%)	44 (54.3%)
Self-employed	26 (6.9%)	8 (9.9%)
Office worker	38 (10.1%)	8 (9.9%)
Housewife	67 (17.8%)	15 (18.5%)
Others	30 (8.0%)	2 (2.5%)
No job	5 (1.3%)	4 (4.9%)

* $P < 0.05$ *** $P < 0.001$

Table 3. Regression coefficients and odds ratios for predictors of TMIG decline (n = 457)

	Regression coefficient	Odds ratio (95% CI)
Sex (female)	0.205	1.23 (0.70-2.14)
Age	0.096***	1.10 (1.04-1.16)
Self rated health	-0.748**	0.47 (0.30-0.76)
Self efficacy	-0.081**	0.92 (0.88-0.97)
Health behavior	0.026	1.03 (0.89-1.18)

** $P < 0.01$ *** $P < 0.001$

Appendix

Self Efficacy for Health Promotion Scale Items
 Instruction: Do you have confidence to perform health promoting behavior as follows?

Please check one from four response categories for each question.

I have confidence in:

- 1) Brushing my teeth regularly after meals
- 2) Getting necessary information to stay healthy
- 3) Avoiding feeling lonely
- 4) Doing exercise in daily life
- 5) Controlling weight appropriate for my condition
- 6) Using medication correctly
- 7) Accessing institutions for exercise
- 8) Confiding in family and friends about the things that are bothering me
- 9) Finding a doctor or nurse who gives me good advice about health problems
- 10) Using available health and welfare services
- 11) Conforming to a balanced diet
- 12) Reducing stress for myself
- 13) Taking foods good for my health routinely
- 14) Finding a way to exercise enjoyably
- 15) Keeping contact with my community

Four point scale, (1 Not at all, 2 A little, 3 Good, 4 Completely)

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