INTRODUCTION

The prevalence of dementia in people aged 65 years and older in Japan has been increasing year on year, and is approximately 15% at present. More than 357,000 elderly people made use of the Roken Geriatric Health Services Facility in 2014. Roken provides new and unique services to meet the medical, welfare, and rehabilitation needs of the elderly. With the increasing demand for institutional care, it is crucial to provide the elderly with high-quality care and help them to maintain an optimal quality of life (QOL). Roken was established in 1986 and is an intermediate facility between hospitals and home.

Rehabilitation services in Roken are divided into those providing individual rehabilitation and those providing group rehabilitation. Participation in rehabilitation two or more times a week has been proposed by the Japanese public Long-term Care insurance act (LTC). From 2006, the LTC introduced “intensive rehabilitation for newly admitted individuals with dementia” in Roken facilities. This intensive rehabilitation consists of individual rehabilitation three times a week for 3 months. Most newly admitted residents also receive conventional rehabilitation for 20 min two to five times per week. Therefore, the structure and the number

Objective: Rehabilitation for dementia is important in Roken Geriatric Health Service Facilities in Japan. This study evaluated the effects of a cooking program as rehabilitation for elderly residents with dementia. Methods: We carried out a 12-week cooking program based on the five principles of brain-activating rehabilitation (BAR): fostering a pleasant atmosphere, interactive communication, establishing social roles, giving and receiving praise, and errorless learning. The program was carried out in small groups and consisted of 90-min classes once a week. Participants were 36 elderly residents with dementia (mean 85.4 ± 6.5 years) who were randomly divided into intervention (n = 18) and control (n = 18) groups. The control group participated in recreation and both groups received individual conventional rehabilitation twice a week for 30 min. The effects of intervention were evaluated using nine outcome measures. Results: A total of 29 participants were included in the analysis (two-way analysis of variance). The attendance rate was 86.6% in the intervention group (n = 13). The Yamaguchi Kanji Symbol Substitution Test (executive function) showed significant interaction (F(1, 27) = 4.305, P = 0.048) between the two groups: the control group (n = 16) showed significant deterioration (pre 4.9 ± 5.6 to post 3.0 ± 4.9; P = 0.032). The dementia behavior disturbance scale also showed significant interaction (F(1, 29) = 13.298, P = 0.001); the intervention group (n = 16) showed significant improvement (pre 21.6 ± 12.2 to post 11.4 ± 11.5; P < 0.001). No significant differences were observed in the other outcome measures. Conclusions: Our findings suggest that a cooking program based on BAR can reduce the behavioral and psychological symptoms of dementia and maintain executive function.

Key Words: behavioral and psychological symptoms of dementia (BPSD); cooking; dementia; geriatric health services facility; rehabilitation
of rehabilitation sessions can vary according to the requirements of newly admitted residents.

The rehabilitation of dementia patients includes non-pharmacological therapies that may consist of reminiscence therapy, learning therapy, music therapy, cognitive stimulation therapy, and others. A previous study suggested that non-pharmacological therapies for dementia and Alzheimer’s disease were a useful, versatile, and potentially cost-effective approach to improve the QOL of dementia patients and their caregivers. In addition, dementia guidelines recommend the use of non-pharmacological interventions as first-line treatment options for the behavioral and psychological symptoms of dementia (BPSD). Non-pharmacological therapy is a common approach to dementia. Therefore, we instigated a trial to investigate the effects of a 12-week cooking program based on the five principles of brain-activating rehabilitation (BAR). Little research has been performed on cooking therapy for elderly residents with dementia. Recently, a group cooking program for patients with mild dementia consisting of 2-h sessions once a week (10 sessions in total) was found to significant improvement of QOL, cognitive function, and depressive state. This result was likely related to the fact that cooking is more difficult than other non-pharmacological therapies. Cooking consists of many processes (e.g., cutting, boiling, roasting, seasoning); moreover, the use of fire and knives is necessary, which carry the risk of injury. Therefore, residents in Roken facilities are normally prohibited from cooking, even as part of a rehabilitation program. Nonetheless, we established an enjoyable group cooking program in which dementia patients

![Flowchart](image)

**Fig. 1.** Flow of participants from recruitment through the 3-month study.
cooperated to make simple, familiar, home-cooked dishes. Cooking programs in a small group setting require rich communication and provide the double pleasure of creating and eating tasty meals. In contrast, paper craft or needlework are individual activities that do not require complex communication.

In this study, we carried out a 12-week cooking program, based on BAR, and investigated the effects of this program on cognitive function, mental health, QOL, care burden, BPSD, activities of daily living (ADL), and the size of the patient’s social network. The five principles of BAR are (1) fostering a pleasant atmosphere, (2) interactive communication, (3) establishing social roles, (4) giving and receiving praise, and (5) errorless learning.11) In our previous study, we showed that BAR improves cognitive function and reduces BPSD in residents of care homes.12)

**METHODS**

**Participants**

The cooking program was conducted in a Roken facility between June and September 2011. We carried out the study on subjects more than 3 months after admission when intensive rehabilitation had finished. Our Roken facility has a capacity of 100 elderly residents. The flow of participants is shown in Figure 1. There were 99 residents in the Roken facility. Participants were selected according to the following inclusion criteria: (1) having a diagnosis of dementia, (2) mini-mental state examination (MMSE) total score from 5 to 24, (3) able to maintain daily conversation, and (4) not undergoing intensive rehabilitation for newly admitted individuals with dementia. Although the 45 residents selected according to these criteria underwent baseline assessment, 9 residents declined to participate. The remaining 36 participants (mean age: 85.4 years) were randomly divided (using a table of random numbers) into two groups: the intervention group (n = 18; 3 men and 15 women) and the control group (n = 18; 4 men and 14 women). Four participants were discharged before the end point assessment.

The Ethics Board of Gunma University School of Health Sciences approved all procedures (Nos. 21–26). We obtained written agreement from all participants before the study. This study was performed in accordance with the ethical standards laid down in the appropriate version of the Declaration of Helsinki (as revised in Brazil, 2013).

**Evaluation**

The effects of intervention were evaluated using nine outcome measures: three cognitive scales, psychological symptoms, BPSD, caregiver burden, QOL, size of social network, and ADL. Subjects were evaluated by ten staff members (nurses, a physical therapist, an occupational therapist, and care workers). The cognitive scales, psychological symptoms, BPSD, caregiver burden, QOL, social network, and ADL tests were evaluated by the staff on each ward. Evaluators had not taken part in the cooking program.

**Cognitive Tests**

Sustained attention and executive function were measured using the Yamaguchi kanji-symbol substitution
The YKSST test is similar to the digit-symbol substitution test of the Wechsler adult intelligence scale-III (WAIS-III). The YKSST was developed for elderly Japanese individuals as an adaptation of the digit-symbol substitution test, a subset of WAIS-III, because the elderly in Japan are more familiar with kanji characters. The mean ± SD YKSST score in healthy elderly subjects was found to be 46.9 ± 10.9 (n = 170, age between 60 and 80 years). The word fluency test (a categorical word fluency test of animals completed in 1 min) was also administered to evaluate executive function. Immediate and delayed memory functions were measured using the short story in the Japanese version of the Repeatable Battery for Assessment of Neuropsychological Status (RBANS); higher scores indicate better performance.

### BPSD and Caregiver Burden

The BPSD was evaluated using the dementia behavior disturbance (DBD) scale, and caregiver burden was evaluated using a Japanese version of the Zarit caregiver burden interview (J-ZBI). These were evaluated by the same nurse/care workers for each participant at baseline and at the end point assessment. Lower DBD and J-ZBI scores indicate better performance.

### ADL and Social Network Size

ADL was evaluated using the Barthel index (BI), and the size of the social network was evaluated using the Japanese version of the Lubben social network scale (Lubben). Improvement is reflected by an increase in BI and Lubben scores.

### Depression and Mood, Morale, and QOL

Depression was evaluated using the 15-item geriatric depression scale (GDS), and mood, morale, and QOL were evaluated using the Philadelphia geriatric center morale scale (PGC). Improvement is reflected by an increase in PGC and by a decrease in GDS.

### Questionnaires for Care Staff

After finishing the intervention program, we wrote a questionnaire for the care staff that asked about their general impression of the cooking program. The questionnaire consisted of three self-completed items concerning changes in their feelings toward residents: “Q1: Did you change your way of thinking regarding the residents after the intervention?” “Q2: How did your impression change (e.g., good impression or bad impression) toward the residents when compared before and after the intervention?” and “Q3: How much did you enjoy the cooking activities?”

### Intervention Cooking Program

The intervention program was carried out for 18 Rokan residents with dementia. The program was conducted in small groups of approximately six members; sessions were once a week for 90 min and the program lasted 3 months. The composition of the group members did not change during the intervention period. The total management and planning of the intervention were carried out by an occupational therapist (OT). The menu consisted of 12 Japanese-style home-cooked dishes that are generally familiar to elderly people (Table 1). One dish was prepared during each session, and week by week the required cooking skills became more difficult. The

### Table 2. Baseline characteristics

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n = 18)</th>
<th>Control (n = 18)</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years, mean ±SD)</td>
<td>86.1±5.8</td>
<td>84.7±7.2</td>
<td>NS</td>
</tr>
<tr>
<td>Sex (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>4</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Education (years, mean ±SD)</td>
<td>7.8±1.8</td>
<td>8.8±2.1</td>
<td>NS</td>
</tr>
<tr>
<td>MMSE (mean ±SD)</td>
<td>12.8±5.4</td>
<td>12.4±3.1</td>
<td>NS</td>
</tr>
<tr>
<td>CDR (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR1</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CDR2</td>
<td>7</td>
<td>9</td>
<td>NS</td>
</tr>
<tr>
<td>CDR3</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Dementia type (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alzheimer</td>
<td>10</td>
<td>9</td>
<td>NS</td>
</tr>
<tr>
<td>Vascular</td>
<td>4</td>
<td>5</td>
<td>NS</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>4</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS, no significant difference by the two-sample t-test, Mann-Whitney test, and χ² test.
intervention was conducted by an OT, a national registered dietitian, nurses, and care workers. The cooking program was developed by the OT and dietitian, whereas the program was actually run by staff members; these staff members took no part in the evaluations. During the cooking program, the OT, dietitian, nurses, and care workers cooperated with participants to guide the cooking process and to ensure that no injuries occurred. The staff roles were as follows: general management was provided by the OT, technical cooperation and advice were provided by the dietitian, the use of kitchen utensils and movement support were provided by the nurses and care workers.

The cooking program was based on the five principles of BAR. Before the intervention, the staff were given a lecture regarding BAR and were supervised by the OT to ensure that the program was administered appropriately. During the staff lecture, a staff manual and informational material regarding BAR care support techniques were handed out.

### The Control Group

While the cooking program took place, the control group participated in recreation (e.g., balloon volleyball, radio gymnastic exercises and chorus) in the hall with the care workers, and therefore received no additional rehabilitation. Both the control and intervention groups underwent individual, conventional rehabilitation (e.g., kinesiotherapy, muscle strengthening exercises, creative activities, and reminiscence therapy) twice a week for 30 min with a physical therapist and OT.

### Data Analysis

Data from the 36 participants were analyzed using the Japanese version of SPSS for Windows version 22.0 (IBM Corporation, New York, NY, USA). Thirty-two participants underwent both baseline and end point assessments. Three participants who participated in the intervention sessions fewer than 9 of 12 times were excluded from the analysis. Finally, 29 participants were included in the analysis (13 in the intervention group and 16 in the control group). Two-way analysis of variance was used to analyze the 29 subjects. The interaction was examined between the intervention and control groups, and post-hoc analysis was conducted using Bonferroni correction. For further analysis, subjects were divided into two groups according to their clinical stages: a clinical dementia rating (CDR) 1-2 subgroup and a CDR3 subgroup.

We regarded $P < 0.05$ as indicating significance. For measures where significant interaction was shown, intention-
to-treat analysis was also conducted; the three participants who attended fewer than nine intervention sessions and the four participants who were discharged prior to the secondary assessment were included in the intention-to-treat analysis (n = 36).

### RESULTS

The baseline data are shown in Table 2. There were no significant differences between the two groups. The attendance rate of the program was 86.6% in the intervention group (n = 16).

#### Cognitive Tests

The YKSST showed significant interaction (F(1, 27) = 4.305, P = 0.048) between the two groups (Table 3); the control group (n = 16) showed significant deterioration (pre 4.9 ± 5.6 to post 3.0 ± 4.9; P = 0.032), whereas the intervention group did not. Word fluency and memory (RBANS) did not show significant interaction between the intervention (n = 13) and control groups.

#### Other Scales

The total DBD score (Table 3) showed significant interaction (F(1, 26) = 13.298, P = 0.001); the intervention group showed significant improvement (pre 21.6 ± 12.2 to post 11.4 ± 11.5; P < 0.001). We further analyzed each item of the DBD assessment. DBD item10 (paces up and down) showed significant interaction (F(1, 26) = 8.180, P = 0.008); the intervention group showed significant improvement (pre 1.5 ± 1.5 to post 0.3 ± 0.9; P = 0.001). Item 22 (throws food) showed significant interaction (F(1, 26) = 5.065, P = 0.033); the control group showed significant deterioration (pre 0.2 ± 0.4 to post 0.5 ± 0.6; P = 0.002). Item 23 (wanders aimlessly outside or in the house during the day) showed significant interaction (F(1, 26) = 6.638, P = 0.016); the intervention group showed significant improvement (pre 1.3 ± 1.3 to post 0.3 ± 0.3).

### Table 4. Two-way analysis of variance for two subgroups: CDR1-2 and CDR3

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Intervention Before</th>
<th>After</th>
<th>Control Before</th>
<th>After</th>
<th>F-value</th>
<th>P-value</th>
<th>Post-hoc P-value</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subgroup A (CDR1-2, n = 17)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word fluency</td>
<td>2.5±2.4</td>
<td>3.9±3.1</td>
<td>4.3±2.1</td>
<td>5.1±1.9</td>
<td>0.783</td>
<td>0.390</td>
<td>0.867</td>
<td>0.162</td>
<td></td>
</tr>
<tr>
<td>YKSST</td>
<td>5.9±5.6</td>
<td>5.9±5.5</td>
<td>7.7±5.9</td>
<td>5.0±5.8</td>
<td>2.035</td>
<td>0.174</td>
<td>1.000</td>
<td>0.055</td>
<td></td>
</tr>
<tr>
<td>RBANS story</td>
<td>2.0±2.4</td>
<td>2.4±2.3</td>
<td>2.4±2.3</td>
<td>3.9±3.0</td>
<td>1.812</td>
<td>0.198</td>
<td>0.526</td>
<td>0.018*</td>
<td></td>
</tr>
<tr>
<td>GDS (depression)</td>
<td>5.7±4.2</td>
<td>6.4±4.6</td>
<td>5.6±3.9</td>
<td>9.5±3.7</td>
<td>0.011</td>
<td>0.918</td>
<td>0.284</td>
<td>0.203</td>
<td></td>
</tr>
<tr>
<td>DBD (BPSD)</td>
<td>18.3±12.8</td>
<td>7.0±5.6</td>
<td>7.3±11.5</td>
<td>18.0±15.7</td>
<td>9.542</td>
<td>0.007**</td>
<td>0.001**</td>
<td>0.805</td>
<td></td>
</tr>
<tr>
<td>J-ZBI (care burden)</td>
<td>2.5±3.0</td>
<td>3.0±4.7</td>
<td>3.8±5.9</td>
<td>5.3±9.0</td>
<td>0.083</td>
<td>0.778</td>
<td>0.854</td>
<td>0.546</td>
<td></td>
</tr>
<tr>
<td>PGC (QOL) (social network)</td>
<td>9.3±5.7</td>
<td>10.9±5.8</td>
<td>11.5±5.0</td>
<td>8.6±5.7</td>
<td>0.118</td>
<td>0.736</td>
<td>0.272</td>
<td>0.489</td>
<td></td>
</tr>
<tr>
<td>Lubben</td>
<td>14.8±10.6</td>
<td>12.1±6.4</td>
<td>15.4±3.7</td>
<td>12.8±5.7</td>
<td>0.857</td>
<td>0.369</td>
<td>0.765</td>
<td>0.321</td>
<td></td>
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<tr>
<td>BI (ADL)</td>
<td>59.4±28.7</td>
<td>58.1±29.0</td>
<td>53.3±22.8</td>
<td>55.0±24.7</td>
<td>0.259</td>
<td>0.618</td>
<td>0.769</td>
<td>0.678</td>
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<tr>
<td>Subgroup B (CDR3, n = 12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word fluency</td>
<td>1.4±1.5</td>
<td>1.2±1.1</td>
<td>1.9±2.0</td>
<td>1.9±1.6</td>
<td>0.027</td>
<td>0.872</td>
<td>0.833</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>YKSST</td>
<td>1.0±2.2</td>
<td>2.8±3.8</td>
<td>1.3±2.2</td>
<td>0.4±1.1</td>
<td>3.986</td>
<td>0.074</td>
<td>0.107</td>
<td>0.342</td>
<td></td>
</tr>
<tr>
<td>RBANS story</td>
<td>1.2±2.7</td>
<td>2.0±1.0</td>
<td>1.6±2.6</td>
<td>0.9±1.1</td>
<td>0.855</td>
<td>0.377</td>
<td>0.537</td>
<td>0.515</td>
<td></td>
</tr>
<tr>
<td>GDS (depression)</td>
<td>6.0±3.7</td>
<td>7.6±2.7</td>
<td>9.5±4.2</td>
<td>10.2±1.5</td>
<td>0.213</td>
<td>0.656</td>
<td>0.312</td>
<td>0.637</td>
<td></td>
</tr>
<tr>
<td>DBD (BPSD)</td>
<td>28.3±8.6</td>
<td>20.3±15.9</td>
<td>26.1±11.2</td>
<td>27.1±7.7</td>
<td>2.890</td>
<td>0.123</td>
<td>0.091</td>
<td>0.761</td>
<td></td>
</tr>
<tr>
<td>J-ZBI (care burden)</td>
<td>5.8±6.0</td>
<td>5.5±5.0</td>
<td>4.0±3.0</td>
<td>6.2±5.4</td>
<td>1.882</td>
<td>0.207</td>
<td>0.859</td>
<td>0.088</td>
<td></td>
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<tr>
<td>PGC (QOL) (social network)</td>
<td>10.4±4.6</td>
<td>9.8±3.5</td>
<td>6.5±5.0</td>
<td>6.3±4.6</td>
<td>0.022</td>
<td>0.886</td>
<td>0.787</td>
<td>0.935</td>
<td></td>
</tr>
<tr>
<td>Lubben</td>
<td>14.4±5.0</td>
<td>9.2±3.7</td>
<td>12.9±7.2</td>
<td>6.9±2.5</td>
<td>0.031</td>
<td>0.864</td>
<td>0.167</td>
<td>0.069</td>
<td></td>
</tr>
<tr>
<td>BI (ADL)</td>
<td>42.0±25.9</td>
<td>41.0±20.0</td>
<td>27.8±28.5</td>
<td>19.3±23.0</td>
<td>2.369</td>
<td>0.155</td>
<td>0.796</td>
<td>0.022*</td>
<td></td>
</tr>
</tbody>
</table>

Data are expressed as mean ± SD. *Significant at P < 0.05, **significant at P < 0.01, ***significant at P < 0.001.
assessments showed no significant interaction between the sive state (GDS); ADL (BI); and social network (Lubben) questions for Care Staff

**Intention-to-treat Analysis**

 Significant interaction of the DBD scale remained after the intention-to-treat analysis (n = 36, F(1, 29) = 12.521, P = 0.001); the intervention group (n = 18) showed significant improvement (pre-post P < 0.001). The YKSST showed marginal interaction (n = 36, F(1, 30) = 3.199, P = 0.084); the control group (n = 18) showed significant deterioration (pre 22.0 ± 11.1 to post 13.0 ± 11.3; P = 0.033). The other assessment scores were unchanged in the intention-to-treat analysis (n = 36).

**Questionnaires for Care Staff**

 Of the 17 staff members who assisted the cooking program, 15 (88.2%) reported that they changed their way of thinking regarding the residents after the intervention. Moreover, 15 of 17 staff members (88.2%) answered that their impression of the residents changed for the better. All staff members (100%) answered that the cooking program was enjoyable for the staff.

**DISCUSSION**

 In a previous study in a Roken facility, intensive BAR-based rehabilitation for dementia patients (individual rehabilitation for 20 min, three times a week) showed significant improvement in MMSE and vitality index and decreases in the DBD scale and GDS, although the study had no control group. In addition, Toba et al. reported that intensive rehabilitation for dementia showed significant improvement in cognitive function, ADL, vitality, and BPSD. Moreover, Higashi showed that intensive rehabilitation reduced the duration of hospitalization in Roken facilities. These previous studies suggested that intensive rehabilitation improves multiple domains, including cognitive function and BPSD. However, subjects of the current study had finished intensive rehabilitation for dementia before they were included in the current study.

 In the present study, significant deterioration of the executive function (YKSST) was evident in the control group, but executive function was preserved in the intervention group. The YKSST was developed for elderly Japanese people as a variation of the digit-symbol substitution test and measures executive function and processing speed. Cooking requires a high level of cognitive ability, such as working memory, prospective memory, planning performance, and executive function. However, the participants had already lost their high-level executive function, so the care staff made great effort to provide support to ensure non-failure.

 This study showed significant reduction of BPSD (DBD) in the intervention group. The cooking program was enjoyable on two levels: the participants enjoyed the cooking process and group work through to completion, including activities such as cutting using knives, boiling, roasting, and seasoning, and the participants enjoyed eating the completed dishes. The anxiety, agitation, and disinhibition items of DBD showed significant improvement in the intervention group. Increased communication during food preparation may have contributed to these improvements. A previous study reported that validation therapy (communication) gives dementia patients support coping with emotional distress (e.g., irritability, anxiety, depression, and changes in self-esteem). Furthermore, the BAR approach may have contributed to the high attendance rate (86.6%) of the current study.

 We previously showed that BAR improves cognitive function and reduces BPSD in subjects with dementia in residential care homes, findings that are consistent with the current study. The aim of BAR is to enhance resident motivation...
by establishing them in social roles and encouraging mutual praise, maximizing the use of their remaining functions, recruiting compensatory networks, and preventing the disuse of brain function.\textsuperscript{11,12} The small-group cooking program was based on the five principles of BAR, which were easily attainable using a group approach. Small groups have some advantages over larger groups, including improved ease in establishing mutual communication, ease in assigning roles for cooking, and ease in establishing empathy. Staff training on BAR before the intervention may have contributed to the good results obtained. A previous study reported that staff training programs can reduce BPSD in patients with dementia living in care homes.\textsuperscript{25)}

This study has several limitations: (1) According to the Japanese LTC insurance service rule for “intensive rehabilitation for dementia,” we set the intervention period at 3 months, and therefore the long-term effects of the cooking program are not known; (2) This study has a small sample size; (3) This study was done in a single facility; (4) There was a difference in the time spent on rehabilitation between the intervention group (cooking rehabilitation) and the control group (recreation; no additional rehabilitation); (5) Male participants had low motivation and little experience of cooking; and (6) As evaluation bias, one of the authors evaluated some of the scales. Although the findings might not be generalized to similar activities being performed in other facilities, our findings suggested that a cooking program based on BAR reduced BPSD, maintained executive function, and had favorable effects on mood in both participants and staff.

**ACKNOWLEDGEMENTS**

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**CONFLICTS OF INTEREST**

The authors declare that there are no conflicts of interest.

**REFERENCES**

12. Yamagami T, Takayama Y, Maki Y, Yamaguchi H: A randomized controlled trial of brain-activating rehabilitation for elderly participants with dementia in...


