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Effects of snoezelen, integrated in 24 h dementia care, on nurse–patient communication during morning care

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ABSTRACT

Objective: To investigate the effectiveness of snoezelen, integrated in 24-hour care, on the communication of Certified Nursing Assistants (CNAs) and demented nursing home residents during morning care.

Methods: A quasi-experimental pre- and post-test design was conducted, comparing sic psychogeriatric wards, that implemented snoezelen, to six control wards, that continued in giving usual care. Measurements were performed at baseline and 18 months after a training 'snoezelen for caregivers'. Independent assessors analysed 250 video-recordings directly from the computer, using an adapted version of the Roter Interaction Analysis System (RIAS) and non-verbal measurements.

Results: Trained CNAs showed a significant increase of resident-directed gaze, affective touch and smiling. The total number of verbal utterances also increased (more social conversation, agreement, talking about sensory stimuli, information and autonomy). Regarding residents, a significant treatment effect was found for smiling, CNA-directed gaze, negative verbal behaviours (less disapproval and anger) and verbal expressed autonomy.

Conclusion: The implementation of snoezelen improved the actual communication during morning care.

Practice implications: Teaching CNAs to provide snoezelen has added value for the quality of care. Morning care by trained CNAs appeared to take more time. This suggests that (some) time investment might be required to achieve positive effects on CNA-resident communication.

1. INTRODUCTION

Effective communication is essential to the quality of life for elderly people living in residential care [1]. The power of communication is confirmed by evidence that residents respond to care and live longer when they are engaged in interpersonal relationships with staff [2–4]. Opportunities for social interaction of nursing home residents rest primarily on staff, but analyses of nursing home communication show a relative absence of talk and predominantly task-oriented or instrumental talk

[5]. Examination of nursing home talk also reveals a failure to meet residents' needs for socio-emotional interaction, which is a critical factor affecting residents' quality of life [4]. In residential dementia care, communication between staff and residents is even more complicated by the decline in verbal as well as nonverbal communicative ability of demented patients. The cognitive deficiencies of demented nursing home residents make it essential for nurses to adapt their communication to the residents' capabilities. Individuals with dementia are still able to transmitmeaningful communication, that can be interpreted by others. Caregivers should focus on receiving and interpreting verbal and nonverbal messages conveyed by demented residents [6].

Thereby, the use of nonverbal communication, in addition to verbal communication, is essential with people who have limited verbal comprehension [7]. Nonverbal behaviour is an eminent mode of expressing empathy and support and an important tool to make contact with residents [8–10].

It is very important that staff continue with communicating in spite of the difficulties entailed to the dementia process. Accordingly, there is considerable agreement in the literature on the need for specialized training for geriatric health care staff [1,11–16]. The communication problems of staff members can be summarized as negative stereotypes about residents and their communication needs, undervaluing communication compared to physical and medical aspects of patient care and restricted communication style [1].

Snoezelen, or Multi-Sensory Stimulation (MSS), is supposed to be an appropriate tool to communicate with severely demented persons, because there is no appeal to intellectual capabilities [17,18]. *Snoezelen* in 24 h dementia care combines a resident-oriented approach with stimulation of the senses by light, sound, feeling, smell and taste. It is a means of making contact and aims for pleasurable sensory experiences, tailored to the needs of demented elderly. The final goal is to increase or maintain the well-being of the demented person [19]. *Snoezelen* was developed in the Netherlands, and quickly gained a significant following in Europe and later in America and Canada. It is a contraction of two Dutch words, the equivalent in English being 'sniffing and dozing' [20]. In daily care, aspects of *snoezelen* are used at the bedside, in the bathroom and in the living room.

Until now, little research has been done to study the effects of *snoezelen*. Most of the studies evaluated the effects of *snoezelen* sessions in a special room on the behaviour of demented elderly. In some of the trials, positive immediate patient outcomes were found on patient behaviour, but carryover and longer-term effects of *snoezelen* were not evident [21–27]. Therefore, it is recommended to implement a continuous and ongoing program [23,26]. Accordingly, *snoezelen* is defined as an integrated approach in 24 h routine care, delivered by Certified Nursing Assistants (CNAs). They are best prepared to interpret patients' needs and eligible to apply *snoezelen* in the care [28].

The aim of the current study is to investigate the extent in which CNAs succeeded to change their communication conforming the communicating principles underlying the philosophy of *snoezelen*. The effects of the implementation of *snoezelen* on the actual communicative behaviour of demented nursing home residents is also examined. The effectiveness is studied during a well-defined and limited care situation, namely morning care. Morning care is defined as the period of time between 7:00 and 12:00 a.m. when CNAs are engaged with residents in activities relating to bathing, grooming, dressing and toileting. Clinical experience and the literature have indicated that the period of morning care is difficult for both residents and CNAs, because it is the time when 'problematic' behaviours, such as agitation in residents, happen most frequently [29,30].

The following research questions will be addressed:

1. What are the effects of the implementation of *snoezelen* in 24 h care on the actual communicative behaviour of CNAs during morning care?
2. What are the effects of the implementation of *snoezelen* in 24 h care on the actual communicative behaviour of demented nursing home residents during morning care?

During *snoezelen,* an affective, empathic attitude of the caregivers is essential: the carers have to be focused on sharing and entering into the experiences of the demented resident and to create an atmosphere of trust and relaxation [31,32]. To promote a sense of mutual togetherness with the resident, caregivers need to balance in their interactions, verbal as well as nonverbal [33]. Nonverbal communication supports the verbal communication, conveys interpersonal attitudes and emotional states and functions as substitute for language if speech is impossible [7,34–36]. Gazing and smiling convey interest and warmth. Touch is a very important aspect in establishing a relationship and can be

applied to show affection, care and comfort. As regards verbal communication, affective talk contributes to the development of a meaningful interpersonal relationship [37]. Verbal communication that makes an appeal to cognitive abilities, such as cognitive questions, does not fit the *snoezelen* approach [19,20]. By incorporating these communicating principles underlying *snoezelen*, resident-oriented care can be provided, which might ultimately result in a decrease of problematic behaviours and an increase in quality of life [6].

In particular, it was hypothesized that the implementation of *snoezelen* would lead to the following measurable changes:

- An increase of rapport-building nonverbal behaviour of both CNAs and residents (e.g., gazing, affective touch, smiling).
- An increase of positive affective or socio-emotional verbal communication of CNAs needed to establish a trusting relationship (e.g., showing empathy, social talk, validation).
- A decrease of negative instrumental communication, initiated by CNAs (e.g., questions about facts, cognitive knowledge).
- A decrease of negative affective verbal communication of both CNAs and residents (e.g., showing disapproval or anger).

2. METHOD

2.1. Design

A quasi-experimental pre- and post-test design was carried out. The study was performed in 12 psychogeriatric wards in six Dutch nursing homes. Each nursing home delivered an experimental and a control ward. The six experimental wards received the training '*snoezelen* for caregivers' and implemented *snoezelen* in 24 h care. In the six control wards, usual care without *snoezelen* continued. The implementation period lasted 18 months per ward in the period between January 2001 and February 2003. Measurements were performed at baseline and after 18 months.

2.2. Sample

Six nursing homes, in different parts of The Netherlands, were selected for the study out of 19 potentially eligible sites. Interviews with staff members revealed whether the nursing homes met the following inclusion criteria: (1) the presence of two comparable units (one experimental ward and one control ward); (2) the willingness to create the conditions to implement *snoezelen* in the daily care of the experimental ward; (3) the promise to refraining from *snoezelen* training during the study period on the control ward; and (4) no substantial organisational changes (e.g., removal, reorganization) during the study period [38]. Commitment to these criteria was laid down in a co-operative agreement.

Randomisation took place at ward level. In four nursing homes, the wards were randomized by having lots drawn from a sealed container by an independent person. Two wards were assigned to the experimental group on the basis of practical considerations (e.g., the presence of a room that could be used as 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 to establish that baseline differences between the experimental and the control ward that might prejudice treatment comparisons (e.g., population, staffclient ratio, motivation of nursing staff, working atmosphere) were absent. These potential confounding factors were objectively evaluated by visiting the wards and interviewing the care manager and the head nurses of the wards. The head nurses also completed a questionnaire.

After 15months, interviewswere held with the head nurses of the control wards to find out whether the control wards refrained from *snoezelen* during the study period, in conformity with 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). However, no one integrated these parts in an individual, resident-centred approach, nor integrated these structurally. As these are considered important conditions for *snoezelen* to be effective, no serious contamination risk is supposed to be present on the control wards.

2.3. Subjects

2.3.1. Residents

To establish the effectiveness of *snoezelen*, a sample size of 120 residents (60 treatments, 60 controls) was minimally required (power = 0.80, $\alpha = 0.05$, $d = 0.50$). To be eligible for the trial, residents had to meet the following criteria: (1) moderate to severe dementia according to DSM-III-R, diagnosed by a physician; (2) moderate to severe nursingcare dependency; (3) absence of an additional psychiatric diagnosis; (4) sense-organs completely or partially unimpaired; and (5) not bedridden [38]. Care dependency was measured by the Care Dependency Scale (CDS) for demented in-patients, an assessment instrument for use in psychogeriatric nursing homes [39–41]. The degree of care dependency is assessed on a five-point Likert-scale.Atotal sumscore with a theoretical range from 15 till 75 can be computed; the higher the score, the less the dependency on nursing care. The internal consistency of the scale was high ($\alpha = 0.93$) [38].

2.3.2. CNAs

All CNAs were recruited for the study from all shifts (day, evening and night). The majority (81.4%) worked in rotation shifts. To be eligible for the trial CNAs had to meet the following criteria: (1) be employed for at least three months in the nursing home (2) be employed for at least 12 h per week and (3) working in rotation shifts. Temporary staff, students, and CNAs only working at night were not eligible. The CNAs participated in the training '*snoezelen* for caregivers' and observation sessions as part of their regular employment duties.

2.3.3. Informed consent

Written informed consent was obtained from the residents using proxy consent wherein the legal guardian of the resident was contacted by mail, informed about the content of the study and the right to withdraw at any time during the study. Guardians were provided with a written informed consent form to allow their participation in the project, i.e. videorecording of the morning care for research purposes as well as the use of medical background characteristics.

2.3.4. Procedures

First, the ward staff selected a minimum of 15 residents who fulfilled the above criteria.

Next, every resident included was matched to a CNA, who was attuned to care for the resident. Every matched 'CNA-resident couple' was videotaped once in the pre-test and once in the post-test (when still attending the ward) during morning care, using a hand-held camera. Morning care was recorded from the moment the CNA reached the bedside until the moment the CNA left the room (usually together with the resident). Twelve CNAs (seven in the pretest and five in the post-test) were videotaped twice as 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 videorecordings and asked permission. The CNAs as well as the research assistant were instructed to stop the videorecording when they noticed negative reactions of the resident, caused by the presence of the researcher or otherwise related to the video-recordings. As this happened only five times (twice in the experimental group and three times in the control group), no sufficient affect of terminating the videotaping on measurement of negative behaviour is assumed. Immediately after the morning care, the CNAs were given the opportunity to disclose their feelings as to the video-recording. Although, in general, they experienced some (minor) stress in advance, the majority reported that stress did not really affect their behaviour or that of the resident 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 has been often reported in observational research before [35,42].

2.3.5. Handling loss to follow-up

To be sure that at least 60 residents could be included in each condition at post-test, the experimental wards were instructed to apply *snoezelen* care to as much (new) residents as fulfilled the above mentioned inclusion criteria. Consequently, a second cohort of subjects could be recruited to replace

residents who dropped out from the first cohort, mainly caused by death (see 'data-analysis' for statistical handling). Three months before the post-test, the above mentioned informed consent procedure was followed to obtain proxy consent from legal guardians of new, eligible residents. Provided a successful implementation of *snoezelen* in 24 h care, a 3 month period was minimally needed to be able to effect changes at the residents' level [19].

The post-test was planned 18 months after the pre-test, because this period was considered to be the minimum time needed for successful implementation of the new care model [43,44], e.g., to improve skills and to change habits.

Loss to follow-up among CNAs was handled by the inclusion of new CNAs, meeting the above mentioned inclusion criteria. 75.0% of the newly included CNAs in the experimental group was new in the ward. They received 'training on the job' from the head nurse or the 'coordinator sensory stimulation', and attended the follow-up meetings, to be able to apply the *snoezelen* method. The other 25% of new members CNAs was employed in the ward at pre-test, but was not able to be included in the pre-test, e.g., because they did not fulfil the inclusion criteria at that time. The median time of new members of the CNA groups in the ward was 1.0 year in the experimental group (range 0.23–5.78) and 1.2 year in the control group (range 0.31–11.20).

2.4. Intervention

2.4.1. Training

The CNAs were trained in *snoezelen* by a qualified and experienced professional trainer of the Bernardus Expertise Center/Fontis. The training consisted of four, weekly, 4 h inservice sessions and homework. The main objectives of training were to motivate team-members and to improve knowledge and practical skills. The underlying philosophy of *snoezelen* is compatible with developments in dementia care to 'person-centred' care, which aims to maintain personhood in the face of failing mental powers, by gaining knowledge of each individual and showing affective involvement [45].

During the training, attention was paid to CNAs attitude towards verbal and nonverbalcommunication and the need for verbal and nonverbal attentiveness. With regard to communication, the training focused in particular on:

- the development of CNAs awareness of the residents' physical, social and emotional needs (e.g., by paying attention to residents' verbal and nonverbal behaviours and learning how these can be interpreted),
- making contact with demented residents and showing affection and empathy (e.g., by gazing, affective touch, smiling or showing verbal affection),
- supporting demented residents in responsiveness (e.g., by waiting for a respons),
- avoiding to correct the residents' subjective reality (e.g., by validation),
- avoiding to spread useless cognitive information and to test the residents' remaining cognitive knowledge.

Furthermore, the training paid attention to practical skills needed for the application of multi-sensory stimulation, such as taking a life style history interview with family members, arranging a stimulus preference screening to find out which sensory stimuli the resident likes most and writing a *snoezel* care plan describing how to approach the resident and how to integrate multi-sensory stimuli in 24 h care. An extensive manual of *snoezelen* was available with specific instructions, methodology observation forms, and examples on the integration of *snoezelen* in 24 h care. In total, 59 CNAs and six head nurses attended the training program. During the 18-month implementation period, the caregivers were offered three in-house supervision meetings under the guidance of the same professional trainer. In addition, there were two general meetings, attended by three representatives of each nursing home (e.g., head nurses, care managers) to support the implementation of *snoezelen* at the organizational level. Details about the intervention have been described elsewhere [44].

2.5. Outcome measures

The effectiveness of *snoezelen* was studied by videorecordings of morning care. Morning care is given on every ward in every nursing home, and allows a nonbiased comparison between treatment

and control groups: both groups deliver care on a one-to-one basis to the resident (individual attention with *snoezelen* versus individual attention without *snoezelen*) and they both have the same final objective (of getting the resident washed and dressed). Morning care is a suitable care moment to stimulate the senses (tactual, visual, auditory, olfactory) and to integrate elements of the *snoezel* methodology (e.g., nice smelling soap, soft towels).

Video assessment of communicative behaviour during morning care was done by three independent observers, who were blinded as to whether the resident was included in the experimental or the control group, using the OBSERVER computer system [46]. The assessors were trained and guidelines were followed to minimize observer bias and reactivity. Every video-recording was observed three times (twice to code nonverbal behaviour and once to code verbal behaviour).

2.5.1. Indicators of nonverbal communication

Based on the research of Caris-Verhallen et al. [35,47], Kerkstra et al. [13] and Kruijver [48], nonverbal affective behaviours were selected that appeared to be particularly important for the establishment of the nurse–elderly relationship. The observation scheme contains the following indicators of rapport-building nonverbal communication: three nonverbal affective categories for CNAs (eye-contact, affective touch, smiling) and two nonverbal affective categories for residents (eye-contact, smiling). Eye-contact, affective touch and smiling convey involvement, closeness, friendliness and attentiveness. They are not necessary in performing nursing tasks, but do facilitate interaction between nurses and patients [48]. In addition, instrumental touch was measured. Instrumental touch is inherent to nursing and does not play a role in building rapport, but has to be observed to distinguish it from affective touch.

Table 1 shows the definitions for the nonverbal indicators used in this study. The instrument has shown to reliable in previous studies [13,35,47,48]. For eye-contact, affective and instrumental touch, the duration was rated. For smiling, the frequency was counted, because the duration of smiling was often too short to assess reliably.

[TABLE 1]

2.5.2. Indicators of verbal communication

Verbal nurse–patient communication was analysed using an adapted version of the Roter Interaction Analysis System (RIAS), originally developed by Roter [49] and further adapted to nurse–elderly patient communication by Caris- Verhallen et al. [47,50] and nurse-demented patient communication by Kerkstra et al. [13]. The system is widely used and has shown to be reliable [13,37,48,51]. The RIAS gives the opportunity to code both CNA and resident communication. The scheme uses verbal utterances as a unit of analysis. Each utterance, which is defined as the smallest distinguishable speech segment to which a coder can assign a classification, was allocated to one of 19 categories, which are mutual exclusive.

Table 2 gives an overview of the categories used in the present study.

In the RIAS, a distinction is made between affective communication and instrumental communication, both essential in nursing care. Positive affective communication is needed to establish a trusting relationship between the CNA and the resident (e.g., social conversation that has no particular function in nursing activities, showing agreement and understanding). Instrumental communication includes communication that structures the encounter, stimulates autonomy and exchanges information (see Table 2).

[TABLE 2]

In addition, some study-specific adaptations were made to tailor the observation system to nurse–patient interaction in dementia care. Within the affective domain, ‘negative affective communication’ was distinguished, including disapproval and anger, which is expected to have a negative influence on the CNA-resident relationship instead of a positive. Furthermore, two sub-categories were specified within the cluster ‘positive affective communication’, because of their value within the concept of *snoezelen* [19]. First, the category ‘conversation about sensory stimulation’, such as talking about the

smell of soap or the colour of clothes. Second, the category 'validation' or 'emotion-oriented communication', meaning that the conversation is adapted to the (subjective) perceived reality of the resident, whether the resident is confused or not.

Within the instrumental domain, the cluster 'negative instrumental communication' was distinguished, containing 'cognitive communication'. 'Cognitive communication' includes the provision of factual knowledge, which is useless in the context of the present situation, checking the residents' knowledge of facts or correcting verbal facts expressed by the resident. As *snoezelen* does not aim to make an appeal to the residents' intellectual capabilities, the active use of cognitive communication might confuse the resident and has to be avoided. We distinguished open and closed questions about factual knowledge, because closed questions are considered less confusing for dementia patients than open questions [19].

2.5.3. Reliability of the observations

To rate inter-observer reliability, the observers rated the same 25 (10%) video-recordings. Inter-observer correlations (mean Pearson's *r*) for the nonverbal behaviours was 0.93 (range 0.83–0.99), for the verbal behaviours 0.84 (affective utterances 0.44 (2.3% of all utterances); other verbal behaviours range 0.59–0.96). Inter-observer reliability was only measured for the verbal utterances that took up more than 2% of the utterances [52].

2.6. Data analysis

Descriptive statistics were obtained on the demographic characteristics of subjects in pre-test and post-test and in the experimental and control groups. Differences were examined using chi-square tests or *t*-tests.

Data-analysis of the video-observations was done by descriptive statistics. The mean frequency of verbal utterances within each category of the observation scheme during every video-taped morning care was calculated, as well as the mean duration of the nonverbal behaviours 'gazing', 'instrumental touch' and 'affective touch', and the mean frequency of 'smiling'. Except for smiling, the length of the nonverbal behaviours was proportionate to the total length of the morning care minus interruptions and unobservable parts.

As dropouts were substituted by new residents and CNAs, multilevel analysis, carried out with MLwiN-software, was used for analyzing the data. With multilevel analysis, it is possible to correct for dependency of the observations within subjects [53,54]. A mixed model of repeated measurements was chosen, which takes into account all available data in an adequate way: the paired samples of completers (included in both pre- and post-test) as well as the unpaired pre- or postmeasurement data of noncompleters (only included in preor post-test). We distinguished two levels of analysis: (1) measurement, and (2) resident and CNA, respectively. The correlated measurements of completers are controlled for by modelling the covariance between the pre- and postmeasurement at resident or CNA level. Similarity among the care by CNAs who were video-recorded twice ($n = 12$) was also taken into account.

Change scores were computed by subtracting the magnitude of change in the control group (pre-treatment score minus post-treatment score) from the magnitude of change in the experimental group. The mean pre-test posttest differences of the experimental group were tested against the mean pre-test post-test differences in the control group. The following characteristics were used as covariates in the adjusted analysis of residents' communication to correct for differences in the residents' condition or function: care dependency, memory impairment, age, duration of nursing home admission and sex [38].

In the analysis of CNAs' communication, age, gender, working experience and working period on the ward were added in the model as covariates. As the communication opportunities for CNAs also depend on the function of the resident involved, additional adjusted analyses were done adding the resident's relevant covariates (care dependency, memory impairment, age, duration of nursing home admission and sex) to the model.

The number of wards ($n = 6$ in each group) was too small to allow for comparisons between subgroups of nursing homes or to take similarity among wards into account.

3. RESULTS

3.1. Response

Fig. 1 presents the informed consent, response and dropping out over time per group (experimental and control).

[FIGURE 1]

Before the pre-test, 155 legal guardians were asked for a written informed consent of whom 25 (16.1%) refused. The main reason for refusal was objection to videotaping by the resident. No significant differences were obtained on age and sex among participants and refusers. A total of 67 residents was lost to follow-up. They were substituted by 66 new residents. Five cases were excluded from the final analysis because there were missing values in the background variables used for the adjusted multilevel analyses ($n = 4$) or adjourned video-recording ($n = 1$). In total, 250 video-recordings could be analysed (124 in pre-test and 126 in post-test).

With regard to CNAs, 37 out of 117 were lost to followup by changing jobs (19 in the experimental group and 18 in the control group). They were substituted by 41 new CNAs (22 in the experimental group and 19 in the control group).

3.2. Sample characteristics

3.2.1. Background characteristics residents

Table 3 summarizes the demographic characteristics for subjects in pre- and post-test.

The table shows that the experimental and the control groups were comparable on background characteristics, with the exception of age. In the post-test, the experimental group was significantly older than the control group: the newly included participants of the experimental group were older than those of the control group (85.1 as against 81.3 years; $P < 0.05$), which probably counts for this difference in the total group. Although age does not appear to be a factor of significance for dependency [39,55], the difference was accounted for in the analyses. No other significant differences were found.

[TABLE 3]

3.2.2. Background characteristics CNAs

Table 4 shows the demographic characteristics for CNAs in pre- and post-test.

There were no significant differences on background characteristics between the experimental and the control group of CNAs. The majority of the study population was female with an average age of 36 years and around 8 years work experience.

[TABLE 4]

Subgroup analyses were done to control for differences between completers and noncompleters (dropouts or newly included CNAs) in both groups during pre- and post-test (not presented in table). In the post-test, completers of both the experimental group and the control group, were significantly longer employed at the ward than new members CNAs, as was expected (Exp.: 4.4 versus 1.7 years, $P < 0.01$; Contr.: 3.1 versus 1.7 years, $P < 0.01$). In the experimental group, completers had also more experience than newly included CNAs (7.3 versus 3.6 years, $P < 0.01$). There were no other differences in the groups.

3.3. Outcomes

3.3.1. Effects on nonverbal communication

Table 5 provides the adjusted estimated means and the change scores from the experimental group in comparison with the control group on nonverbal communication.

[TABLE 5]

On all measures, negative change scores indicate a difference in change in favour of the experimental group. Regarding CNAs nonverbal behaviour, a significant treatment effect was obtained for the duration of eye-contact, affective touch and the mean number of smiles. In proportion to the total duration of the morning care, the percentages of eye-contact (resident-directed gaze) and affective touch increased significantly, while the percentage of instrumental touch did not.

With regard to residents' nonverbal behaviour, the duration of eye-contact (CNA-directed gaze) and the mean number of smiles of experimental subjects increased significantly. The percentage of eye-contact within the group of experimental subjects also showed a significant increase, but, in comparison with the control group, the total change score was not significant.

The morning care with trained CNAs tended to be longer. The total length of the morning care increased significantly in the experimental group as compared to the control group.

3.3.2. Effects on verbal communication

The effects of the application of *snoezelen* on verbal communication of CNAs during morning care are presented in Table 6. On measures representing positive verbal communication (affective and instrumental) negative change scores indicate a difference in change in favour of the experimental group. On measures representing negative verbal communication (affective and instrumental) positive change scores indicate a difference in change in favour of the treatments.

[TABLE 6]

Significant treatment effects were particularly seen in the categories 'positive affective communication' and 'positive instrumental communication'. These effects were mainly caused by significant increases in the following subcategories: social conversation, showing agreement and understanding, conversation about sensory stimuli (affective sub-categories), giving information and autonomy (instrumental sub-categories). Moreover, 'negative affective behaviour' and 'negative instrumental behaviour' decreased, in favour of the experimental group. The total number of verbal utterances by CNAs showed a significant increase in the experimental group.

In proportion to the total number of verbal utterances, the percentages of 'conversation about sensory stimuli' ($P < 0.001$) and 'autonomy' ($P < 0.01$) increased and the percentages of 'disapproval' ($P < 0.01$), 'anger' ($P < 0.05$), 'knowledge' ($P < 0.05$) and 'open questions about knowledge' ($P < 0.05$) decreased (not presented in table).

Effects on the verbal communication of residents are presented in Table 7. A significant treatment effect was found in the category 'negative affective communication'. More detailed analysis revealed that, at post-test, the residents in the experimental condition decreased in showing disapproval and anger whereas those of the control condition increased in showing anger. Further analysis of resident communication showed a significant increase in showing autonomy (giving opinion, making a choice) by residents in the experimental condition. Consequently, the total number of positive instrumental responses increased significantly in the experimental condition, although not leading to a significant effect in the total change score. Residents in the experimental condition also showed significantly more verbal utterances at post-test than at pre-test. Yet, a significant total change score was not reached.

[TABLE 7]

There were no significant changes in the ratio of verbal affective behaviour (positive nor negative) versus verbal instrumental behaviour (positive nor negative) of residents.

4. CONCLUSION AND DISCUSSION

4.1. Results

The results of this study support CNAs' use of *snoezelen* principles by improvements being observed in nonverbal and verbal communication in dementia care. CNAs applying a *snoezel* approach during morning care demonstrated more rapport-building nonverbal behaviour (resident-directed gaze, affective touch and smiling) than the control group, which applied usual care. As regards verbal communication, they showed more affective communication, particularly social conversation, agreement and understanding and conversation about sensory stimuli. Negative verbal communication, such as the provision of factual knowledge or showing disapproval, decreased. The improved communication of trained CNAs seemed to facilitate residents' responsive communication. Residents showed an increase in CNA-directed gaze and smiling as well as a decrease in verbal disapproval and anger. These findings are in accordance with our hypotheses. Unexpectedly, CNAs of the experimental group also increased in giving information and facilitating autonomy (instrumental communication). Residents in turn showed an increase in taking autonomy (giving opinion, making a choice). Although these results were not expected in advance, they are quite easy to explain afterwards. During the training 'snoezelen for caregivers', CNAs learned to be more aware of the residents' physical, social and emotional needs. One of the needs, often identified by CNAs, seem to be the need for information. Taking notice of the possibilities of the resident appeared to be another one. By enabling a resident to do what he or she would not be inclined to do beforehand, CNAs facilitated the autonomy of the resident.

The mean duration of morning care also increased in the experimental group. Compared to a previous, descriptive study measuring the duration of morning care in two Dutch psycho-geriatric nursing homes in 1996 (n = 77 videorecordings), the average length of morning care was 2.2 min shorter at pre-test in the present study (21.2 min in 1996 versus 19.0 min in 2000) [13]. At post-test (in 2001), the mean duration of morning care increased to 23.7 min in the experimental group. It is interesting how communication changes (e.g., increased nonverbal communication of CNAs and residents) coincide with the length of morning care. One could argue that during longer morning care, CNAs have more opportunities to communicate, just because they have more time for it [8]. Accordingly, only proportionate results should be of importance. A more theoretically based line of reasoning, known from doctor– patient communication research, is that the use of nonverbal and verbal behaviours by caregivers encourages the patient to respond, with longer consultation length as a consequence [8]. Following this hypothesis, the absolute measurements should be presented to avoid the (real) effect of increased nonverbal and verbal communication being masked by using a relative measure. According to Bensing et al. [8], both lines of reasoning seem to be partly true in general practice, and reinforce each other in circular processes. Dementia care especially differs from somatic health care in the expectations one could have of patient's communication. Demented nursing home residents usually cannot be expected to initiate communication; they are more likely to respond on the encouragement of other persons. This means that the efforts of caregivers to facilitate residents' responses might even be more important than in other care settings. Moreover, residents need time to assimilate to the CNAs' input and to be able to provide a reaction [45]. Taking this into account, it seems most likely that increased communicative initiatives by CNAs, aiming to adequately facilitate responses of demented residents, will automatically lead to a (somewhat) increased length of morning care. This raises the question whether an increased time commitment during morning care has to be considered as problematic. In dementia care, there are only a few care moments with the possibility of real individual contact between CNAs and residents. Morning care is one of these. Time investment in these scarce, but individual, care routines might yield a profit during the rest of the day. This train of thought was confirmed by the CNAs of the experimental group. They mentioned that, when a battle during the morning care can be avoided and the resident becomes in a good mood during the care routines, the rest of the day progresses more smoothly too. They also reported that they were still able to get their work finished [44]. Additional analysis revealed that CNAs of the experimental group perceived less time pressure, fewer problems caused by lack of time, fewer stress reactions and less emotional exhaustion after the implementation of *snoezelen* than those of the control group [56]. Moreover, the implementation of the new care model did not require an expansion of staff members, which suggests that a shift in time investment was made. In conclusion, time commitment to morning

care might be feasible in the nursing home environment, because the benefits seem to balance the investment in time.

4.2. Strengths and limitations

The findings on CNA nonverbal and verbal communication in the present investigation illustrate the contributions that behavioural observation can make in the context of an intervention study. The communication between CNAs and residents in dementia care has never been described in this detail before. The detailed analysis of the communication addressed specific research questions about the occurrence of specific verbal and nonverbal communication between CNAs and residents that might otherwise go unanswered and resulted in clear and convincing findings.

There are also limitations of this study. As this study was using video-recordings, CNAs' reaction to observation might be a potential problem. CNAs' performance of skills during observation may be influenced by social desirability factors and may not be completely representative [57]. For instance, the increased length of morning care in the actual day-to-day situation of the experimental group during posttest might be (somewhat) less than 5 min. A little overextension of the morning care cannot be excluded due to enthusiasm of CNAs to show the new working style, though the CNAs did not know how the video-recordings would be analysed. We do not know to what degree social desirability exactly influenced the CNA result, but several authors stated that the occurrence of performance bias in nursing research seems to be limited [42,48,50,58]. Accordingly, CNAs reported afterwards that the videotaped morning care reflected the normal situation.

Because the intervention was a combination of communication principles and the application of sensory stimuli, it is not possible to draw a fixed conclusion about the separate contributions of each element. During the implementation period of *snoezelen*, a lot of attention was given to the application of a stimulus preference screening to find out which sensory stimuli the resident liked most, the development of a snoezel care plan and organizational adaptations to be able to apply the new care model [44]. The present study shows that the CNAs used the communication principles underlying *snoezelen*, 18 months after the training. Whether separate training in communication skills or separate training in the application of sensory stimuli would result in the same findings has to be investigated in future research.

To observe nonverbal communication, we relied on instruments used in the studies of Caris-Verhallen [35], Kerkstra et al. [13] and Kruijver [48]. As regards verbal communication, we built on RIAS [49]. These instruments have proven to be reliable and valid in analysing nurse- (elderly) patient communication [13,35,48,50]. The RIAS contains a large number of variables regarding both the communication of CNAs and that of residents. Due to this, there is a decrease of the power of the statistical tests and, at the same time, an increased risk of false-positive results (falsely assuming that a hypothesis is confirmed, type I error). In the present study, the significance level was set at $P \leq 0.05$. Therefore, one out of 20 tests will be coincidentally significant [50]. To account for the number of comparisons being performed, it is often recommended to lower the alpha [59], but this increases the possibility of false-negative results (falsely rejecting a hypothesis, type II error) [50,60]. Also when the sample size is limited, type II errors might occur. The majority of the significant test results regarding CNA communication reached the $P \leq 0.01$ or $P \leq 0.001$ level. These results are still convincing. The results regarding resident communication need to be interpreted with caution, as they may be attributed to chance, although they were in conformity with the hypothesis and all point in the same direction.

The analysis methods used supply content information about the nature and frequency of behaviour categories in nurse–patient communication. Frequency-based data analysis does not really give insight into how the information was presented [50,61]. The results of the present study revealed, for instance, that nonverbal affective behaviour increased, while the number of verbal affective utterances hardly changed. This suggests that empathy and affection were mainly expressed nonverbally. Gazing and affective touch are essential for a provider–patient relationship and smiling is also supposed to be an important characteristics of a caregiver who wishes to establish a good rapport with patients [37,62]. However, verbal affection might also be expressed by the use of social communication or asking the opinion of the resident instead of the use of explicitly affective pronounced statements. It would be of interest to assess the quality of the interaction in future research to find out whether the CNA had the right attitude and indeed was acting in a respectful and empathetic way.

4.3. Practice implications

In dementia care, ideas have developed rapidly in recent years (e.g., Kitwood [45]), and the underlying philosophy of *snoezelen* is compatible with such developments. Underpinning of skills training by a 'person-centred' care philosophy is essential [63]. This study provides evidence of a perceived benefit from training on *snoezelen* among nursing home staff and residents. *Snoezelen* aims to fit the individual needs of the resident. The implementation of *snoezelen* contributed to a deeper understanding of the residents' situation and helped CNAs to understand what was important in the residents' lives. To achieve this, staff members are required who are skilled communicators, trained to facilitate effective communication despite demented residents' communication difficulties. Teaching CNAs to provide *snoezelen* care holds promise as an approach to improve the communication environment in nursing homes. Ultimately, achieving optimal communication environments in nursing homes is considered to contribute to increased satisfaction with nursing home life and well-being [4]. Reaching the goals of a training program requires strong team leadership and communication, clear patient-oriented goals definition, an understanding and appreciation of roles among various disciplines, skilful negotiation, and shared responsibility for the patient [64].

In the present study, favourable shifts within the nonverbal and verbal categories occurred. Training programs usually pay less attention to the performance of nonverbal skills. Nonverbal behaviour seemed to facilitate residents' responses most effectively. Regarding verbal communication, especially the facilitation of autonomy appeared to result in residents' responses. Even severely demented residents appeared to be able to make a choice between, for instance, two dresses that were showed to them. By stimulating autonomy (nonverbal and verbal), residents are supported to make their own choice and to find their own answers, which turned out to be possible until a very late stage of dementia.

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TABLES AND FIGURES

Table 1
Nonverbal categories of the observation scheme

Abbreviations	Measurement (duration or frequency)	Definition
CNAs' nonverbal communication		
Eye-contact	Duration	Resident-directed gaze: the CNA is looking at the eyes of the resident
Instrumental touch	Duration	Deliberate physical contact, which is necessary in performing the nursing task
Affective touch	Duration	Relatively spontaneous and affective touch, which is not necessary for the completion of a nursing task. Affective touch shows empathy and intends to make contact with the resident
Smiling	Frequency	Facial utterance of friendliness directed to the resident
Residents' nonverbal communication		
Eye-contact	Duration	CNA-directed gaze: the resident is looking at the eyes of the CNA
Smiling	Frequency	Facial utterance of friendliness directed to the CNA

Table 2
Verbal categories of the observation scheme

Abbreviations	Definition	Examples
Affective communication (positive)		
Social	Social conversation, personal remarks, jokes, greetings, friendly statements and conversation about non-nursing topics, unrelated to health or social context	'Good morning, how is it going?' 'Did you sleep well? 'It's really nice weather today'
Validation	Emotion-oriented communication, acknowledging the (subjective) reality of a persons' feelings and adapting to this reality, whether 'true' or not	'We can take it easy, your father is taking a cup of coffee in the meantime' [in answer on residents' question about her (dead) father becoming impatient]
Agree	Shows agreement or understanding, paraphrase	'Yes', 'I see', 'I know', 'hmmm'
Affection	Shows affection, empathy, emotional involvement, warmth, gratitude or reflection of feelings (pronounced affectively)	'Are you feeling so sad now' 'It will work out, I'll help you' 'Thank you, you're so sweet'
Partnership	Shows partnership	'We have done well together'
Sensory stimuli	Conversation about sensory stimuli	'Do you like this smell?' 'Feel how nice and soft this jersey is'
Affective question	Affective question, question which intents to make real contact on an emotional level, question which shows emotional involvement with the other person	'How do you feel?' 'Why are you so sad by now?'
Affective communication (negative)		
Disapproval	Shows disapproval or criticism (moderately negative utterances)	'I don't want to be washed' 'Don't pinch my arm, Mrs. X'
Anger	Shows anger, irritation or reluctance (shows real negative emotions)	'Stop it!', 'Keep your hands off me', 'You're a fright, I hate you'
Instrumental communication (positive)		
Information and orients	Gives orientation or information on nursing and health, including statements telling the other what is about to happen	'We are now going to the bathroom' 'Just brushing your hair and then we are ready'
Instruction	Gives instructions on morning care, instructing or dictating the other person to do something specific	'Please, turn on your right side' 'Pick up your feet!'
Autonomy	C: Questions that asks for the residents' opinion in order to give the resident autonomy R: Giving opinion by resident, making a choice	C: 'Would you like to wear this dress or this one?' R: 'That one' C: 'Do you want to take a shower?'
Ask for clarification	Bids for clarification, statements requesting for repetition of the other's previous statement	'What did you say?'
Instrumental question	Other instrumental questions, questions on nursing and health	'Does your knee still hurts?'
Instrumental communication (negative)		
Knowledge	Providing factual knowledge/unnecessary cognitive information in the actual context, correcting the resident on cognitive facts	'It's Wednesday today, not Monday' 'In six months, the euro will be introduced in Europe'
Closed question knowledge	Closed-ended questions on factual knowledge	'Is Julie coming to visit you tomorrow?' 'Do you remember that queen Beatrix celebrated her birthday last month?'
Open question knowledge	Open-ended questions on factual knowledge	'What's your daughter's name?' 'What did you have for dinner yesterday?'
Other communication		
Third person	Communication to a third person	'Can you please give me a towel?' (to another nurse)
Unintelligible	Not categorizable or unintelligible utterances	'xxxx xxxx xxxx xxxx'

C: CNA category, R: Resident category.

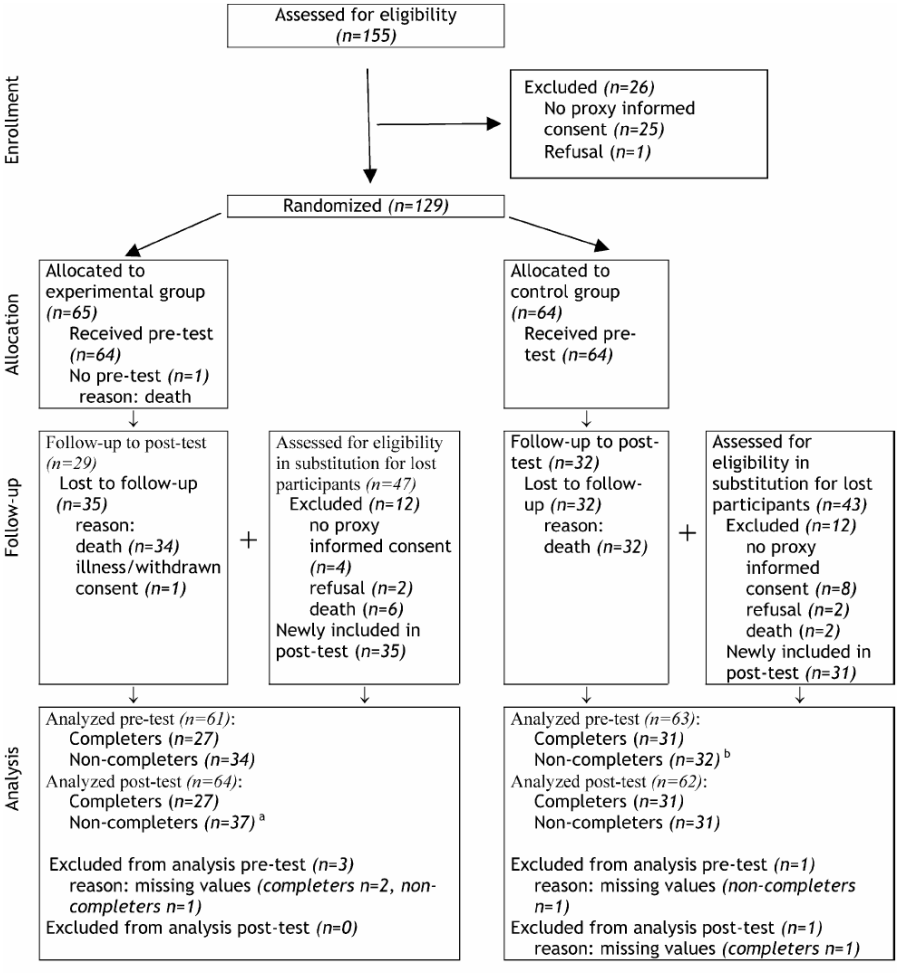

Fig. 1. Flow chart of the trial.

Table 3
Background characteristics of participating residents by treatment group

Residents' characteristics	Experimental group				Control group			
	Pre-test (n = 57)		Post-test (n = 60)		Pre-test (n = 60)		Post-test (n = 61)	
Gender: female, n (%)	48	(78.7)	56	(87.5)	52	(82.5)	47	(75.8)
Age (mean in years, S.D.)	84.01	(8.7)	85.83[a,b]	(6.1)	82.60	(8.2)	82.54	(7.9)
Duration of illness (mean in years, S.D.)	5.6	(2.7)	6.3	(3.0)	6.1	(3.5)	6.3	(3.1)
Residing in nursing home (mean in years, S.D.)	3.17	(2.5)	3.48	(2.8)	2.57	(2.5)	2.96	(2.6)
Care dependency (CDS; 15–75)[c] (mean score, S.D.)	26.87	(11.0)	30.22	(12.8)	29.46	(11.2)	27.06	(12.0)
Memory impairment (BIP7; 0–21)[c] (mean score, S.D.)	14.61	(3.1)	13.41	(3.8)	13.37	(4.0)	13.84	(3.9)
Diagnosis, n (%)								
Alzheimer's (DAT)	35	(57.4)	36	(56.3)	34	(54.0)	32	(51.6)
Vascular dementia	13	(21.3)	11	(17.2)	5	(7.9)	13	(21.0)
Combined DAT + vascular	9	(14.8)	14	(21.9)	16	(25.4)	8	(12.9)
Other dementia	4	(6.6)	3	(4.7)	8	(12.7)	9	(14.5)
Predominant features, n (%)								
With delirium	0	(0.0)	2	(3.1)	0	(0.0)	2	(3.2)
With delusions	10	(16.4)	13	(20.3)	12	(19.0)	15	(24.2)
With depressed mood	8	(13.1)	10	(15.6)	9	(14.3)	9	(14.5)
With anxiety	10	(16.4)	7	(10.9)	7	(11.1)	11	(17.7)
With primary insomnia	6	(9.8)	8	(12.5)	6	(9.5)	4	(6.5)
Uncomplicated	27	(44.3)	24	(37.5)	29	(46.0)	21	(33.9)
Cognitive disturbances, n (%)								
Aphasia	3	(4.9)	1	(1.6)	5	(7.9)	5	(8.1)
Apraxia	12	(19.7)	16	(25.0)	10	(15.9)	13	(21.0)
Agnosia	31	(50.8)	37	(57.8)	28	(44.4)	25	(40.3)
None of these disturbances	3	(4.9)	5	(7.8)	4	(6.3)	7	(11.3)
Unknown	12	(19.7)	5	(7.8)	16	(25.4)	12	(19.4)

To test the differences in background characteristics, t-tests and x^2 analysis were used.
[a] Difference between experimental group and control group at post-test.
[b] $P < 0.05$.
[c] The underlined scores indicate the most favourable score (least impairment) for the scale.

Table 4
Background characteristics of participating CNAs by treatment group

CNAs' characteristics	Experimental group				Control group			
	Pre-test (n = 57)		Post-test (n = 60)		Pre-test (n = 60)		Post-test (n = 61)	
Gender: female, n (%)	53	(93.0)	55	(91.7)	55	(91.7)	58	(95.1)
Age (years, S.D.)	36.75	(10.7)	35.62	(10.7)	33.24	(9.4)	36.11	(9.9)
Hours employment per week (mean hours, S.D.)	29.51	(10.9)	27.68	(7.5)	29.17	(7.4)	28.82	(7.5)
Psychogeriatric experience (mean years, S.D.)	8.17	(6.4)	8.23	(7.3)	7.42	(5.9)	8.98	(8.2)
Employed on this ward (mean years, S.D.)	3.79	(3.9)	3.63	(3.2)	3.45	(3.7)	4.06	(3.0)
Position, n (%)								
Team leader	4	(6.6)	4	(6.7)	6	(10.0)	5	(8.2)
Nursing assistant	50	(87.7)	50	(83.3)	45	(75.0)	48	(78.7)
Other (ward assistant, geriatric helper)	3	(5.3)	6	(10.0)	9	(14.9)	8	(13.1)

To test the differences in background characteristics, t-tests and x^2 analysis were used. No significant differences were found.

Table 5
Change in nonverbal communication of CNAs and residents

Outcome measures	Experimental group				Control group				Change score[c]	$\chi^2(1)$
	Pre-test		Post-test		Pre-test		Post-test			
	M	(se)	*M*[a]	(se)	*M*	(se)	*M*[b]	(se)		
CNAs'nonverbal behaviour										
Eye-contact (sec)	72.15	(7.7)	215.40***	(16.1)	57.25	(7.5)	78.52	(15.9)	−121.96***	30.39
Eye-contact (%)	6.23	(0.6)	14.30***	(0.9)	4.70	(0.6)	6.53*	(0.8)	−6.25***	23.02
Instrumental touch (sec)	567.90	(25.6)	560.60	(29.6)	584.20	(24.8)	564.20	(29.1)	−11.55	0.04
Instrumental touch (%)	43.96	(2.0)	43.08	(1.6)	47.19	(2.0)	41.96*	(1.6)	−4.35	1.89
Affective touch (sec)	26.22	(4.5)	76.48***	(6.2)	17.21	(4.4)	19.15	(6.1)	−44.16***	23.20
Affective touch (%)	2.23	(0.4)	5.06***	(0.4)	1.43	(0.4)	1.61	(0.4)	−2.49***	13.73
Smiling (freq)	2.56	(0.6)	9.90***	(1.0)	3.23	(0.6)	5.19	(0.9)	−5.34***	10.90
Residents' nonverbal behaviour										
CNA-directed gaze (sec)	49.95	(6.5)	107.50***	(12.0)	38.52	(6.3)	54.00	(12.1)	−42.07*	6.62
CNA-directed gaze (%)	4.61	(0.6)	7.66***	(0.8)	3.33	(0.6)	4.67	(0.8)	−1.70	1.96
Smiling (freq)	1.17	(0.3)	4.60***	(0.7)	1.58	(0.3)	2.14	(0.7)	−2.87**	8.14
Mean duration of morning care (min)	19.08	(0.6)	23.72***	(0.8)	18.92	(0.6)	19.58	(0.8)	−3.97**	9.54

M: estimated mean score (mean duration; percentages of total duration of morning care; for smiling mean frequencies), se: standard error, $\chi^2(1)$: chi square (1 degree of freedom), sec: seconds, freq: frequencies.
[a] *P*-values as compared to pre-test in experimental group.
[b] *P*-values as compared to pre-test in control group.
[c] The underlined scores indicate a significant change in favour of the experimental group, meaning that the pre-/post change in the experimental group is significantly different from the pre-/post change in the control group.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Table 6
Change in verbal communication of CNAs (estimated number of utterances per category)

Outcome measures	Experimental group				Control group				Change score[c]	$\chi^2(1)$
	Pre-test		Post-test		Pre-test		Post-test			
	M	(se)	*M*[a]	(se)	*M*	(se)	*M*[b]	(se)		
Affective (positive)	42.73	(2.8)	66.64***	(3.6)	35.27	(2.8)	40.03	(3.5)	−19.15***	**14.31**
Social	19.70	(1.7)	33.37***	(2.3)	16.54	(1.7)	21.22	(2.3)	−9.00*	6.06
Validation	1.37	(0.3)	4.44***	(0.8)	1.09	(0.3)	2.50	(0.8)	−1.66	1.73
Agree	13.19	(1.3)	20.14***	(1.2)	10.91	(1.2)	11.31	(1.2)	−6.56**	10.02
Affection	5.34	(0.6)	4.74	(0.6)	4.76	(0.6)	3.46	(0.6)	−0.70	0.40
Partnership	0.16	(0.1)	0.51*	(0.1)	0.18	(0.1)	0.24	(0.1)	−0.28	2.21
Sensory stimuli	0.34	(0.1)	2.56***	(0.3)	0.29	(0.1)	0.36	(0.3)	−2.15***	23.29
Affective question	1.87	(0.3)	0.67**	(0.2)	1.70	(0.3)	0.38**	(0.2)	−0.12	0.06
Affective (negative)	1.71	(0.4)	0.62*	(0.3)	1.00	(0.4)	1.66	(0.3)	1.74*	6.02
Disapproval	1.52	(0.4)	0.62*	(0.3)	1.00	(0.4)	1.44	(0.3)	1.34*	4.48
Anger	0.17	(0.1)	0.02	(0.1)	0.01	(0.1)	0.22*	(0.1)	0.37**	7.75
Instrumental (positive)	86.12	(5.5)	114.70****	(4.7)	85.58	(5.4)	75.76	(4.6)	−38.41***	**15.62**
Information	57.76	(3.6)	73.49***	(3.3)	56.47	(3.5)	49.63	(3.2)	−22.57***	13.35
Instruction	13.41	(1.7)	13.56	(1.1)	13.94	(1.6)	10.31	(1.1)	−3.78	1.91
Autonomy	8.26	(0.9)	21.30***	(1.6)	8.42	(0.9)	10.36	(1.6)	−11.11***	21.02
Ask for clarification	1.91	(0.4)	1.17	(0.2)	1.54	(0.4)	0.68*	(0.2)	−0.12	0.04
Instrumental question	5.15	(0.6)	5.06	(0.6)	5.11	(0.6)	4.78	(0.5)	−0.25	0.05
Instrumental (negative)	2.72	(0.4)	1.16**	(0.5)	2.01	(0.4)	2.47	(0.5)	2.03**	7.05
Knowledge	1.34	(0.3)	0.47*	(0.2)	0.95	(0.3)	1.00	(0.2)	0.92	3.44
Closed qst knowledge	0.75	(0.2)	0.48	(0.2)	0.63	(0.2)	0.89	(0.2)	0.53	3.10
Open qst knowledge	0.62	(0.2)	0.25	(0.2)	0.41	(0.1)	0.56	(0.2)	0.52	3.33
Other	11.61	(1.7)	12.77	(1.7)	10.90	(1.6)	14.64	(1.7)	2.58	0.64
Third person	10.51	(1.7)	11.27	(1.7)	9.93	(1.6)	13.79	(1.7)	3.10	0.97
Unintelligible	1.08	(0.3)	1.53	(0.4)	0.95	(0.3)	0.81	(0.4)	−0.59	0.79
Total verbal utterances	145.1	(7.1)	195.9***	(7.6)	135.1	(6.9)	134.0	(7.4)	−51.93***	16.79

M: estimated mean score (multilevel analysis), se: standard error, $\chi^2(1)$ = chi square (1 degree of freedom), qst: question.
[a] *P*-values as compared to pre-test in experimental group.
[b] *P*-values as compared to pre-test in control group.
[c] The underlined scores indicate a significant change in favour of the experimental group, meaning that the pre-/post change in the experimental group is significantly different from the pre-/post change in the control group.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Table 7
Change in verbal communication of residents (estimated number of utterances per category)

Outcome measures	Experimental group				Control group				Change score[c]	$\chi^2(1)$
	Pre-test		Post-test		Pre-test		Post-test			
	M	(se)	*M*[a]	(se)	*M*	(se)	*M*[b]	(se)		
Affective (positive)	29.20	(3.1)	35.97	(3.4)	25.06	(3.0)	24.64	(3.4)	−7.18	1.80
Social	7.63	(1.5)	9.77	(1.4)	7.56	(1.5)	8.52	(1.4)	−1.17	0.38
Validation	1.49	(0.6)	4.47	(1.4)	1.26	(0.6)	1.75	(1.4)	−2.49	1.34
Agree	18.99	(1.8)	20.35	(2.0)	15.04	(1.8)	13.82	(2.0)	−2.58	0.81
Affection	1.10	(0.3)	0.93	(0.2)	1.19	(0.3)	0.61	(0.2)	−0.41	0.76
Partnership	0.00	(0.0)	0.00	(0.0)	0.02	(0.0)	0.00	(0.0)	−0.02	1.52
Sensory stimuli	0.02	(0.0)	0.11	(0.1)	0.03	(0.0)	0.05	(0.1)	−0.07	0.83
Affective question	0.11	(0.1)	0.01	(0.0)	0.11	(0.1)	0.04	(0.0)	0.04	0.19
Affective (negative)	5.77	(1.0)	3.16	(1.1)	3.23	(1.0)	5.98	(1.1)	5.36*	6.42
Disapproval	5.10	(0.9)	3.02	(0.9)	3.06	(0.9)	5.06	(0.9)	4.08*	4.81
Anger	0.67	(0.3)	0.11	(0.3)	0.17	(0.3)	0.92*	(0.3)	1.31*	5.94
Instrumental (positive)	14.81	(1.7)	22.46**	(1.8)	12.65	(1.7)	15.26	(1.8)	−5.05	2.18
Information	6.90	(0.9)	9.30	(1.0)	5.99	(0.9)	7.52	(1.0)	−0.89	0.24
Instruction	0.23	(0.1)	0.12	(0.0)	0.26	(0.1)	0.11	(0.0)	−0.03	0.06
Autonomy	3.64	(0.6)	9.65***	(1.0)	2.93	(0.6)	4.89	(1.0)	−4.06**	6.87
Ask for clarification	2.09	(0.4)	1.69	(0.3)	1.60	(0.4)	0.93	(0.3)	−0.26	0.14
Instrumental question	1.90	(0.3)	1.66	(0.3)	1.88	(0.3)	1.66	(0.3)	0.02	0.00
Instrumental (negative)	1.24	(0.3)	0.83	(0.3)	1.21	(0.3)	1.26	(0.3)	0.46	0.68
Knowledge	0.73	(0.3)	0.63	(0.2)	0.90	(0.3)	0.86	(0.2)	0.06	0.02
Closed qst knowledge	0.09	(0.1)	0.10	(0.1)	0.16	(0.1)	0.07	(0.1)	−0.09	0.33
Open qst knowledge	0.30	(0.1)	0.10*	(0.1)	0.24	(0.1)	0.20	(0.1)	0.17	1.76
Other	16.60	(4.5)	20.19	(2.7)	11.24	(4.4)	14.56	(2.7)	−0.26	0.00
Third person	0.30	(0.2)	0.49	(0.2)	0.48	(0.2)	0.59	(0.2)	−0.09	0.04
Unintelligible	16.18	(4.5)	19.71	(2.7)	10.55	(4.4)	13.79	(2.6)	−0.28	0.00
Total verbal utterances	66.94	(6.4)	83.72*	(6.0)	53.26	(6.3)	61.81	(5.9)	-8.24	0.53

M: estimated mean score (multilevel analysis), se: standard error, $\chi^2(1)$: chi square (1 degree of freedom), qst: question.

[a] *P*-values as compared to pre-test in experimental group.

[b] *P*-values as compared to pre-test in control group.

[c] The underlined scores indicate a significant change in favour of the experimental group, meaning that the pre-/post change in the experimental group is significantly different from the pre-/post change in the control group.

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.001$.

[TABLE]