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AN EVALUATION OF THE EFFECTS OF SENSORY STIMULATION WITH PEOPLE WHO HAVE DEMENTIA

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Abstract. Hospitalized older adults with dementia often have few opportunities for social interaction and psychological stimulation. Their psychological functioning is affected by the dementing illness, sensory impairment and the effects of living in an institutional environment. The adverse effects of sensory deprivation may be particularly relevant for this client group. Using a multiple single case design, we evaluated the effects of individual sensory stimulation sessions on four elderly patients with dementia. All were living on a hospital continuing care psychiatric ward. Detailed behavioural observations were made before, during and after sessions to assess patients' responses. Adaptive functioning and wellbeing were also investigated. Results indicated that the intervention led to observable changes in levels of interaction, active looking and interest. The effects were transitory with the exception of active looking, which endured following the session. Adaptive behaviours also improved, though there was no change in wellbeing. The study indicates that sensory stimulation is a valuable therapeutic intervention with this client group.

Keywords: Sensory, stimulation, Snoezelen, dementia, elderly.

Introduction

Sensory stimulation, also referred to as Snoezelen (Moffat, Parker, Pinkney, Garside, & Freeman, 1993), has become a widely accepted therapeutic tool used in the ongoing challenge to promote quality of life for severely impaired individuals. Originating in Holland at the Haarendale Institution, Snoezelen emerged in the 1960s as an innovative tool used predominantly as a leisure resource for people with severe learning difficulties. More recently, there has been a growing popularity of this approach as a potential therapeutic intervention for dementia suffers.

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Traditionally Snoezelen comprises a light room, soft comfortable furnishings and an array of equipment, the sophistication of which may range from a simple tactile ball to a vibrating bed or spotlights that change colour at the clap of a hand. High levels of verbal communication or intellectual skills are not necessary as the individual can engage in the sensory experience at any level of ability. The aim of this approach is to engage the client in such a way as to promote interest, participation and interaction, thus lessening the adverse effects of severe cognitive impairment. The ''Snoezelen'' concept originates from research suggesting that a lack of stimulation is detrimental to the health and well-being of normal individuals (Solomon et al., 1967). Loew and Silverstone (1971) believe stimulation is required by all humans if brain functioning is to remain normal, with deprivation leading to a deterioration in behaviour. The elderly confused are particularly vulnerable to the effects of sensory deprivation. Patients in the final stages of dementia may experience lack of stimulation or at least inappropriate kinds of stimulation e.g. background noise, screaming (Norberg, Merlin, & Asplund, 1986). Psychosocial withdrawal may result whereby individuals become apathetic or engage in self-stimulating behaviours (Berkson, 1967; Edelson, 1984). Norberg et al. (1986) suggest this may occur when patients are unable to remove themselves physically from stressful stimuli. However, they may do so psychologically by withdrawing internally, becoming inaccessible, and making communication increasingly difficult. Reduced intellectual reasoning, limited verbal skills, restless or agitated behaviour make it difficult for some patients to participate in and benefit from the traditional therapy and leisure activities that many hospitals offer. Attempts to include patients in such activities can paradoxically lead to the experience of failure, anxiety and increased agitation.

A number of positive effects have been attributed to the use of Snoezelen with the severely impaired elderly client group. Some reports describe a calming effect (Kewin, Hutchinson, & Hagger, 1991; McKenzie, 1995), whilst others suggest a tendency towards increased contentment and maintenance of functional abilities (Arno & Frank, 1994). In a pilot project Maloney and Dailey (1986) noted improvements in both cognitive and social functions. Added benefits may include a reduction in staff burn-out (Bloemhard, 1992; Moffat et al., 1993) as it provides a pleasant context in which severely impaired patients and carers can interact.

Whilst there are a number of descriptive accounts claiming positive benefits associated with Snoezelen, there are few experimental studies. There may be several reasons for this. Norberg et al. (1986), in an evaluative study of sensory intervention, highlighted a number of experimental problems associated with the severity of their clients' conditions. Suitable measures were difficult to find and behavioural responses (e.g. eye blinking, mouth movements) and physiological changes (e.g heart rate and respiration) were difficult to interpret. The authors acknowledge that interpretation of these behavioural changes is subjective. Despite these difficulties, Long and Haigh's (1992) exploratory study of Snoezelen yielded observable changes in behaviour which led them to conclude that it could be evaluated experimentally. In their experimental evaluations, Moffat et al. (1993) investigated the level of enjoyment experienced by patients during a sensory intervention. The authors also explored whether any benefits of the session were maintained for a 10 minute period after it had ended. Whilst they used detailed behavioural observations before and after sessions, therapist rated assessments during

the sensory intervention were brief. Clearly there is a need for a more detailed evaluation of the sensory intervention itself.

The aim of the current study is to systematically investigate the appropriateness and effectiveness of sensory stimulation with people suffering from advanced dementia. In particular, it was hypothesized that the intervention would lead to measurable changes in immediate behaviour, adaptive functioning and general wellbeing (Kitwood, 1993).

Method

Design

The design for the present study is modified from a methodology for the assessment and manipulation of affect in people with dementia developed by Gaebler and Hemsley (1991). They developed a behavioural rating instrument to provide a reliable measure of engaged behaviour and emotional response to a short term intervention in a group of non-verbal elderly patients in a geriatric ward.

In the present study the behaviours of patients from a continuing care ward were recorded for 10 minutes before, 20 minutes during and 10 minutes after a free format sensory stimulation session in an adapted room off the ward. Each participant received a series of 12 sessions spread out over several weeks in a repeated ABA design of no intervention – snoezelen session – no intervention, with within and between subject replications across the 12 sessions (Sidman, 1960).

For such modified single case designs, Herson and Barlow (1976) suggest that four participants represent the optimum number of replications in applied clinical research before it is appropriate to report findings and move on to systematic replication using different therapists and centres.

Kazdin (1976) identifies that statistical analyses have rarely been reported in investigations of intra-subject replication designs, mainly because of the autocorrelation of time series data which violate analysis of variance models. However, Gentile, Roden and Klein (1972) have suggested that such autocorrelation effects can be ameliorated by combining results from non-adjacent phases in the design. For the current design, this is achieved by combining results of replications on the same participant on different sessions and by averaging scores for each variable across all time series.

Kazdin (1976) himself suggests that this approach can be further strengthened by the addition of a second subject into the single case design, so that phases of treatment remain one factor in the design and subjects become a second factor. For the current design, increasing numbers to four (as recommended by Herson and Barlow, 1976) means that a conventional mixed model ANOVA design can be adopted, with one factor (scores on modified behavioural subscales) repeated across the second factor of three treatment phases (before, during and after). Analysis of main effects (before, during and after) for individual subscales will then yield an evaluation of the effect of the sensory stimulation sessions.

Participants

The four participants, aged 77, 79, 82 and 84, were all resident on a male continuing care ward of a psychiatric unit. All had severe cognitive and functional disabilities

requiring full nursing care. Three also had behavioural disturbance and agitation and three had communication difficulties (aphasia). All had been admitted into hospital care because the severity of their disability had led to a breakdown in their care at home (2) or in their specialist residential placement (2). None of the participants were able to comply with cognitive testing or measures of mental state. The consultant diagnosis for the participants were (1) severe dementia of the Alzheimer's type with behavioural disturbance, (2) multi-infarct dementia and paranoid psychosis, (3) severe dementia of the Alzheimer's type and (4) multi-infarct dementia with severe expressive and receptive dysphasia.

Materials and procedure

Ethical permission to conduct the study was granted from the appropriate committee and nursing and occupational therapy staff consulted to clarify the design. Written informed consent for participation in the study was granted by the carers of all participants.

The individual sensory stimulation sessions were held in an occupational therapy staff office just outside the ward, which had been modified by covering furniture with white sheets. Snoezelen equipment, including a bubble tube, projector, optic fibres, aroma diffuser, audio tapes, balloons and soap bubbles, were utilised in a freeform intervention dictated by the response of the participant to the stimuli. Sessions were conducted by an occupational therapist.

A preliminary study, using participants not included in the main study, was conducted to pilot the behavioural measures. Inter-rater differences were resolved through discussion, leading to definitions of behavioural categories being clarified and operationalized. Data were recorded using the following measures:

1. Modified Behaviour Rating Scale. The rating scale consists of several classes of emotional responses across a 5-point scale. Raters recorded the amount of each particular response during a 30 second observation period (with 30 seconds allowed for the recording). The variables rated are recorded in Table 1. Each participant was recorded on videotape by one of the authors (C.L.) for later analysis for 10 minutes before, 20 minutes during and 10 minutes immediately following each session. Participants received three sessions a week over a four week period.

2. Short form Adaptive Behaviour Scale. Seven subscales were adopted from the American Association of Mental Deficiency (AAMD) Adaptive Behaviour Scale (Nihira, Foster, Shellhaas, & Leland, 1974). Subscales for unacceptable or eccentric habits, stereotyped behaviour and odd mannerisms, withdrawal, unacceptable vocal habits, self-abusive behaviour, hyperactive tendencies, inappropriate interpersonal manners were rated by the key nurse for each participant before and after the study was completed.

3. Dementia Care Mapping. The overall wellbeing of participants was assessed in the ward environment for three hours before and after the series of sessions by an occupational therapist or one of the authors (D.S.) who had both received training in Dementia Care Mapping (Kitwood & Bredin, 1994).

Table 1. Criteria for rating behaviour categories

Variable	Summary	Rating criteria
Body	Moves body	Any deliberate bodily movement including postural movements
Neutral	Passive contentment	Contented or passive with no obvious signs of extreme interest or sadness
See	Looks at what is going on	Attempts to follow observable stimuli or times when an activity caused the participant to follow an area of interest rather than staring vacantly
Acts	Interacts with others	All attempts to initiate interaction or obtain attention using facial, bodily or vocal gestures
Happy	Happy mood	All smiling or animated facial expressions or involvement in activity in the absence of signs of unhappiness
Interest 1	Interest time	Amount of time spent showing interest in observable activity
Interest 2	Interest level	Level of interest accompanied by movement and excited expression

The multiple single case design therefore aimed to collect data at increasing levels of abstraction to evaluate the impact of sensory stimulation in immediate behaviour terms, adaptive functioning and wellbeing. It was hypothesized that the sessions would lead to significant improvements in functioning at all these levels.

Results

In order to assess levels of interrater reliability, coefficients for five randomly selected sessions were calculated. Significant agreement between the two raters was found (range $r_S = 0.61$ for the variable "Body" to $r_S = 0.83$ for the variable "See" $p < .001$ in all cases).

To test the prediction that individuals would respond to sensory stimulation with measurable behaviour changes, Behaviour Rating Scale scores were compared as shown in Figure 1. To test for significant differences between subscales before, during and after the session, a two-way analysis of variance design with repeated measures (before, during and after) was processed which generated main effects for Factor A (time of measurement), Factor B (subscale) and Subjects (participants).

A significant main effect was found for scores before, during and after, $F(2, 6) = 31.12$ ($p < .001$), indicating that overall behavioural scores were significantly different in the three time periods sampled before, during and after the sessions. To identify how the three conditions were different to each other, post hoc analyses were made using Tukey's honest significant difference test (Hochberg & Tamhane, 1987). Table 2 records the mean differences exceeding the critical value for Tukey's statistic. This shows that overall scores during the sessions were significantly higher than scores before the sessions, and that scores after the sessions were significantly lower than scores during the sessions. There was, however, no significant difference between scores before and after the sessions.

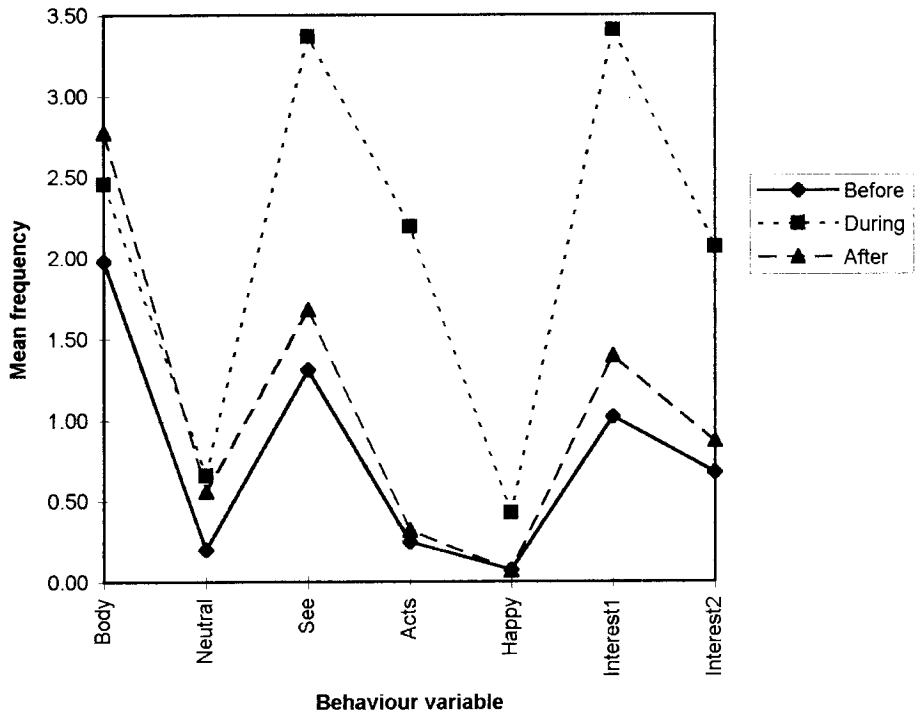

Figure 1. Mean scores for behaviour ratings before, during and after sessions

The ANOVA design also indicated a significant main effect for differences between individual subscales ($F(6, 18) = 44.87$, $p < .001$). To explore further which subscales were significantly different between the conditions, the interaction (A × B) between subscales and conditions was processed ($F(12, 36) = 4.23$, $p < .001$), indicating that some subscale scores were significantly different from each other in different conditions.

To evaluate how the pattern of subscale scores changed across the conditions, post hoc analyses (Tukey's test for unconfounded means in an interaction table) were made as recorded in Table 3. These interactions indicate that the subscale (see Table 1 for definition) was scored significantly higher during the sessions than before the sessions (and did not fall significantly again after the sessions). The subscale "Acts" also was scored significantly higher during the sessions than before them, and fell back to a significantly lower level after the sessions compared to during it. The subscale "interest

Table 2. Mean differences for overall scores before, during and after the sessions

	During	After
Before	1.29*	0.21
During		0.98*

*$p < .01$.

Table 3. Unconfounded mean differences for individual subscale scores before, during and after the sessions

	Before/During	Before/After	During/After
Body	0.48	0.79	0.31
Neutral	0.46	0.36	0.10
See	2.06*	0.37	1.68
Acts	1.94*	0.07	1.87*
Happy	0.35	0.00	0.35
Interest 1	2.39*	0.38	2.01*
Interest 2	1.39	0.20	1.20

*$p < .01$.

1'' also showed the same pattern of significantly higher scores during the sessions than either before or after it.

The two-way ANOVA model with repeated measures also permitted an evaluation of the different response of the participants to the sensory environment. Inspection of the main effect for participants revealed that there were significant differences between them in terms of the behavioural variables ($F(3, 36) = 12.59$, $p < .001$). Intersubject differences were controlled for by the design in evaluating the main effects of Factors A and B.

To test the prediction that the series of Snoezelen sessions would lead to a significant improvement in adaptive functioning, scores for the short form Adaptive Behaviour Scale subtests were compared for the participants using a repeated measures design comparing each individual score before and after the intervention. Unadaptive behaviour scores were significantly lower following the intervention ($T(27) = 2.51$, $p < .05$), indicating that the participants were displaying significantly fewer challenging behaviours after the sessions, with a concomitant increase in adaptive functioning. Figure 2 shows the change in each variable for each participant after the study versus before the study. Of course, given the nature of the design, it is not possible to ascertain that the sessions themselves rather than other factors contributed to this change.

Finally, comparisons of Dementia Care Mapping scores before and after the intervention indicated no significant change in wellbeing for any of the participants.

Discussion

The aim of this study was to investigate the effect of sensory stimulation on the functioning of patients with dementia. It was hypothesized that the intervention would have demonstrable effects on behaviour, adaptive functioning and wellbeing. The results suggest that the effect of the sessions is specific (being associated with significant behavioural changes in interaction, interest and active looking) though transient (only the third of these was maintained after the sessions). In addition, the significant decrease in unadaptive behaviours following the sessions suggests that sensory stimulation might be associated with an improvement in adaptive functioning, though its causal role cannot be established given the current design.

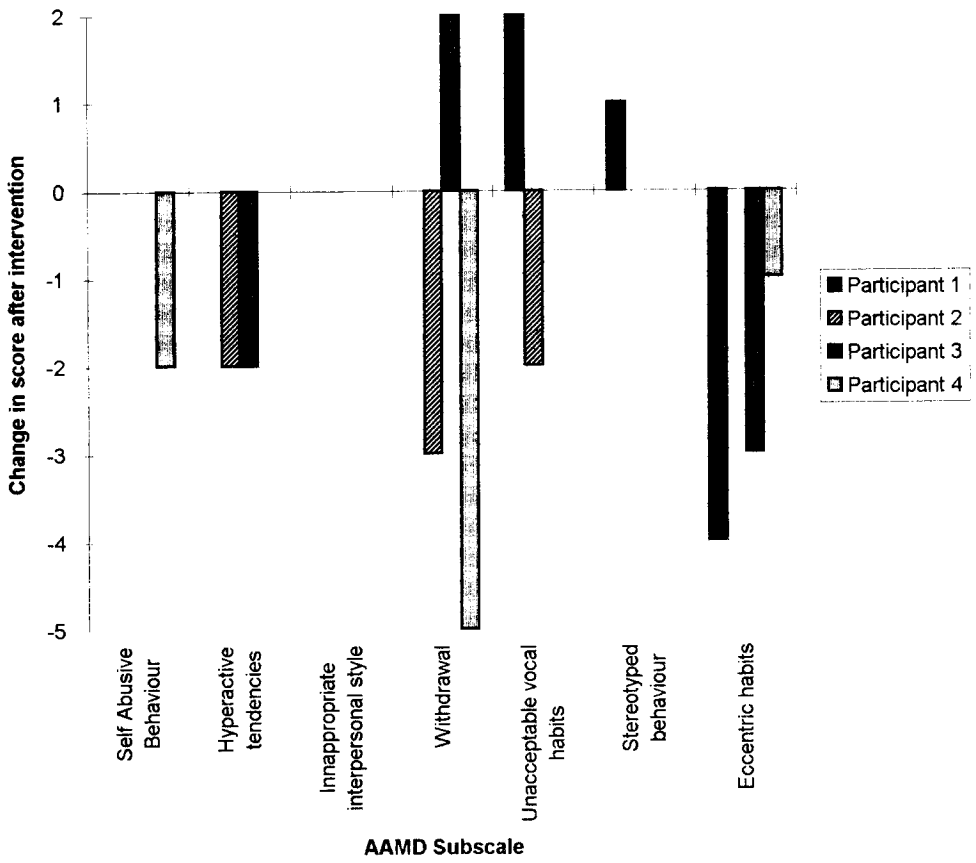

Figure 2. Changes in Adaptive Behaviour scores after the sessions

If the three measures adopted reflect increasing levels of abstraction in assessing behaviour, adaptive functioning and wellbeing, then the results indicate that sensory stimulation may contribute to small and short-lived adaptive changes in behaviour rather than generalizing to improvements in the wellbeing of patients on the ward. However, the DCM measure was only completed on two occasions, and this design may have lacked the power to show longer-term effects.

Even though the participants had similar levels of cognitive and functional disabilities, there were differences in their response to the intervention. Despite such differences, the study demonstrated a significant main effect for the intervention, supporting the clinical value of sensory stimulation for this clinical group. However, the design could have been further strengthened by including a more formal measure of severity of dementia.

It may be difficult to partial out the independent effects on behaviour of random fluctuations in cognitive functioning, changes in ward environment or other intervening variables. Further investigations of sensory stimulation are needed to evaluate experimentally the many descriptive accounts in the literature. Comparison studies of the

effectiveness of sensory stimulation against other interventions (such as individual attention without Snoezelen) could incorporate controls for common environmental factors and match participants by level of functioning.

The current study found a maintenance of the increased levels of active looking (variable "See") in the period immediately following the intervention, raising the possibility that sensory stimulation enables patients to reach a criterion level of arousal which endures after the session. The effects demonstrated are likely to be short-lived. However, by identifying and using these behavioural changes as opportunities to engage with patients, it may be possible for staff and carers to prolong/maintain patients' increased levels of interaction and interest in their surroundings. Given the strong ethos towards physical and practical care on many hospital continuing care wards, greater awareness of this effect could help to shift the emphasis towards improved psychological care.

One of the potential benefits of Snoezelen not explored in the present study is that sensory stimulation sessions may contribute to improvements in the patient-carer relationship. For patients unable to engage in conversation, Snoezelen may offer a context for shared experience and prosocial behaviours. Its effects on carer/staff morale would be a useful area of further research.

Dementia is often portrayed as a universally negative condition. Whilst the loss and stress associated with the illness cannot be denied, it may be that the effects of the environment, interactions and conditions demented people find themselves in contribute significantly to their experience of the illness. If sensory stimulation can help carers to interact with the person inside, it may offer a way to meet a most basic human need.

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