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## Behavioral and Mood Effects of *Snoezelen* Integrated into 24-Hour Dementia Care

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**OBJECTIVES:** To investigate the effectiveness of *snoezelen*, integrated in 24-hour daily care, on the behavior and mood of demented nursing home residents. **DESIGN:** Quasiexperimental pre- and posttest design. **SETTING:** Twelve psychogeriatric wards of six nursing homes, spread over different parts of the Netherlands. **PARTICIPANTS:** One hundred twenty-five patients with moderate to severe dementia and care dependency were included in the pretest and 128 in the posttest; 61 were completers (included in both pre- and posttest). **INTERVENTION:** Experimental subjects received an individual 24-hour *snoezel* program, based on family history taking and stimulus preference screening. Caregivers were trained, and (organizational) adaptations were made to fulfill the conditions for resident-oriented *snoezel* care. The control group received usual nursing home care. **MEASUREMENTS:** Observations were made on the wards using subscales of the Dutch Behavior Observation Scale for Psychogeriatric Inpatients, the Dutch version of the Cohen-Mansfield Agitation Inventory, and the Cornell Scale for Depression in Dementia. Independent assessors observed video recordings of morning care and rated residents' behavior and mood using INTERACT and FACE, respectively. **RESULTS:** Residents receiving *snoezel* care demonstrated a significant treatment effect with respect to their level of apathetic behavior, loss of decorum, rebellious behavior, aggressive behavior, and depression. During morning care, the experimental subjects showed significant changes in well-being (mood, happiness, enjoyment, sadness) and adaptive behavior (responding to speaking, relating to caregiver, normal-length sentences). **CONCLUSION:** *Snoezel* care particularly seems to have a positive effect on disturbing and withdrawn behavior. The results suggest that a 24-hour integrated *snoezel* program has a generalizing effect on the mood and behavior of demented residents.

Dementia is a progressive, irreversible, neurological cognitive-impairment syndrome that affects about 6.1% of the population aged 65 and older.<sup>1</sup> Once people are institutionalized, behavioral problems occur in up to 97% of cases and often reduce individuals' quality of life.<sup>2</sup> In the view of the Dialectical Framework for dementia care,<sup>3-5</sup> dementia caregivers can do much to promote nursing home residents' quality of life. The central thesis is that the dementia process arises from an interaction between neurological impairment and social psychological processes (e.g., the interaction between caregivers and dementia patients). Certain kinds of malignant caregiver behavior, damaging to those who have dementia (malignant social psychology), and positive caregiver behavior, that make for well-being (positive person work) have been distinguished.<sup>3-5</sup> Seventeen indicators of malignant social psychology, such as infantilization, stigmatization, and ignoring, and 12 indicators of positive person work, such as recognition, validation, and stimulation of the senses, have been identified.<sup>3-5</sup>

*Snoezelen* (*Snoezelen* is the registered trademark of Rompa, Chesterfield, England), or Multi-Sensory Stimulation (MSS), is a widely used and accepted approach to nursing home residents suffering dementia and seems to fit the premises of the Dialectical Framework.<sup>6</sup> It was developed in the Netherlands but is becoming more popular in Great Britain and the United States.<sup>7</sup> *Snoezelen* can be defined as an approach that actively stimulates the senses using light, sound, smell, and taste.<sup>8</sup> The application of *snoezelen* requires a resident-oriented attitude, knowledge, and skills, allowing caregivers to incorporate personal circumstances such as lifestyle, preferences, desires, and cultural diversity to achieve or maintain a state of well-being. Therefore, *snoezelen* matches the concept of "patient-centeredness." The caregivers do not restrict themselves to the "resident's complaint" but orient themselves to the "resident with a complaint."<sup>9</sup> The prime task of person-centered dementia care is to maintain personhood in the face of failing mental powers by showing empathy and gaining knowledge of the individual's personal history, personality, and needs. The required resident-oriented attitude to apply *snoezelen* includes the different types of interaction described in the Dialectical Framework as positive person work.<sup>3-5,8</sup>

Although several studies have been conducted to investigate the effectiveness of *snoezelen*, and the majority of them reported within-session positive effects, many lack a comparison between treatment and control groups.<sup>10</sup> Only two randomized clinical trials of high quality are available, both evaluating the effect of *snoezelen* sessions in a special room.<sup>11</sup> In these trials, positive immediate outcomes were found, particularly on apathetic behavior, but carryover and longerterm effects of *snoezelen* were not evident.<sup>11-14</sup> This suggests that caregivers in daily contact with those with dementia should implement a continuous and ongoing program.<sup>11,15</sup> Accordingly, the present study addresses the implementation of *snoezelen* as a person-centered 24-hour approach to care delivered by certified nursing assistants (CNAs) and integrating multisensory stimuli throughout the day.

The aim of the study was to investigate the effect of integrated *snoezelen* on behavior and mood of nursing home residents suffering from dementia. In particular, it was hypothesized that the intervention would lead to measurable changes in

- well-being: more happiness/contentment, more enjoyment, better mood
- adaptive behavior: more attentive and responsive in relation to the environment, more personal initiative, better relationship to caregiver
- maladaptive behavior: less antisocial behavior, apathetic behavior, loss of decorum, loss of consciousness, rebellious behavior, restless behavior, disoriented behavior, anxious behavior, agitation, aggression, and depression<sup>6,7,10,12-17</sup>

## METHODS

A quasiexperimental pre- and posttest design was used. The study was performed in 12 psychogeriatric wards at six Dutch nursing homes. Each nursing home designated an experimental and a control ward. The six experimental wards implemented *snoezelen* in 24-hour care. Usual care continued in the six control wards. The implementation period lasted 18 months per ward between January 2001 and February 2003. Measurements were performed at baseline and after 18 months.

## SAMPLE

### Nursing Homes

Six nursing homes in different parts of the Netherlands out of 19 potentially eligible sites were selected for the study. Dutch nursing homes are comparable with skilled nursing facilities in the United States. There are separate wards for patients with Alzheimer's disease.<sup>18</sup>

Interviews with staff members revealed whether the eligible nursing homes met the following inclusion criteria:

- Snoezelen* not yet implemented in the daily care of their residents
- Presence of two comparable (population of residents, composition of nursing staff, care model used, level of attention and assistance) units with at least 15 residents that met the inclusion criteria for residents (assuming one-third nonresponse) and at least 10CNAs
- Willingness to create the conditions to implement *snoezelen* in the daily care of the experimental ward
- No *snoezelen* training during the study period or implementation of elements from the *snoezel* intervention on the control ward
- Presence of some basic, practical conditions (e.g., a comfortable residents' chair for arm-hand massage)
- No substantial organizational changes (e.g., removal, reorganization) during the study period
- Commitment to these criteria was laid out in a cooperative agreement.

The six nursing homes had a mean number of 194 residents (range 122–280) and 21 residents per ward (range 15–32). On average, staff-client ratio was 0.15 CNA per resident (range 0.14–0.16). In all nursing homes, CNAs consistently cared for the same residents every day. By selecting an experimental and a control ward from the same nursing home, the control wards were comparable with the experimental wards in terms of capacity, staff-client ratio, system of resident allocation, service types, care plans used, and level of assistance.

Randomization took place at the ward level. In four nursing homes, the wards were randomized by having an independent person draw lots from a sealed container. Two wards were assigned to the experimental group based on practical considerations (e.g., the presence of a room that could be used as a *snoezelroom* by other disciplines such as activity therapists). This decision was taken after careful assessment of other differences between the experimental and the control ward that might prejudice treatment comparisons (e.g., population, motivation of nursing staff, working atmosphere) to exclude selection and confounding biases.

## SUBJECTS

### Residents

To establish the effectiveness of *snoezelen*, a sample size of 120 residents (60 treatments, 60 controls) was required (power=0.80,  $\alpha=0.05$ , effect size=0.50). To be eligible for the trial, residents had to meet the following criteria

- Moderate to severe dementia according to the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised*, diagnosed by a physician<sup>19</sup>
- Moderate to severe nursing care dependency, measured using the Care Dependency Scale for demented inpatients, an assessment instrument for use in psychogeriatric nursing homes.<sup>20–22</sup>
  - The degree of care dependency is assessed on a 5-point Likert-scale. A total sum score with a theoretical range from 15 to 75 can be computed, the higher the score, the less the dependency on nursing care. The internal consistency of the scale was high ( $\alpha=0.93$ ).
- Absence of an additional psychiatric diagnosis (e.g., schizophrenia and other psychotic disorders)
- Hearing and vision completely or partially unimpaired
- Not bedridden

The ward staff selected a minimum of 15 residents who fulfilled the above criteria. About 1 month before the measurements, the legal guardians of the selected residents were informed by mail of the nature and the content of the study. They were asked to sign an informed consent form to allow video recording of the morning care for research purposes and the use of medical background characteristics. Guardians were informed about their right to withdraw at any time during the study.

## Certified Nursing Assistants

Every resident included was matched to a CNA, who had to be familiar with the resident. The majority of nursing staff members recruited for the study (81.4%) worked in rotation shifts. Temporary staff, students, and CNAs only working at night were not eligible. The CNAs participated in the training program and observation sessions as part of their regular employment duties. Consent for their participation was obtained from the director of nursing. Every matched “couple” (resident- CNA) was videotaped once in the pretest and once in the posttest (when still on the ward) during morning care, using a hand-held camera. Twelve CNAs (seven in the pretest and five in the posttest) were videotaped twice because there were more residents than CNAs. When the level of intellectual capacity of the resident allowed verbal communication, the CNA informed the resident about the video recordings and asked permission. The CNAs and the research assistant were instructed to stop the video recording when they noticed negative reactions of the resident. Immediately after morning care, the CNAs were given the opportunity to disclose their feelings about the video recording. Although, in general, they experienced some stress in advance, the majority reported afterward that stress did not really affect their behavior and that the video reflected the normal situation. Despite the obvious fact that they were being observed, the CNAs and residents adapted to the presence of the observer, as previously reported.<sup>23,24</sup>

Thirty-seven CNAs of 117 were lost to follow-up, mainly because they changed jobs (19 in the experimental group and 18 in the control group); new CNAs replaced them. To be able to apply the *snoezelen* method, the new CNAs received training on the job and attended the followup meetings. The experimental and control group CNAs did not differ significantly in background characteristics. At baseline, 92.2% were female, and they had an average age of 34.9. Mean work experience was 7.6 years. On average, they worked 29.1 hours a week.

## Coping with Loss to Follow-Up

To make sure that at least 60 residents could be included in each condition at posttest, the experimental wards were instructed to apply *snoezelen* care to all (new) residents who fulfilled the inclusion criteria. Consequently, a second cohort of subjects could be recruited to replace the dropouts from the first cohort of residents. Three months before the posttest, the same informed consent procedure was followed to obtain proxy consent from legal guardians of new eligible residents. Once the new care model (*snoezelen* in 24-hour care) was successfully implemented, the *snoezelen* program was supposed to be effective at the residents’ level within 3 months,<sup>8</sup> although the posttest was planned 18 months after the pretest, because 15 months was considered to be the minimum time needed for successful implementation of the new care model.<sup>25,26</sup> This time was required to effect a change from task-oriented care to resident-oriented care and to effect changes at the organizational level, such as investments in *snoezel* materials and adaptation of daily schedules, activities, and procedures (e.g., no longer waking up residents who prefer to sleep late, no hurry to be ready with the morning care before the coffee break).<sup>26</sup>

## INTERVENTION

Figure 1 gives a summary of the intervention and measurements. Details of the intervention have been described elsewhere.<sup>26</sup>

A qualified and experienced professional trainer of the Bernardus Expertise Center/Fontis, a nursing home with a connected training center specializing in *snoezelen*, trained the CNAs in *snoezelen*. In-house training included four weekly 4-hour sessions (16 hours total) and homework. The main objectives were to motivate team members and improve caregiver knowledge and practical skills with regard to resident-oriented care (e.g., attitude toward verbal and nonverbal communication) and *snoezelen* (e.g., how to take a family history, review specific behavior problems, observe sensory preferences, adapt care plans, and apply sensory stimulation in daily care). An extensive manual of *snoezelen* was available with specific instructions, methodology, observation forms, and examples on the integration of *snoezelen* into 24-hour care. At the end of the course, trainees received a certificate. Eighty caregivers attended the training program, 59 of whom were CNAs and six head nurses. The other participants (not included in the measurements) were activity therapists (n=10), nutrition assistants (n=2), a care manager (n=1), a clerical worker (n=1), and a student nurse (n=1). Thus, almost complete teams were trained. Compliance with the training sessions was 92.5%.

## [ FIGURE 1 ]

After the training, the CNAs took a detailed history of the matched residents' life and preferences by interviewing family members. Then, stimulus preference screening was arranged during 10 weekly 1-hour sessions. The residents were offered various sensory stimuli (tactual, visual, auditory, olfactory, gustatory) to find out which they enjoyed most. Their reactions were observed and carefully registered.

Next, the CNAs wrote an individual *snoezel plan* based on life history, stimulus preference screening, and multidisciplinary conferences. The *snoezel plans* described the residents' specific behaviors and how to react to these behaviors (e.g., "Anxiety: Mrs. X is anxious when she goes to bed. Approach: sit down at the bedside, stroke her cheek, hold her hand. Then she will sleep soon"). The *snoezel plan* was translated into the residents' *snoezel care plan*, to integrate the required approach into activities of daily living (e.g., how to wake up, whether the resident was capable of choosing own clothes, whether perfume or makeup could be used, how (eye) contact could be made, whether the resident liked to be touched affectively, whether music or aroma therapy could be used, which *snoezel* activities could be offered in the living room). During (multidisciplinary) consultations, the *snoezel plans* were evaluated and, if necessary, adapted to residents' changes in response or condition.

Each experimental ward set up a study group, usually comprising three CNAs, the head nurse, and an activity therapist or coordinator in sensory stimulation. The aim of the study group was to evaluate the implementation process structurally and to make adaptations where necessary.

The caregivers were offered three in-house follow-up meetings (10 hours total) under the guidance of the same professional trainer. The aim of these supervision meetings was to support the implementation of *snoezelen* in daily care by discussing the observations, evaluating the *snoezel care plans*, and providing feedback and video exercises. In addition, two general meetings, attended by three representatives per nursing home (e.g., head nurses, care managers), supported the implementation of *snoezelen* at the organizational level. Depending on the bottlenecks mentioned by the executive staff, implementation problems on the experimental wards were discussed.

## OUTCOME MEASURES

The effectiveness of *snoezelen* was studied by observing residents on the wards and video recordings of morning care. The observations on the wards were intended to give insight into the overall (generalized) behavior of the residents during the previous 2 weeks. The video recordings enabled detailed observation of the residents' behavior during a well-defined care moment (within sessions). Morning care was videotaped because it is given on every ward in every nursing home and allows an unbiased comparison between treatment and control groups (individual attention with vs without *snoezelen*).

### Assessment of Behavior in the Ward Environment

Matched CNAs conducted observation of residents on the ward using the most reliable, valid, and sensitive observation scales available in Dutch.<sup>27</sup> Ratings covered the 2 weeks preceding the administration of the scales. Unless otherwise stated, the internal consistency of the data was sufficient to good. Details on psychometric properties are available upon request from the first author.

### CNA-Assessed Behavior

Parts of the Dutch Behavior Observation Scale for Psychogeriatric In-patients (BIP) were used to measure the behavior of residents.<sup>27,28</sup> The BIP is an extensive psychogeriatric behavior observation scale for institutionalized psychogeriatric people. The scale contains 82 four-point scale items divided over 14 independent subscales.<sup>28,29</sup> The CNAs filled out the BIP completely, although only eight of the 14 subscales were selected as outcome measurements (nonsocial behavior, apathetic behavior, distorted consciousness, loss of decorum, anxious behavior, rebellious behavior, restless behavior, and disoriented behavior). The CNAs were not informed about selected subscales. In accordance with the manual, two CNAs completed the BIP together to maximize interrater reliability and to avoid observer bias. The subscale "memory disorders" (seven items) was used as a background

characteristic/confounder. Disoriented behavior was excluded from analysis due to low Cronbach alpha (a50.47; 5 items).<sup>30</sup>

### **Agitation**

CNAs completed the Cohen-Mansfield Agitation Inventory (Dutch version) (CMAI-D) to measure agitation.<sup>27,31-34</sup> The CMAI is a caregivers' rating questionnaire consisting of 29 agitated behaviors, each rated on a 7-point frequency scale, ranging from never to several times an hour. The scale covers three syndromes of agitation: aggressive behavior, physically nonaggressive behavior, and verbally agitated behavior.<sup>31</sup> In accordance with the manual, factor analysis was performed to control for the factor structure.<sup>32</sup> The results confirmed earlier findings on the factor structure of the CMAI in a nursing home setting.<sup>33,34</sup> Details are available from the first author.

### **Depression**

The Cornell Scale for Depression in Dementia (Dutch version) (CSDD-D), designed for assessing depression in dementia patients, was used to measure depressive symptoms (mood-related signs, behavioral disturbance, physical signs, and cyclic functions).<sup>35,36</sup> Each of the 15 items was rated on a scale from absent, to mild, to severe, to unable to evaluate.

### **Video Assessment of Behavior During Morning Care**

Two independent observers rated the video observations of the residents during morning care. They were both university graduates, one in psychology and one in social sciences, and had worked as CNAs in the past. Training consisted of explaining the use of the scale, rating the same patients, and discussing discrepancies. The original guidelines were followed to minimize observer bias and reactivity.<sup>37</sup> After 3 weeks of training, the "real" observations started. A technician randomly converted the videotapes to digital videodiscs, which one of the observers assessed. They were blinded as to whether the resident was in the experimental or control group. The observer watched a video recording twice before scoring to ensure a reliable assessment. The average duration of the videotaped morning care was 20.3 minutes.

### **Observer-Assessed Behavior**

The video recordings were observed using the measuring device INTERACT, which was specifically designed to measure the effects of *snoezelen* on demented elderly.<sup>13,14,37,38</sup> The scale includes 22 items about mood (4 items), speech (5 items), relating to other people (4 items), relating to the environment (4 items), need for prompting (1 item), and stimulation level (4 items), using a 5-point Likertscale, ranging from not at all to nearly all the time, to reflect behavior during morning care. Positive and negative behaviors of demented older people are identified. Eight study-specific items, based on the observation form of Bernardus Expertise Center/Fontis and literature,<sup>8,39,40</sup> extended the INTERACT; two items were added to the relating to person domain and six to the stimulation level domain (Table 1). Six INTERACT items were excluded from analysis because of low interobserver reliability (Pearson  $r < 0.60$ ).

[ TABLE 1 ]

### **Mood**

Individuals' mood was measured using three face diagrams (FACE) with different mouth shapes, which are considered universal symbols for happy, neutral, and sad affects.<sup>41-43</sup> The observers were asked to rate the patient using a sad face if a frown predominated, a neutral face if the expression was neutral, and a happy face if a smile predominated.

### **Reliability of the Video Observations**

Interrater reliability checks on the observational measures were conducted during observer training. The final interobserver reliability was calculated for 25 of 250 video recordings (10%).<sup>44</sup> Interrater reliability (mean Pearson  $r$ ) of the 24 selected INTERACT items was 0.83 (range 0.68–0.99); for the FACE it was 0.84.

## Interviews

After 15 months, the head nurses of the control wards were interviewed to find out whether the control wards refrained from *snoezelen* during the study period, conforming to the cooperative agreement. The results revealed that on three control wards, some CNAs started to apply parts of the *snoezel* methodology in the daily care (e.g., music, aroma), but no one integrated these parts in an individual, residentcentered approach, nor did anyone integrate them structurally. Because these are considered important conditions for *snoezelen* to be effective, no serious contamination risk was present on the control wards.

## Data Analysis

All instruments were reviewed immediately after completion so that CNAs could be contacted about missing data. The amount of missing data for BIP, CMAI-D, and CSDDD was therefore negligible. Data resulting from video analysis were complete.

Descriptive statistics were obtained on the demographic characteristics of subjects in pretest and posttest and in the experimental and control groups. Differences in these variables were examined using chi-square tests or *t* tests (Table 2).

As new residents were substituted for dropouts, multilevel analysis, performed using MLwiN-software (Multilevel Models Project Institute of Education, London, United Kingdom), was used for analyzing the data. A mixed model of multilevel analysis for repeated measurements was chosen, which takes into account all available data in an adequate way: the paired samples of completers (included in pre- and posttest) as well as the unpaired premeasurement or postmeasurement data of noncompleters (included in pre- or posttest).<sup>45,46</sup> Two levels of analysis were distinguished: measurement and resident. The correlated measurements of completers are controlled for by modeling the covariance between the pre- and postmeasurement at the resident level.

To compare the rate of change across the two groups, the mean pretest/posttest differences in the experimental group were tested against the mean pretest/posttest differences in the control group.

The following characteristics were selected as relevant covariates in adjusted analysis to correct for differences in the residents' conditions and background characteristics: care dependency, memory impairment, age, duration of nursing home admission, and sex.<sup>19,20,25,27,47</sup>

The number of wards was too small to compare subgroups of nursing homes or to take similarity between wards into account.

[ TABLE 2 ]

## RESULTS

### Response

Figure 2 presents the study flow diagram.

Before the pretest, 155 legal guardians were asked to give written informed consent; 25 refused (11 in the experimental group and 14 in the control group). The main reason was objection to videotaping. No significant differences were obtained on age and sex between participants and refusers. Four cases (three in pretest and one in posttest) were excluded from the final analysis because information on background variables was missing. Because of residents' refusal, three video recordings of experimental subjects were missing. As they received the *snoezel* program, the ward observations were still used. From the 125 residents analyzed in the pretest, 61 "completers" could also be included in the posttest. Two of them had missing values in pretest or posttest. Their data were analyzed unpaired, similar to the data of "noncompleters." Sixty-eight "newly included residents" (noncompleters) entered the study group. The majority of legal guardians (43 of 47) of newly eligible experimental subjects gave informed consent, as a result of which the sample size increased from 64 at pretest (analyzed 62) to 66 at posttest (analyzed 66). In the control group, the sample size decreased from 64 at pretest (analyzed 63) to 63 at posttest (analyzed 62).

[ FIGURE 2 ]

### Background Characteristics

Table 2 summarizes the demographic characteristics for subjects at baseline.

The table shows that the experimental and control groups were to a large extent comparable on background characteristics. At baseline, there were no significant differences between the experimental and control groups.

### Outcomes

Table 3 provides the adjusted estimated means (95% confidence interval) and the change scores from the experimental group and the control group on the observed behaviors. On all measures, positive change scores indicate a change in favor of the experimental group.

A significant treatment effect was obtained for apathetic behavior, loss of decorum, rebellious behavior, aggressive behavior, and depressive behavior.

The effects of *snoezelen* during morning care are presented in Table 1. On measures representing positive feelings or adaptive behavior (e.g., happy/content, enjoying self, normal-length sentences), negative change scores indicate a change in favor of the experimental group. On measures representing maladaptive, negative behavior (e.g., restless, bored/inactive, verbal anger), positive change scores indicate a change in favor of the treatments.

Significant treatment effects were seen in the following nine INTERACT outcome measures: tearful/sad, happy/content, talked with normal-length sentences, related well, enjoying self, bored/inactive, responding to speech, negativism/complaining, and reluctance. The scores on FACE also showed a significant effect in favor of the experimental group. Restlessness and verbal anger improved marginally ( $P < .100$ ).

### DISCUSSION

The results of this study support the effectiveness of *snoezelen* in dementia care. Residents receiving a *snoezel* approach, integrated into 24-hour daily care, demonstrated significantly more improvements with respect to their level of apathetic behavior, loss of decorum, rebellious behavior, aggressive behavior, and depression than the control group, who received usual care. During morning care, residents receiving the *snoezel* program showed more happiness and enjoyment, related better to the CNA, were more responsive to speaking, and talked more frequently with normal length sentences than the control group. They were also in a better mood and showed less sadness, bored and inactive behavior, negativism, and reluctance.

Although occasions have been reported in which participants had temporary behavioral deterioration or severe behavioral problems, which brought a definite stop to *snoezel* sessions, in the present study, no participants dropped out for that reason.<sup>10</sup> Nor were there any other negative findings or side effects. An explanation might be that, in the present study, contrary to most of the other studies, a stimulus-preference screening was part of the intervention. This allowed staff to expose the participants selectively to the stimuli that they found more pleasurable and more suitable to their condition, which is recommended to help prevent or minimize behavioral problems within the *snoezelen* context.<sup>10</sup> The within-session improvements found during morning care are consistent with positive findings obtained in earlier, less-rigorous studies (e.g., weak control conditions, limited number of sessions and use of descriptive data).<sup>6,7</sup>

Much of the literature on *snoezelen* demonstrates a wide range of positive outcomes, but there is little evidence of generalization.<sup>17</sup> Four studies were found showing that the immediate postsession effects were more favorable than those of control conditions,<sup>10</sup> yet longer-term, generalized effects of *snoezelen* were only reported in two of six studies, and these studies did not meet the criteria for high methodological quality.<sup>11</sup> The overall improvement of behavior on the ward, found in the present study, seems to be an indication of the generalized effects of integrated *snoezel*

[ TABLE 3 ]

care. As expected, *snoezelen* influenced disturbing behaviors such as physical aggression and rebellion and withdrawn behaviors such as apathy or depression. A treatment effect was also found on loss of decorum, which has never been reported before. The increased attention of CNAs to the residents' preferences for their personal appearance, which is part of the integrated *snoezel* program, but not of the *snoezel* sessions in a special room described in earlier studies, might explain this. There was no generalized improvement of antisocial behavior, restless behavior, anxious behavior, loss of consciousness, verbal aggression, or physically nonaggressive behavior. Behaviors falling in the speech domain did not change either. *Snoezelen* is possibly less likely to affect these domains. Negative symptoms such as apathy and loss of decorum are perhaps amenable to treatment, whereas more complex behaviors such as agitation, restlessness, and anxiety or more cognitive competences such as speech seem to be more difficult to influence.<sup>48</sup>

The actual effective ingredient(s) of the *snoezelen* intervention still remain indeterminate. The combination of individualized, person-centered care and a 24-hour comprehensive care plan integrating multisensory stimulation might contribute to the success, although additional scientific research is needed to gain more insight into the underlying mechanisms.

Some methodological considerations need attention. Although the multilevel model takes into account the data of completers (included in pre- and posttest) and noncompleters (included in pre- or posttest), there might be conflicting findings in the patterns of deterioration and improvement in both groups. Subgroup analyses were conducted with regard to the variables that showed significant changes. There was no improvement in the control groups for completers or noncompleters. The experimental groups showed improvement or, within the subgroup of completers, no or small changes from pre- to posttest, with less deterioration in the experimental group than in the control group (BIP4 loss of decorum: experimental group = +1.11, effect size = 0.29; control group = +2.13, effect size = 0.82; responding to speaking: experimental group = -0.48, effect size = 0.37; control group = -1.00, effect size = 0.71).

Another potential limitation was the unblinded observations on the ward by CNAs. Whether participation in the study influenced the judgment of CNAs has been investigated by asking an independent CNA from another ward for a second opinion on the BIP subscales CMAI-D and CSDD-D for 15% of the residents.<sup>25</sup> No indications were found that the judgment of the first CNA assessor deviated systematically from the assessment of the independent CNA assessor. In the present study, CNAs completed five (hidden) BIP subscales that were not selected as outcome measurements, but effects were only found on selected subscales. In addition, the video observations were blinded and did not contradict the observations on the wards. Therefore, no sufficient bias is assumed.

The aim of using video recordings of the morning care was to provide supplementary data to the observations on the ward with the advantage of blinded assessment. The limitation to morning care may create measurement bias. In future studies, the video observations should be extended to other care moments.

The posttest was limited to one measurement. Future research should consider the measurement of outcome measures at different times to strengthen the results. Measurement intervals are also recommended to investigate the effectiveness of *snoezelen* at an individual level, to find out whether some residents benefit more from the *snoezelen* intervention than others.

The results need to be interpreted with caution because the experimental group appeared to show more behavioral problems at baseline than the control group, although the disordinal interactions still account for convincing results. There is no clear explanation for these differences in baseline scores. There might have been unexpected selection bias (e.g., the experimental wards might have been more eager to have their most difficult residents included). In future research, this might be prevented by selecting participants by the research team (e.g., after a period of participating observations), by randomizing the wards after the pretest, or by selecting residents on their main behavior problem (e.g., to focus on aggression or depression).

Finally, the INTERACT scale does not give sum scores, and the item-by-item analysis increases the risk of a falsepositive result (type I error).<sup>38</sup> Although no contradictions were found in the results, future studies should develop a scale consisting of multiitem subscales measuring the same domains. At the beginning of this study, such measurement was not available.

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## TABLES AND FIGURES

Month	Experimental Group	Control Group
	<b>6 psychogeriatric wards</b>	<b>6 psychogeriatric wards</b>
1	Informed consent procedure	Informed consent procedure
	<b>Pretest</b>	<b>Pretest</b>
2	Measurements: <ul style="list-style-type: none"> <li>- observations on the ward by CNAs</li> <li>- video recordings during morning care</li> <li>- medical background data by physician</li> </ul>	Measurements: <ul style="list-style-type: none"> <li>- observations on the ward by CNAs</li> <li>- video recordings during morning care</li> <li>- medical background data by physician</li> </ul>
<b>3-20</b>	<b>From pre- to posttest</b>	<b>From pre- to posttest</b>
	Implementation of <i>snoezelen</i> in 24-hourly care:	Care as usual:
3	- in-house training ' <i>snoezelen</i> for caregivers'	- continuation of the usual care at baseline
4	- start implementation in daily care	
from 4	- stimulus preference screening of residents	
from 6	- writing of <i>snoezel care plans</i>	
from 4	- study group	Control for contamination:
	- supervision meetings:	- interview with head nurse (15 months
7,14,18	follow-up meetings (3x per ward)	after pretest)
12,16	general meetings (2x)	
18	Informed consent procedure to include new residents	Informed consent procedure to include new residents
<b>21</b>	<b>Posttest</b>	<b>Posttest</b>
	Measurements: <ul style="list-style-type: none"> <li>- observations on the ward by CNAs</li> <li>- video recordings during morning care</li> <li>- medical background data by physician</li> </ul>	Measurements: <ul style="list-style-type: none"> <li>- observations on the ward by CNAs</li> <li>- video recordings during morning care</li> <li>- medical background data by physician</li> </ul>

Figure 1. Design of the study. CNA = Certified Nursing Assistant.

Table 1. Change in Outcome Measures According to Video Observations During Morning Care (Multilevel Analysis)

Outcome Measure	Experimental Group			Control Group			Change score*	$\chi^2$ (df = 1)
	Pretest	Posttest	Change	Pretest	Posttest	Change		
	Mean <sup>†</sup> ± SE			Mean <sup>†</sup> ± SE				
INTERACT (range 1–5)								
Mood								
Tearful/sad	1.52 ± 0.1	1.29 ± 0.1	0.23	1.16 ± 0.1	1.54 ± 0.1	-0.39 <sup>‡</sup>	0.62 <sup>§</sup>	6.74
Happy/content	2.74 ± 0.2	3.47 ± 0.2	-0.73 <sup>  </sup>	3.07 ± 0.2	2.63 ± 0.2	0.44	-1.17 <sup>  </sup>	13.82
Fearful/anxious	1.60 ± 0.1	1.32 ± 0.1	-0.28 <sup>‡</sup>	1.40 ± 0.1	1.28 ± 0.1	0.12	0.16	0.70
Speech								
Talked spontaneously	2.45 ± 0.2	2.64 ± 0.2	-0.20	2.42 ± 0.2	2.57 ± 0.2	-0.14	-0.06	0.04
Recalled memories	1.22 ± 0.1	1.27 ± 0.1	-0.04	1.26 ± 0.1	1.30 ± 0.1	-0.03	-0.01	0.01
Spoke clearly	2.54 ± 0.2	2.65 ± 0.2	-0.11	2.69 ± 0.2	2.86 ± 0.2	-0.17	0.06	0.04
Spoke sensibly	2.51 ± 0.2	2.86 ± 0.2	-0.36	2.75 ± 0.2	2.61 ± 0.2	0.14	-0.49	2.59
Normal-length sentences	2.27 ± 0.2	2.83 ± 0.1	-0.56 <sup>§</sup>	2.58 ± 0.2	2.52 ± 0.1	0.06	-0.62 <sup>‡</sup>	4.46
Relating to person								
Appropriate eye contact	2.53 ± 0.1	2.98 ± 0.1	-0.45 <sup>§</sup>	2.50 ± 0.1	2.87 ± 0.1	-0.37 <sup>§</sup>	-0.08	0.10
Related well	3.40 ± 0.1	3.87 ± 0.1	-0.47 <sup>§</sup>	3.64 ± 0.1	3.35 ± 0.1	0.28	-0.75 <sup>‡</sup>	7.06
S: Listened to voice/noise	4.25 ± 0.1	4.20 ± 0.1	0.05	4.30 ± 0.1	4.00 ± 0.1	0.30	-0.25	1.13
S: Responded to speaking	3.79 ± 0.1	3.54 ± 0.1	0.23	4.06 ± 0.1	3.24 ± 0.1	0.83 <sup>  </sup>	-0.60 <sup>‡</sup>	5.40
Relating to environment								
Tracked observable stimuli	2.78 ± 0.1	3.03 ± 0.2	-0.26	3.31 ± 0.1	3.23 ± 0.2	0.08	-0.34	2.06
Touched objects/equipment	2.26 ± 0.1	2.20 ± 0.1	0.06	2.45 ± 0.1	2.16 ± 0.1	0.29	-0.23	0.85
Need for prompting								
Own initiative	1.94 ± 0.1	1.80 ± 0.1	0.14	1.87 ± 0.1	1.84 ± 0.1	0.03	0.12	0.25
Stimulation level								
Restless	1.67 ± 0.1	1.46 ± 0.1	0.21	1.47 ± 0.1	1.67 ± 0.1	-0.19	0.40	2.70
Enjoying self, pleasure	2.32 ± 0.2	3.17 ± 0.2	-0.84 <sup>  </sup>	2.54 ± 0.2	2.43 ± 0.2	0.10	-0.84 <sup>§</sup>	9.77
Bored, inactive	2.33 ± 0.2	1.69 ± 0.2	0.64 <sup>§</sup>	2.05 ± 0.2	2.25 ± 0.2	-0.20	0.85 <sup>§</sup>	7.21
S: Alert	3.76 ± 0.1	3.74 ± 0.2	0.02	3.99 ± 0.1	3.69 ± 0.2	0.30	-0.28	1.07
S: Verbal anger	1.30 ± 0.1	1.07 ± 0.1	0.23	1.18 ± 0.1	1.26 ± 0.1	-0.07	0.30	3.02
S: Aggressive	1.25 ± 0.1	1.05 ± 0.1	0.19	1.11 ± 0.1	1.13 ± 0.1	-0.02	0.21	2.10
S: Negativism, complaining	1.85 ± 0.1	1.48 ± 0.1	0.37 <sup>‡</sup>	1.32 ± 0.1	1.65 ± 0.1	-0.33	0.71 <sup>§</sup>	8.12
S: Reluctance	1.43 ± 0.1	1.11 ± 0.1	0.32 <sup>‡</sup>	1.24 ± 0.1	1.38 ± 0.1	-0.14	0.46 <sup>‡</sup>	5.59
S: Repetitious mannerism	1.42 ± 0.1	1.55 ± 0.1	-0.13	1.40 ± 0.1	1.30 ± 0.1	0.11	-0.24	0.92
Face (range 1–3)								
Mood	2.10 ± 0.1	2.49 ± 0.1	-0.39 <sup>  </sup>	2.17 ± 0.1	2.16 ± 0.1	0.11	-0.40 <sup>§</sup>	7.72

\* A significant change score means that the pre/post change in the experimental group was significantly different from the pre/post change in the control group.

<sup>†</sup> Estimated mean score (multilevel analysis).

SE = standard error; S = study-specific additional item;  $\chi^2$  = chi-square; df = degrees of freedom.

<sup>‡</sup>  $P < .05$ ; <sup>§</sup>  $P < .01$ ; <sup>||</sup>  $P < .001$ .

**Table 2. Background Characteristics at Baseline by Treatment Group**

Resident Characteristic	Experimental (n = 62)	Control (n = 63)
Female, n (%)	49 (79.0)	52 (82.5)
Age, mean $\pm$ SD	84.0 $\pm$ 8.6	82.6 $\pm$ 8.2
Duration of illness, years, mean $\pm$ SD	5.6 $\pm$ 2.7	6.1 $\pm$ 3.5
Residing in nursing home, years, mean $\pm$ SD	3.1 $\pm$ 2.5	2.6 (2.5)
Care Dependency Scale score, mean $\pm$ SD (range 15–75)*	27.4 $\pm$ 11.7	29.5 $\pm$ 11.2
Memory impairment, mean $\pm$ SD <sup>†</sup>	14.5 $\pm$ 3.1	13.4 $\pm$ 4.0
Diagnosis, n (%)		
Alzheimer's disease	35 (56.5)	34 (54.0)
Vascular dementia	13 (21.0)	5 (7.9)
Combined Alzheimer's disease and vascular dementia	10 (16.1)	16 (25.4)
Other dementia	4 (6.5)	8 (12.7)
Predominant features, n (%)		
With delirium	0 (0.0)	0 (0.0)
With delusions	10 (16.1)	12 (19.0)
With depressed mood	8 (12.9)	9 (14.3)
With anxiety	11 (17.7)	7 (11.1)
With primary insomnia	6 (9.7)	6 (9.5)
Uncomplicated	27 (43.5)	29 (46.0)
Cognitive disturbances, n (%)		
Aphasia	3 (4.8)	5 (7.9)
Apraxia	13 (21.0)	10 (15.9)
Agnosia	31 (50.0)	28 (44.4)
None of these disturbances	3 (4.8)	4 (6.3)
Unknown	12 (19.4)	16 (25.4)

*Note:* No significant differences in baseline characteristics were found between the experimental group and the control group.

\* High score indicates least impairment.

<sup>†</sup> Dutch Behavior Observation Scale for Psychogeriatric In-patients (range 0–21, low score indicates least impairment).

SD = standard deviation.

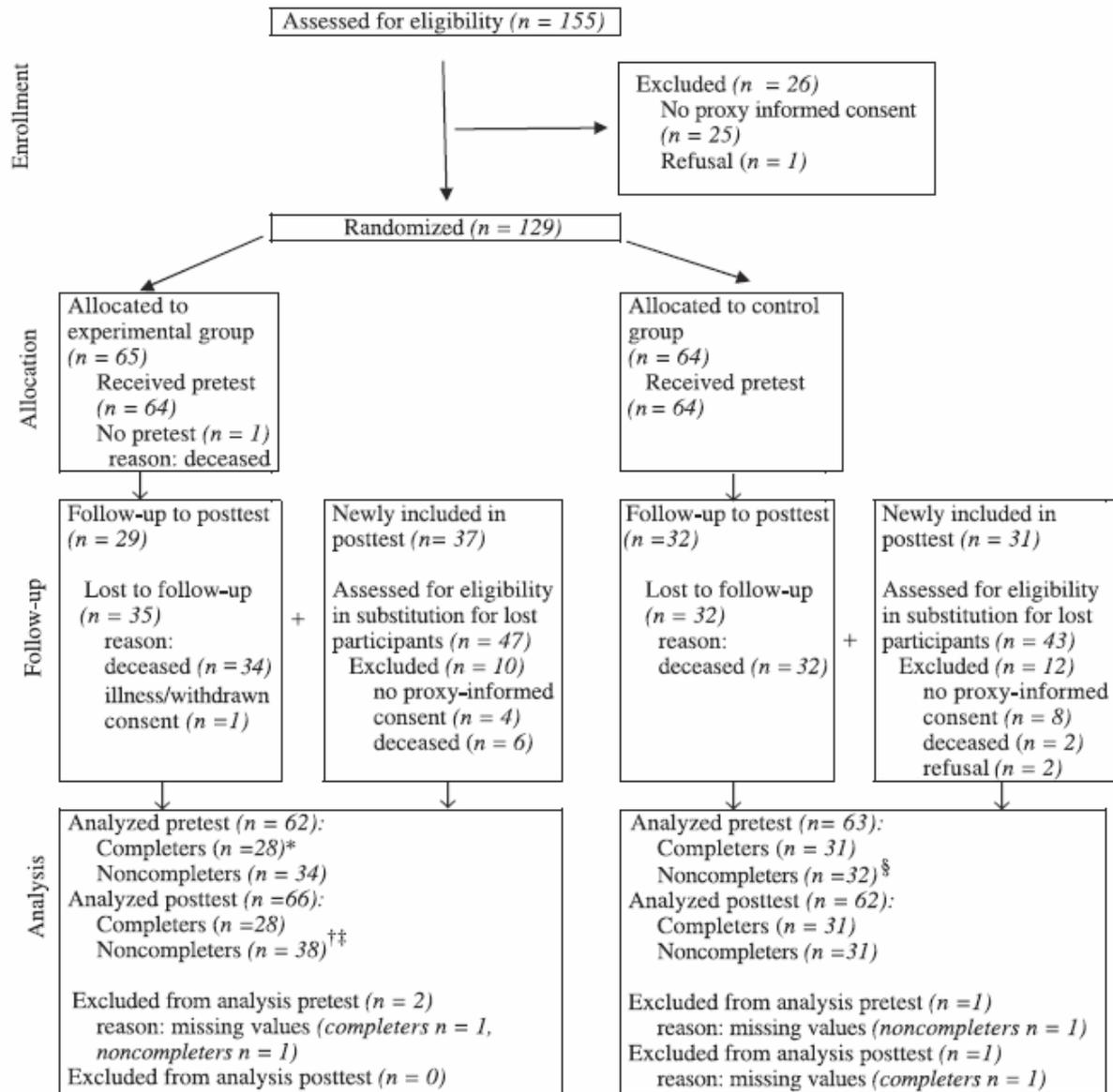


Figure 2. Flow chart of the trial.

\*Video observations ( $n = 27$ ). Reason: missing values ( $n = 1$ ).

†Video observations:  $n = 36$ . Reason: missing values ( $n = 2$ ).

‡37 newly included residents + 1 “completer” with missing values in pretest.

§31 noncompleters + 1 “completer” with missing values in posttest.

Table 3. Change in Outcome Measures According to CNAs' Assessments in the Ward Environment (Multilevel Analysis)

Outcome Measure (Range)*	Experimental Group			Control Group			Change Score <sup>†</sup>	$\chi^2$ (df = 1)
	Pretest	Posttest	Change	Pretest	Posttest	Change		
	Mean <sup>‡</sup> ± SE			Mean <sup>‡</sup> ± SE				
Behavior <sup>§</sup>								
Nonsocial behavior (0–24)	13.82 ± 0.4	13.31 ± 0.4	0.51	13.78 ± 0.4	13.81 ± 0.4	-0.03	0.54	0.54
Apathetic behavior (0–18)	10.98 ± 0.3	9.87 ± 0.3	1.11 <sup>††</sup>	10.48 ± 0.3	10.62 ± 0.3	-0.15	1.26 <sup>**</sup>	5.16
Loss of consciousness (0–21)	9.14 ± 0.4	7.89 ± 0.4	1.25 <sup>**</sup>	8.19 ± 0.4	7.60 ± 0.4	0.60	0.65	0.75
Loss of decorum (0–15)	7.72 ± 0.4	6.88 ± 0.3	0.84	6.60 ± 0.4	7.34 ± 0.3	-0.74	1.58 <sup>**</sup>	6.22
Rebellious behavior (0–15)	6.09 ± 0.3	5.23 ± 0.3	0.87 <sup>**</sup>	5.03 ± 0.3	5.60 ± 0.3	-0.57	1.44 <sup>**</sup>	5.99
Restless behavior (0–15)	4.42 ± 0.3	4.11 ± 0.3	0.31	3.66 ± 0.3	4.01 ± 0.3	-0.35	0.66	1.25
Anxious behavior (0–18)	4.04 ± 0.4	4.03 ± 0.5	0.02	3.47 ± 0.4	4.36 ± 0.5	-0.89	0.91	1.70
Agitation <sup>  </sup>								
Aggressive behavior (0–60)	5.36 ± 0.8	3.53 ± 0.7	1.83	3.73 ± 0.8	4.93 ± 0.7	-1.21	3.03 <sup>**</sup>	4.33
Physically nonaggressive behavior (0–36)	3.94 ± 0.6	3.53 ± 0.5	0.41	4.02 ± 0.6	3.64 ± 0.5	0.38	0.03	0.00
Verbally agitated behavior (0–30)	5.21 ± 0.6	5.06 ± 0.6	0.14	4.59 ± 0.6	5.26 ± 0.6	-0.67	0.81	0.69
Depression <sup>#</sup> (0–30)	8.93 ± 0.6	7.44 ± 0.5	1.48 <sup>**</sup>	7.22 ± 0.6	7.88 ± 0.5	-0.66	2.14 <sup>**</sup>	4.83

\* Low scores indicate the most favorable score for the scale.

<sup>†</sup> A significant change score means that the pre/post change in the experimental group was significantly different from the pre/post change in the control group.

<sup>‡</sup> Estimated mean score (multilevel analysis).

<sup>§</sup> Dutch Behavior Observation Scale for Psychogeriatric In-Patients.

<sup>||</sup> Cohen-Mansfield Agitation Inventory—Dutch version.

<sup>#</sup> Cornell Scale for Depression in Dementia—Dutch version.

\*\* $P < .05$ ; <sup>††</sup> $P < .01$ .

SE = standard error; CNA = certified nursing assistant;  $\chi^2$  = chi-square; df = degrees of freedom.

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