Frequency of Going Outdoors: A Predictor of Functional and Psychosocial Change Among Ambulatory Frail Elders Living at Home

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Background. This study investigated the relationship between the frequency of going outdoors among ambulatory frail elders living at home and subsequent functional and psychosocial changes.

Methods. In this 9-month prospective cohort study, data were collected via questionnaire from 112 frail elderly persons living at home and their families. Functional and psychosocial status at baseline and follow-up regarding activities of daily living, functional capacity, depression, self-efficacy for daily activities, self-efficacy for health promotion, and social support, were compared among 3 groups defined by the frequency of going outdoors: 1) more than 4 times a week, 2) 1–3 times a week, 3) less than once a week. At baseline, elders going outdoors more often were less functionally impaired, more socially active, and scored less depressed than elders going outdoors less often.

Results. There were significant differences in functional capacity (p = .0201) and intellectual activities (p = .0026) over time according to the frequency of going outdoors, even when controlling for baseline differences, and the scores of those who seldom went outdoors decreased rapidly. There were similar relationships between frequency of going outdoors and changes in self-efficacy for both daily activities (p = .0067) and for health promotion (p = .0245), with participants going outdoors most frequently improving significantly more.

Conclusions. These results suggest that the frequency of going outdoors may be a useful and simple indicator to predict changes in functional capacity, intellectual activity and self-efficacy.

Functional and psychosocial decline is common among frail elders living at home, and its identification is important because further decline can often be averted (1–3). To screen the older population for frailty, functional decline, and need for services, researchers have developed a large number of screening instruments (4–6). These instruments include multiple questions regarding physical and cognitive impairments as well as functional status, such as activities of daily living (ADLs) and instrumental ADLs (IADLs). However, many of these screening instruments are lengthy and time consuming. Having simpler indicators of frailty and risk of decline would be of obvious benefit.

We hypothesized that the frequency of going outdoors could be a simple prognostic indicator, because cross-sectional studies have shown decreased frequency of going outdoors to be associated with low functional and psychosocial status (7–9). However, few longitudinal studies have examined the frequency of going outdoors and whether this could predict future functional or psychosocial decline.

The purpose of the study was to investigate the relationships between the frequency of going outdoors among ambulatory frail elders living at home and subsequent functional and psychosocial changes over a 9-month follow-up period, and to control for possible confounding factors. We focused on elders who were frail but still ambulatory as a group with particular unmet needs, because in Japan extensive home-care services are provided to the public by the long-term care insurance system to the most frail elders but generally exclude those elders who are ambulatory.

METHODS

Study Participants and Procedure

We performed the study in Saku City, a rural farming community in Nagano Prefecture, Japan. Of this city’s population of 66,000, 21% were aged 65 years and older in the 2000. The study design was a prospective cohort analysis lasting more than 9 months. In July 2000, all 13,679 community residents aged 65 and older were screened as to whether they needed assistance by the Welfare Department of the city government. Local volunteers helping the government determined 575 frail elders without severe functional impairment as needing some assistance to live independently. Our study selected 60 adjacent districts from a total of 127 districts in the city, and 309 frail elders comprised the eligible sample. At the beginning of the baseline survey, in November 2000, 11 people were hospitalized, 15 people lived in nursing homes, 3 people had died, and 12 people refused to participate in the survey. Of these remaining 268 elders living at home, some were able to walk on level surfaces independently and some were not. As we defined our study population as frail elders who could walk independently, but still needed some assistance to live on their own, we excluded 65 severely disabled elders who needed
assistance with walking. Because 59 people were involved in an additional intervention study at the same time (10), they were excluded from the present analysis, and 7 other people did not answer the question about the frequency of going outdoors. Thus, 137 participants were included in the baseline survey. In the follow-up survey, conducted in August 2001, 112 of the previously surveyed frail elders living at home were eligible for the analysis, as 6 people were hospitalized, 7 people were in nursing home, 6 people had died, 5 people refused to participate in the survey, and 1 person moved to another area. Their mean age was 83.4 years, and 73.2% of them were women.

The data were collected via questionnaire to the elderly participants and their families. We asked the local volunteers to distribute and collect the questionnaire.

**Variables and Instruments**

The questionnaire included the frequency of going outdoors, ADLs, functional capacity, self-efficacy for daily activities, self-efficacy for health promotion, depression, and social support.

Participants were asked a question, “How often do you usually go outside the house?” (Examples of going outdoors include going shopping, taking a walk, going to a hospital, and going out to work in the garden or field.). The frequency of going outdoors was categorized as: 1) more than 4 times a week, 2) 1–3 times a week, (3) less than once a week.

ADL items included eating, transfers from chair to bed, grooming, toileting, walking on level surface, stairs, dressing, bathing, controlling bladder and controlling bowels (11). Scores of ADLs range from 0 to 20.

Functional capacity was measured by the Index of Competence developed by Tokyo Metropolitan Institute of Gerontology (TMIG) (12). The TMIG Index of Competence consists of 13 items in 3 subscales that we analyzed: 5 items of instrumental self-maintenance, 4 items of intellectual activity, and 4 items of social role. The response to each item was scored as 1 for “yes” or 0 for “no.” High scores by these measurements indicate a high level of both ADLs and functional capacity.

Self-efficacy for daily activities was measured by the Modified Falls Efficacy Scale (MFES) (13), which includes more difficult daily activities than the original Falls Efficacy Scale (14). Each item of the MFES scored from 1 for “not confident at all” to 4 for “very confident” in daily activities, providing a range of 14 to 56.

Self-efficacy for health promotion was measured by the 15-item Self Efficacy for Health Promotion scale (SEHP) developed by Yokokawa and colleagues (15). Each item of the SEHP scores from 1 for “not confident at all” to 4 for “very confident” in daily activities related to health promotion, providing a range of 15 to 60.

Depression was assessed by the 15-item short version of the Geriatric Depression Scale (GDS) (16), which is translated and widely used in Japan (17). Higher scores in the GDS 0–15 score range indicate worsening depression.

Social support was assessed by the Social Support Scale by Noguchi (18). This tool measures emotional support and instrumental support for elders from family members and friends, and higher scores indicate high availability of social support range 0 to 24.

**RESULTS**

The participants were classified into three groups according to the frequency of going outdoors at baseline: 72 people as “more than 4 times a week” (mean age 82.3 ± 7.1 years; 68.1% women), 39 people as “1–3 times a week” (mean age 82.1 ± 6.7 years; 79.5% women), and 26 people as “less than once a week” (mean age 84.4 ± 8.6 years; 76.9% women). The relationship between the frequency of going outdoors at baseline and living location at follow-up is shown in Table 1. More elderly participants going outdoors more than 4 times a week were still living at home at follow-up than were participants in the other two groups (living at home vs not living at home; p = .004).

Functional and psychosocial characteristics were compared according to the frequency of going outdoors at baseline, using one-way ANOVA. There were significant associations between the frequency of outdoor-going groups and the majority of the variables, including ADLs (p = .0002), functional capacity (p = .0068), instrumental self-maintenance (p = .0007), social role (p = .0001), self-efficacy for daily activities (p = .0001), self-efficacy for health promotion (p = .0213), and depression (p = .0161), as shown in Tables 2 and 3. These relationships were all in the expected direction, with persons going outdoors more often being more highly functional.

Functional changes over 9 months by frequency of going outdoors were examined by two-way repeated ANCOVA controlling for each baseline measure (Table 2). There were

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**Table 1. Frequency of Going Outdoors at Baseline and Living Location at Follow-Up (N = 137)**

<table>
<thead>
<tr>
<th>Frequency of Going Outdoors</th>
<th>Home</th>
<th>Hospital</th>
<th>Nursing Home</th>
<th>Death</th>
<th>Moved Away</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 4 times/wk</td>
<td>68 (94.4)</td>
<td>0 (0)</td>
<td>1 (1.4)</td>
<td>3 (4.2)</td>
<td>0 (0)</td>
<td>72 (100.0)</td>
</tr>
<tr>
<td>1–3 times/wk</td>
<td>28 (71.8)</td>
<td>5 (12.8)</td>
<td>4 (10.3)</td>
<td>1 (2.6)</td>
<td>1 (2.6)</td>
<td>39 (100.0)</td>
</tr>
<tr>
<td>Less than once/wk</td>
<td>21 (80.8)</td>
<td>1 (3.9)</td>
<td>2 (7.7)</td>
<td>2 (7.7)</td>
<td>0 (0)</td>
<td>26 (100.0)</td>
</tr>
</tbody>
</table>
significant differences in the total score of functional capacity ($p = .0201$) and intellectual activities ($p = .0026$) over time by the frequency of going outdoors, with greater functional deterioration among the less-active groups.

With respect to changes in psychosocial characteristics, there were significant differences between groups in both self-efficacy for daily activities ($p = .0067$) and health promotion ($p = .00245$) over time, indicated by two-way repeated ANCOVA (Table 3), with improvement noted for the group going outdoors frequently, at baseline, and deterioration for the other two groups.

Adjusted means of these variables are shown in graphs to explore the change over time between the three groups (Figure 1A–D). Figure 1A and B shows the relationships between functional capacity and intellectual activity changes and the frequency of going outdoors. Both scores of participants who went outdoors less than once a week decreased more than the scores of the other two groups.

As shown in Figure 1C, the adjusted mean score of self-efficacy for daily activities of participants who went outdoors more than 4 times a week increased slightly, while the scores of those who went outdoors less frequently decreased.

**DISCUSSION**

Our results show that several changes in functional and psychosocial characteristics over time among ambulatory frail elders living at home are clearly correlated with the frequency of going outdoors.

Many researchers have reported that the risk of functional decline increases with age (19–23). Because our study participants had a mean age of 83.4 years, it is not surprising that scores of functional capacity tended to decrease over time among all groups. However, importantly, scores of functional capacity of participants who went outdoors less than once a week at baseline decreased significantly more than the elders who went outdoors more frequently. This result indicates that the elders who went outdoors less than once a week might be a high-risk group for functional decline.

These trends in physical function were paralleled by measures of intellectual activities. Generally, the frequency of going outdoors has a strong association with functional activity in frail older people (7–9). Previous cross-sectional

### Table 2. Functional and Cognitive Status at Baseline and Changes at Follow-Up as a Function of Frequency of Going Outdoors at Baseline ($n = 112$)

<table>
<thead>
<tr>
<th>Frequency of Going Outdoors</th>
<th>&gt;4×/wk ($N = 63$)</th>
<th>1–3×/wk ($N = 28$)</th>
<th>&lt;1×/wk ($N = 21$)</th>
<th>$p$ Value*</th>
<th>$p$ Value†</th>
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</thead>
<tbody>
<tr>
<td>ADLs (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>16.4 (3.9)</td>
<td>16.2 (3.4)</td>
<td>12.5 (3.1)</td>
<td>.0002</td>
<td>NS</td>
</tr>
<tr>
<td>Follow-up</td>
<td>15.8 (4.5)</td>
<td>15.6 (3.9)</td>
<td>11.3 (5.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional capacity (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>7.7 (3.7)</td>
<td>7.6 (3.4)</td>
<td>5.0 (2.0)</td>
<td>.0068</td>
<td>.0201</td>
</tr>
<tr>
<td>Follow-up</td>
<td>6.9 (4.1)</td>
<td>7.0 (4.3)</td>
<td>2.8 (1.9)</td>
<td></td>
<td></td>
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<tr>
<td>Instrumental self-maintenance†</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>2.6 (1.9)</td>
<td>2.8 (1.8)</td>
<td>1.0 (1.3)</td>
<td>.0007</td>
<td>NS</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.4 (1.9)</td>
<td>2.8 (2.0)</td>
<td>0.7 (0.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intellectual activity†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>2.3 (1.5)</td>
<td>2.0 (1.4)</td>
<td>2.3 (1.1)</td>
<td>NS</td>
<td>.0026</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.3 (1.5)</td>
<td>2.1 (1.4)</td>
<td>1.4 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social role†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>2.9 (1.1)</td>
<td>2.8 (1.1)</td>
<td>1.8 (0.7)</td>
<td>.0001</td>
<td>NS</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.3 (1.5)</td>
<td>2.1 (1.6)</td>
<td>0.8 (0.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Values are unadjusted mean (SD, standard deviation).

*Baseline group comparison: one-way analysis of variance was done, using each score at baseline as a dependent variable and frequency of going outdoors as an independent variable.

†Comparing change over time between groups: two-way repeated analysis of covariance was done, adjusting for each baseline score.

### Table 3. Psychosocial Status at Baseline and Changes at Follow-Up as a Function of Frequency of Going Outdoors at Baseline ($n = 112$)

<table>
<thead>
<tr>
<th>Frequency of Going Outdoors</th>
<th>&gt;4×/wk ($N = 63$)</th>
<th>1–3×/wk ($N = 28$)</th>
<th>&lt;1×/wk ($N = 21$)</th>
<th>$p$ Value*</th>
<th>$p$ Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy for daily activities (13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>36.7 (9.7)</td>
<td>35.8 (9.0)</td>
<td>28.6 (6.9)</td>
<td>.0001</td>
<td>.0067</td>
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<tr>
<td>Follow-up</td>
<td>37.5 (10.7)</td>
<td>32.6 (10.0)</td>
<td>26.8 (7.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy for health promotion (15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>38.1 (11.4)</td>
<td>39.5 (8.5)</td>
<td>33.5 (7.9)</td>
<td>.0213</td>
<td>.0245</td>
</tr>
<tr>
<td>Follow-up</td>
<td>38.5 (12.7)</td>
<td>34.4 (9.6)</td>
<td>32.4 (9.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression (16,17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>6.0 (3.3)</td>
<td>6.4 (3.4)</td>
<td>7.6 (3.2)</td>
<td>.0161</td>
<td>NS</td>
</tr>
<tr>
<td>Follow-up</td>
<td>6.3 (3.2)</td>
<td>6.9 (3.4)</td>
<td>6.7 (3.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support (18)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>10.2 (5.1)</td>
<td>8.9 (4.8)</td>
<td>9.5 (4.1)</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Follow-up</td>
<td>8.8 (5.8)</td>
<td>8.5 (5.5)</td>
<td>8.9 (4.2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Values are unadjusted mean (SD, standard deviation).

*Baseline group comparison: one-way analysis of variance was done, using each score at baseline as a dependent variable and frequency of going outdoors as an independent variable.

†Comparing change over time between groups: two-way repeated analysis of covariance was done, adjusting for each baseline score.
studies have reported the relationships between physical activity and better performance on cognitive function measures (24–27), and other prospective studies have already indicated that those with higher levels of baseline activity were less likely to develop cognitive decline in a healthy older cohort (28,29). This finding was corroborated among ambulatory frail older people in our study.

With respect to self-efficacy for daily activities and health promotion, the scores of participants who went outdoors more than 4 times a week improved, while scores of the other two groups declined. This finding is consistent with physical activity literature that has shown that activity itself can enhance self-efficacy (30,31), as well as many other health and functional outcomes (32–34). As several studies reported that low self-efficacy for daily activities is associated with a decline in the ability to perform ADLs (35–37), and low self-efficacy relates to poor health behavior (38), it is likely that elders who go outdoors more often may maintain a stable health status because of higher levels of self-efficacy.

Figure 1. Functional capacity, intellectual activity, and self-efficacy for daily activities and health promotion. Baseline and follow-up scores are stratified by the frequency of going outdoors at baseline. A, Functional capacity; B, intellectual activity; C, self-efficacy for daily activities; D, self-efficacy for health promotion. Note: Variables are means, adjusting for each baseline score by two-way repeated analysis of covariance.
The present study has several limitations that must be taken into consideration in interpreting the results. First, there were significant differences in almost every functional and psychosocial variable at baseline between the three groups categorized by the frequency of going outdoors. Although we tried to control for each baseline score when analyzing the change over time between groups, other characteristics that we had not studied might reflect on the frequency of going outdoors and their changes over time. Second, participants were selected by local volunteers. The criterion of the selection was depended on their judgment of “frail elders.” Because the term “frailty” has been used in various ways to describe people (39–42), our study participants might not be representative of ambulatory frail elders elsewhere, particularly as we excluded elderly people with the most severe levels of disability. Third, our study participants are from a single cultural and geographic context (i.e., residents of a rural Japanese community). Moreover, since some participants live in areas with poor transportation resources, future studies should investigate the relationships between the frequency of going outdoors and geographic issues.

Lastly, the frequency of going outdoors might be influenced by season. We asked the question about the frequency of going outdoors during seasons when people like to get out the house, and answers might be different during winter when it snows.

Conclusion

We conclude that the frequency of going outdoors among ambulatory frail elders may be a useful and simple indicator of older persons with functional and psychosocial problems and an important predictor of persons at risk for deterioration. Future research should be directed toward confirming the predictive accuracy of the frequency of going outdoors as a screening question and perhaps as an indicator for persons in need of care. Whether going outdoors actually helps to preserve function or is only closely correlated with functional preservation requires further research. Finally, it seems likely that getting elders to go outdoors more often can have beneficial therapeutic effects in itself, but this remains to be tested in clinical trials.

Acknowledgments

We greatly acknowledge the elders and their families for participation in the study, and express gratitude to the local volunteers and staff of the Senior Citizens’ Welfare Section in Saku City for their support with data collection. This research was partly supported by grants from the Japan Ministry of Health, Labour, and Welfare (project leader: Shoji Shinkai), Kimura Foundation for Nursing Education.

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Received January 13, 2003
Accepted February 21, 2003