
Efficacy of a Sensory Integration Program on Behaviors of Inpatients With Dementia

Line Robichaud, Réjean Hébert,
Johanne Desrosiers

Key Words: environmental stimulation

Objectives. Dementia is the disease most frequently leading to admission in long-term care institutions, primarily because persons with this disease exhibit several behavioral problems. The objective of this study was to measure the efficacy of the sensory integration program developed by Ross and Burdick in improving the functioning of persons with dementia.

Method. Forty subjects with dementia (28 women, 12 men, mean age of 78.4 years) in three different institutional settings in Quebec City, Canada, were randomly assigned to the study (n = 22) or control (n = 18) group. Subjects in the study group participated in three 45-min sessions of a sensory integration program per week for 10 weeks. Outcomes were measured using the Revised Memory and Behavior Problems Checklist and the Psychogeriatric Scale of Basic Activities of Daily Living.

Results. The sensory integration program had no significant effect on the behaviors of the study group.

Conclusion. Before this type of program is labeled inefficacious, other studies are necessary to determine whether modifying the frequency of sessions, the number of subjects, and the measuring instruments would lead to similar results.

Line Robichaud, MA, is a doctoral student, Centre de Recherche en Gérontologie et Gériatrie, Hôpital d'Youville, 1036 Belvédère Sud, Sherbrooke, Québec, Canada, J1H 4C4.

Réjean Hébert, MD, is Director, Centre de Recherche en Gérontologie et Gériatrie, Hôpital d'Youville, Sherbrooke, Québec, Canada.

Johanne Desrosiers, MA, is Researcher, Centre de Recherche en Gérontologie et Gériatrie, Hôpital d'Youville, Sherbrooke, Québec, Canada.

This article was accepted for publication October 23, 1993.

The prevalence of dementia increases exponentially with age, reaching 20% among persons 85 years and older (Jorm, Korten, & Henderson, 1987). More than half of the residents in long-term care institutions are affected (Evans, 1988; Maddox, 1987). Every day, the caregivers must deal with behavioral problems resulting from cognitive deficits. Such problems include agitation, irritability, apathy, perseverance, wandering, screaming, self-stimulation, aggressivity, and running away. These problems are unpredictable, often embarrassing for people surrounding them, and sometimes dangerous even for the resident with dementia. The expected aging of the population challenges therapists and caregivers to adapt interventions with these patients.

To date, several group intervention programs have been used by occupational therapists to improve the functioning of persons with dementia, including Reality Orientation Therapy (ROT), Reminiscence Therapy, and Validation Therapy. ROT, which has been studied the most, suggests that giving information about the time, the environment, and the surrounding people to the patient with dementia may increase the patient's awareness of reality. Some benefits of this approach have been documented (Folsom, 1968; Zepelin, Wolfe, & Kleinplatz, 1981), but other studies have cast doubt on its usefulness (Groppe-Katz, 1987; Hanley, McGuire, & Boyd, 1981). Dietch, Hewett, and Jones (1989) have even observed that it increases the anxiety of persons with dementia. The Reminiscence Therapy (Schaffer, Berghorn, Holmes, & Quadagno, 1986) and the Validation Therapy approaches (Babins, Dillion, & Merovitz, 1988) call on the person to remember his or her past and require a certain capacity for insight. Both capacities are usually lacking in persons with dementia. Moreover, the effects of these programs are still debatable and poorly understood.

Because the behavioral expression of dementia is influenced by the physical and social environments, a stable and appropriately organized environment can contribute to the demented person's adaptation and performance of activities in his or her environment (Evans, 1988; Lawton, 1981). When the person receives significant and understandable stimuli, he or she is likely to react in an adapted pattern that is accepted by those around the person. According to the human occupation frame of reference (Kielhofner, 1992), the human being is seen as a dynamic and open system interacting with the environment in a series of cyclical processes. These processes are input, throughput, output, and feedback. In persons with dementia, the throughput is altered: it is made easier by a less complex input of information producing an adapted output to the conditions of the environment. Hence, the hypothesis of the present study is that modifying or adapting the stimuli (input) favorably influences the behavior (output).

Given this theoretical context, it is assumed that sensory stimulation programs could improve the functioning

of institutionalized persons with dementia. These programs were found efficacious with persons with mental retardation (Storey, Bates, McGhee, & Dycus, 1984) and with older persons with schizophrenia (Paire & Karney, 1984). In 1967, Bower used a sensory stimulation program with patients with dementia; despite some methodological limitations, his work suggests that intensive stimulations can reverse or slow down the deterioration process of dementia.

The program developed by Ross and Burdick (1981) for use with regressed, psychiatric, and geriatric patients was based on Ayres's Sensory Integration approach (Ayres, 1962) to the treatment of patients with neuromuscular dysfunctions. Ross and Burdick's program aims to promote the assimilation of simplified stimuli (inputs) and contributes to the organization of an adapted response. Among other objectives, the program's goals are to improve the patient's quality of interactions with others and capacity to manipulate and use common objects in everyday life. The cumulative effect of each activity of this program would be to increase the level of complexity of the stimuli and promote cortical integration (Ross & Burdick, 1981). Each session progresses gradually from arousing activities to activities for organizing thought and behavior. Each session is divided into five steps: (a) opening of the session, reality orientation; (b) activities emphasizing bodily responses: gross, proprioceptive, and vestibular movements; (c) sensory stimulations: taste, smell, touch, sight, hearing; (d) cognitive stimulations for organizing thought: memory, concentration, judgment; and (e) closing the session: socialization, pleasure, and relaxation.

Although many occupational therapists offer the Sensory Integration (SI) program developed by Ross and Burdick to persons with dementia, only one experimental study has evaluated the effectiveness of this program in patients with dementia. Corcoran and Barrett (1987) observed a significant improvement in task-oriented behaviors, but the limited number of subjects ($n = 11$) and the limited data on the validity of the measuring instrument used justify the undertaking of another evaluative study. The objective of the present study was to verify whether the SI program developed by Ross and Burdick improves the behavior and functioning of institutionalized patients with dementia. The research design was a randomized controlled trial.

Method

Subject

The study was conducted in three different institutions in Quebec City, Canada: a long-term care hospital, a psychogeriatric unit of a nursing home, and another nursing home where patients with dementia are not segregated from other inpatients. Eligibility for the study was determined by the following criteria: subjects were age 60

years or older, fulfilled the criteria for dementia established in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)* (American Psychiatric Association, 1989), scored 75 or lower (out of 100) on the Modified Mini Mental State Examination (Teng & Chui, 1987), had at least one disruptive behavior, and were physically able to attend the SI sessions. Forty subjects aged from 66 to 88 years (mean: 78.4 years) were eligible to participate in the study.

Within each institution, subjects were randomly assigned to either a control or study group after stratification according to the severity of their dementia. The median of the distribution of scores obtained on the Modified Mini Mental State Examination was used to classify the subjects. Subjects in the study group participated in the SI program and subjects in the control group continued to participate in the usual leisure activities of their institution.

This study was approved by the ethical board of the three institutions involved. The subjects were invited to participate in the program but were free to drop out temporarily or permanently at any time. Informed consent was obtained from the subject's legal representatives.

Study Intervention

The SI program was conducted by the first author, in a room close to the care units of each of the participating institutions. Each session followed the five steps suggested by Ross and Burdick (1981) three times per week with each session lasting between 30 and 45 min. For each session, the subjects were invited to join the group and receive the different stimuli offered by the structured activities and the materials (e.g., balls, sandbags, rope, music, food, cards, calendar). At the end of the session, they were conducted to their rooms and thanked for their participation. The total duration of the program was 10 weeks; beyond that, according to Zepelin et al. (1981), such programs reach a ceiling effect.

Measurements

The efficacy of the study intervention was evaluated on the basis of social functioning and task-oriented behaviors. The indicators chosen to measure social functioning were the frequency of disruptive behaviors and the reaction of the caregivers to these behaviors in the care unit. A *disruptive behavior* was defined as a behavior that was inadmissible by employees and residents. Severity of dementia has been correlated with the frequency and intensity of caregivers' reactions to disruptive behaviors (Cooper, Mungas, & Weiler, 1990; Swearer, Drachman, O'Donnel, & Mitchell, 1988). The measuring instrument used to evaluate disruptive behaviors was the Revised Memory and Behavior Problems Checklist (RMBPC) developed by Teri et al. (1992). This is a modified version of

the instrument used by Zarit and Zarit (1987); it includes 53 items that describe 53 behaviors. The RMBPC has 17 items related to depression problems, 13 items related to memory problems, 7 items related to psychomotor slowness, and 16 items related to other disruptive behaviors. The evaluator scores each behavior item according to two ordinal scales. The first scale defines the frequency of the behavior during the previous week, ranging from "never" (0) to "every day or more often" (4). The second scale was slightly modified in this study for use in an institutional setting. The question "How much does this problem bother or upset you when it happens?" was changed to "How much does this problem bother or upset the unit when it happens?" The scale of reactions ranged from "not at all" (0) to "extremely" (4). For both scales, the choice "do not know/does not apply" is also available.

Separate scores were obtained for the two scales by obtaining the mean of the raw scores on each item after eliminating the "do not know/does not apply" response. Then a composite score was calculated by obtaining the mean (out of 16) of the products of the frequency and reaction scores. Because an infrequent but very disruptive behavior may be as exhausting as a very frequent but not very disruptive behavior, the composite score is a good indicator of the burden experienced by the caregivers. This score, moreover, showed the highest correlation with the burden on caregivers for the 1982 Zarit version of this instrument.

A validation study of the RMBPC was done on 201 subjects (Teri et al., 1992). A test-retest reliability study on the French translation of the RMBPC (the French version was used in our study) showed coefficients of 0.77 (frequency) and 0.90 (reaction) (Hébert, Bravo, & Girouard, 1993).

The task-oriented behaviors were operationalized by the level of assistance required for activities of daily living (ADL) as measured by the Psychogeriatric Scale of Basic Activities of Daily Living (PSBADL) (Laberge & Gauthier, 1990). This scale is designed to objectively measure the level of executive cognitive functions in the activities of bathing, dressing, grooming, continence, and eating. The 25 items are basic operations for accomplishing the tasks of these five activities and are measured in terms of the type of help required. The total score can vary from 0 (totally dependent) to 125 (totally independent). The construct validity and test-retest reliability ($r = 0.967$) of this instrument have been studied by Laberge and Gauthier.

Data Collection

Each subject was evaluated at the beginning and at the end of the study intervention program. The RMBPC was completed by the head nurse of the subjects' units, whereas the PSBADL was completed during an interview with the caregiver most responsible for the patient's care.

Because the latter also had to prepare the study group subjects to participate in the sessions, only the first collection of data was blinded.

Data Analysis

Analysis of present data used chi-square tests and Student's *t*-test or the Wilcoxon rank sum test, according to the normality of the distributions. Two-tailed paired *t*-tests and Wilcoxon signed rank tests were used to analyze the pretest/posttest differences within each group. Analysis of covariance with pretest scores as a covariate was used to compare groups at posttest and verify the hypothesis. Inferential tests were done based on all the assigned subjects (intention to treat analysis), including those who dropped out (1 in the study group and 2 in the control group) to rule out the possibility of an exclusion bias during the comparison of groups at posttest. The sample size allowed the detection of a very large effect-size ($[gr\ \delta]/[gr\ \sigma] = 1$) of the program on the disruptive behaviors, with a power of 80% and a Type I error of 0.05 (Cohen, 1977; Colton, 1974).

Results

The sociodemographic characteristics of the 40 subjects and the mean scores obtained at pretest for both the study and control groups are presented in Table 1. Although there appear to be group differences in pretest scores for the RMBPC-frequency, reaction, and composite scores, a multivariate analysis using the Hotelling test (Morrisson, 1976) verifies the overall equivalence of the groups at pretest ($T = 4.08$, NS). Study group subjects ($N = 22$) participated in an average of 17 sessions out of a total of 29, which represents 1.7 sessions per week per subject. Eighteen attended more than 15 sessions, and four subjects attended fewer than 10 sessions.

The study group subjects showed a significant decrease in the frequency of disruptive behaviors ($t = 3.16$, $p = 0.004$), a decrease of the caregivers' reactions to these behaviors ($t = 5.80$, $p = 0.0001$), and an improvement of the level of assistance required in ADL ($t = 2.91$, $p = 0.009$). The 18 control group subjects also demonstrated similar changes, but these were not statistically significant, except for the reaction to the disruptive behaviors ($t = 2.15$, $p = 0.05$). However, an analysis of covariance (ANCOVA) of the posttest data indicated that the intervention program had no significant effect on the behaviors of the group (see Table 2).

Discussion

Sensory deprivation, or a deficiency in significant sensory inputs, is more frequently experienced in institutions

Table 1
Data on Subjects of Both Groups at Pretest

Descriptive and Dependent Variables	Study Group (n = 22)		Control Group (n = 18)		Statistical Tests
	M	SD	M	SD	
Age	76.6	5.8	80.1	7.9	X ² = 0.943; NS
3MS (0-100)	28.9	15.7	29.4	13.7	t = -1.57; NS
RMBPC -					t = -1.10; NS
Frequency	1.43	0.64	1.11	0.46	t = 1.79; p = 0.080
Depression	0.98	0.73	0.88	0.56	z = -0.12; NS
Memory	2.49	1.26	1.88	1.20	z = -1.55; NS
Psychomotor slowness	1.89	1.06	1.47	0.96	z = 1.32; NS
Disruptive behavior	0.91	0.65	0.61	0.38	z = -1.07; NS
RMBPC - Reaction	1.97	0.87	1.45	0.79	t = 1.91; p = 0.063
Depression	2.19	1.04	1.41	1.08	t = 2.33; p = 0.025
Memory	1.59	1.11	1.36	1.05	z = -1.72; NS
Psychomotor slowness	1.27	0.90	0.79	0.72	z = -1.58; NS
Disruptive behavior	2.47	1.06	1.99	1.02	z = 1.46; NS
RMBPC Composite Score	3.24	2.43	1.88	1.66	z = -1.72; p = 0.084
PSBADL 0-125	30.6	25.4	34.1	29.3	t = -0.04; NS

Note. MS = Modified Mini Mental State Examination, RMBPC = Revised Memory and Behavior Problems Checklist, PSBADL = Psychogeriatric Scale of Basic Activities of Daily Living, NS = Not significant, t = Student's t-test, z = Wilcoxon rank sum test.
Gender: Study Group - 14 women, 8 men; Control Group - 14 women, 4 men.

than at home and is hypothesized to be one of the causes of behavioral problems in persons with dementia (Husian, 1981; Lawton, 1981; Lévesque, Roux, & Lauzon, 1990; Loew & Silverstone, 1971). The objective of this study was to measure the effect of an SI program on the disruptive behaviors of inpatients with dementia. Be-

Table 2
Data on Subjects of Both Groups at Posttest

Dependent Variables	Study Group (n = 22)		Control Group (n = 18)		ANCOVA
	M	SD	M	SD	
RMBPC - Frequency	1.16	0.43	1.04	0.37	F = 0.42; NS
Depression	0.89	0.58	0.85	0.61	F = 0.02; NS
Memory	2.22	1.07	2.02	1.15	F = 1.66; NS
Psychomotor slowness	1.43	1.03	1.09	0.66	F = 0.58; NS
Disruptive behavior	0.54	0.44	0.49	0.37	F = 0.62; NS
RMBPC - Reaction	1.21	0.58	1.10	0.60	F = 0.71; NS
Depression	1.41	0.97	1.29	0.89	F = 1.55; NS
Memory	0.69	0.43	0.68	0.53	F = 0.12; NS
Psychomotor slowness	0.59	0.63	0.67	0.66	F = 0.78; NS
Disruptive behavior	1.90	1.39	1.76	1.33	F = 0.13; NS
RMBPC Composite Score	1.54	0.95	1.26	0.89	F = 0.60; NS
PSBADL (0-125)	37.7	25.3	38.1	27.6	F = 0.51; NS

Note. NS = Not significant, ANCOVA = analysis of covariance, RMBPC = Revised Memory and Behavior Problems Checklist, PSBADL = Psychogeriatric Scale of Basic Activities of Daily Living.

tween the pretest and the posttest, the study group showed a significant decrease in the frequency of their disruptive behaviors and in the caregivers' reaction to these behaviors, as well as an improvement in the level of assistance required in ADL. The control group showed a significant decrease in the caregivers' reaction to the disruptive behaviors. However, the analysis of covariance indicated that there was no significant difference between the study and control groups at posttest when pretest scores were treated as a covariate. This apparent contradiction may be explained by the phenomenon of regression toward the mean (see Figure 1). At the pretest, the study group showed a higher frequency in disruptive behaviors than the control group, although this difference was not statistically significant. At posttest, the frequency of these behaviors in the study group simply approached that of the control group, thus giving the illusion of an effect. The improvement in the two groups in terms of reactions of the caregivers to the disruptive behaviors can be explained by a contamination effect. Nemiroff, Rosenberg, and Radbill (1977) explained that the attitudes of caregivers can be influenced by the presence of the program: they become more understanding, indulgent, and respectful and thus the quality of life of all the patients is improved. The slightly more substantial improvement in the study group could also result because the second collection of data was not blinded.

Four reasons may explain the lack of efficacy of the SI program in this study. First, it is likely that the frequency of sessions in the program was not sufficient. The expected frequency of three sessions per week was not reached. However, it seems unrealistic to apply a higher frequency for this type of program in a clinical setting, considering the limited staff resources available on the care units. Second, the sample size only allowed the detection of a very large effect of the program. A more modest effect would have been clinically interesting but could not be detected by the present study. Third, the measuring instruments may not have been the most appropriate for the valid measurement of the effect of this type of program. More sensitive instruments could be chosen, and other dimensions, such as communication and postural tone, could also be measured. Finally, this SI program might not have been appropriate for these patients because of the irreversibility of the dementia.

Although the validity of this study is better than that of the study by Corcoran and Barrett (1987), the efficacy of the SI program could not be verified. Before concluding that this type of program is inefficacious, other studies are necessary to determine whether modifying the frequency of sessions, the number of subjects, and the measuring instruments would lead to similar results. Research that evaluates intervention programs would give caregivers and therapists who work with patients with dementia useful methods for dealing with behavioral problems. ▲

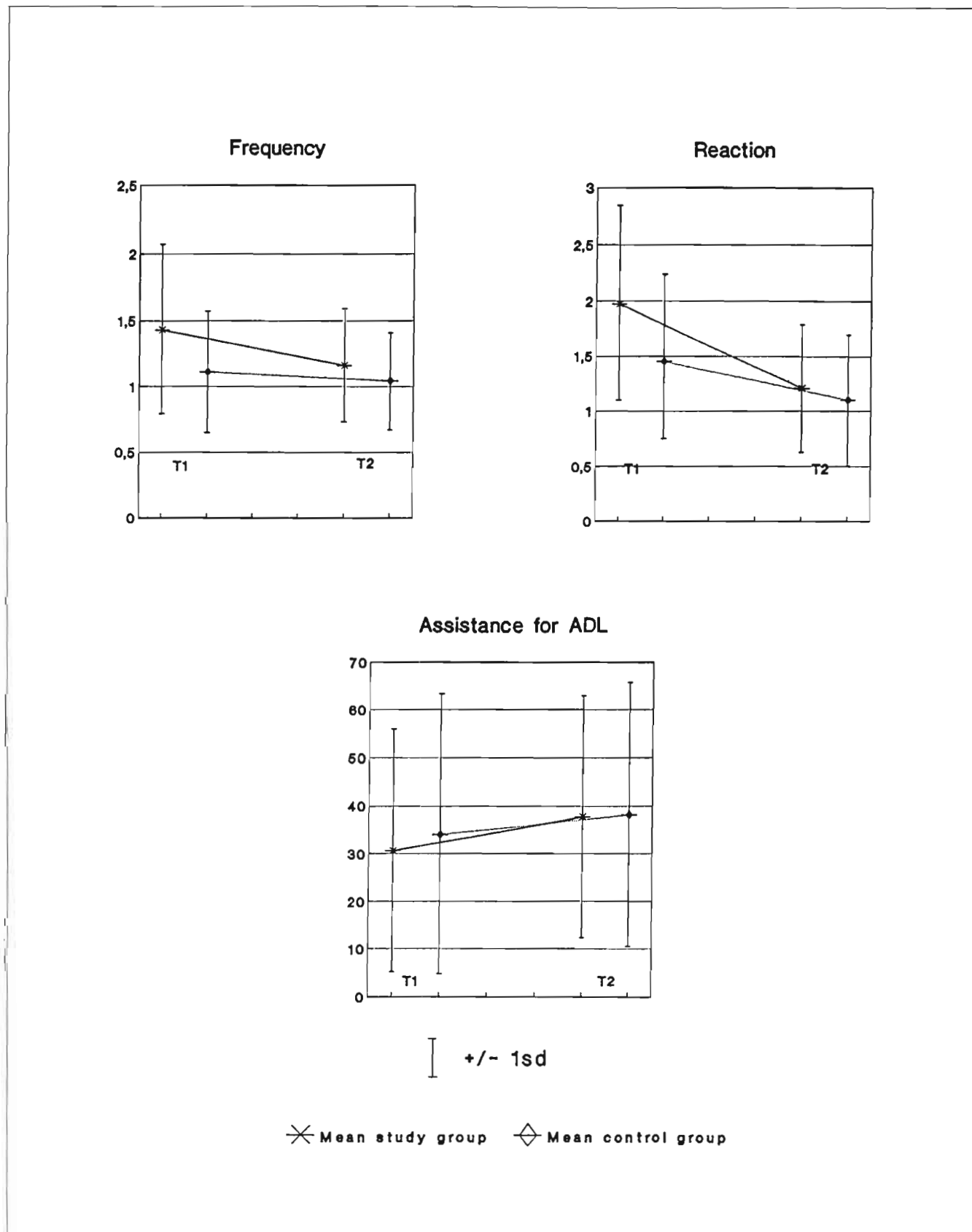


Figure 1. Mean scores and standard deviations of subjects of both groups at pretest and posttest on the three variables: frequency of disruptive behaviors, reaction of the caregivers to the behaviors, and assistance for activities of daily living (ADL).

Acknowledgments

We thank Patrice Gauthier for support in statistical analysis and Carmen Moliner, or, and Gina Bravo, PhD, for revisions to the manuscript. Three institutions in the Quebec City area collaborated in the research: the Centre d'accueil St-Antoine, the Foyer Notre-Dame de Lourdes, and the Centre Hospitalier St-Augustin.

This study was conducted with financial support from the Université Laval, Quebec City, the Centre de Recherche en Gériologie et Gériatrie, Hôpital d'Youville, Sherbrooke, and the Faculté des Lettres et Sciences Humaines, Université de Sherbrooke. This study was undertaken to meet master's degree requirements for the first author. Presentations based on this study have been made at the 6th Conference of the Corporation Professionnelle des Ergothérapeutes du Québec held in Sherbrooke in November, 1992, and at the 9th Conference of the Société Québécoise de Gériatrie, held in Quebec City in December, 1992.

References

- American Psychiatric Association. (1989). *Diagnostic and statistical manual of mental disorders (DSM-III-R)* (3rd ed. rev.). Washington, DC: Author.
- Ayres, A. J. (1962). *Approaches to the treatment of patients with neuromuscular dysfunction*. Dubuque, IA: Brown Book.
- Babins, L. H., Dillion, J. P., & Merovitz, S. (1988). The effects of validation therapy on disoriented elderly. *Activities, Adaptation & Aging, 12*(1/2), 73–86.
- Bower, H. M. (1967). Sensory stimulation and the treatment of senile dementia. *Medical Journal Australia, 1*, 1113–1119.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences*. Orlando, FL: Academic Press.
- Colton, T. (1974). *Statistics in medicine*. Boston: Little, Brown.
- Cooper, J. K., Mungas, D., & Weiler, P. G. (1990). Relation of cognitive status and abnormal behaviors in Alzheimer's disease. *Journal of the American Geriatric Society, 38*, 867–879.
- Corcoran, M. A., & Barrett, D. (1987). Using sensory integration principles with regressed elderly patients. *Occupational Therapy Health Care, 4*(2), 119–128.
- Dietch, J. T., Hewett, L. J., & Jones, S. (1989). Adverse effects of reality orientation. *Journal of the American Geriatric Society, 37*, 974–976.
- Evans, J. G. (1988). The epidemiology of the dementias of the elderly. In J. A. Brody & G. L. Maddox (Eds.), *Epidemiology and aging: An international perspective* (pp. 36–53). New York: Springer.
- Folsom, J. C. (1968). Reality orientation for the elderly mental patient. *Journal of Geriatric Psychiatry, 1*, 291–307.
- Gropper-Katz, E. I. (1987). Reality orientation research. *Journal of Gerontologist Nursing, 13*(8), 13–18.
- Hanley, I. G., McGuire, R. J., & Boyd, W. D. (1981). Reality orientation and dementia: A controlled trial of two approaches. *British Journal of Psychiatry, 138*, 10–14.
- Hébert, R., Bravo, G., & Girouard, S. (1993). Fidélité de la traduction française de trois instruments d'évaluation des aidants naturels de malade déments [Reliability of the French translation of three instruments designed for evaluation of caregivers of demented patients]. *Canadian Journal on Aging, 12*, 324–337.
- Hussian, R. A. (1981). *Geriatric psychology: A behavioral perspective*. New York: Van Nostrand Reinhold.
- Jorm, A. F., Korten, A. E., & Henderson, A. S. (1987). The prevalence of dementia: A quantitative integration of the literature. *Acta Psychiatrica Scandinavica, 76*, 465–479.
- Kielhofner, G. (1992). *Conceptual foundations of occupational therapy*. Philadelphia: F. A. Davis.
- Laberge, H., & Gauthier, L. (1990). *L'échelle psychogériatrique des activités de base chez une personne déprimée et chez une personne démente*. Mémoire de maîtrise [The Psychogeriatric Scale of Basic Activities of Daily Living designed for a depressed or a demented person]. Université McGill, Montréal.
- Lawton, M. P. (1981). Sensory deprivation and the effect of the environment in management of the patient with senile dementia. In N. E. Miller & G. D. Cohen (Eds.), *Clinical aspects of Alzheimer's disease and senile dementia* (pp. 227–249). New York: Raven.
- Lévesque, L., Roux, C., & Lauzon, S. (1990). *Alzheimer: Comprendre pour mieux aider* [Alzheimer's: Understanding in order to help better]. Montréal: Éditions du Renouveau Pédagogique.
- Loew, V. A., & Silverstone, B. M. (1971). A program of intensified stimulation and response facilitation for the senile aged. *Gerontologist, 11*, 341–347.
- Maddox, G. L. (1987). *The encyclopaedia of aging*. New York: Springer.
- Morrisson, D. F. (1976). *Multivariate statistical methods* (2nd ed.). New York: McGraw-Hill.
- Nemiroff, T., Rosenberg, G., & Radbill, R. (1977). Étude expérimentale de l'orientation des personnes âgées dans la réalité [An experimental study of reality orientation therapy for the elderly]. *Service Social, 2*, 640–655.
- Paire, J. A., & Karney, R. J. (1984). The effectiveness of sensory stimulation for geropsychiatric inpatients. *American Journal of Occupational Therapy, 38*, 505–509.
- Ross, M., & Burdick, D. (1981). *Sensory integration: A training manual for therapists and teachers for regressed, psychiatric and geriatric patient groups*. Thorofare, NJ: Slack.
- Schaffer, D. E., Berghorn, F. J., Holmes, D. S., & Quadagno, J. S. (1986). The effects of reminiscing on the perceived control and social relations of institutionalized elderly. In P.M. Foster (Ed.), *Therapeutic activities with the impaired elderly* (pp. 95–110). New York: Haworth.
- Storey, K., Bates, P., McGhee, N., & Dycus, S. (1984). Reducing the self-stimulatory behavior of a profoundly retarded female through sensory awareness training. *American Journal of Occupational Therapy, 38*, 510–516.
- Swearer, J. M., Drachman, S. A., O'Donnell, B. F., & Mitchell, A. L. (1988). Troublesome and disruptive behaviors in dementia: Relationship to diagnosis and disease severity. *American Journal of the Geriatric Society, 36*, 784–790.
- Teng, E. L., & Chui, H. C. (1987). The Modified Mini Mental State (3MS) Examination. *Journal of Clinical Psychiatry, 48*, 314–317.
- Teri, L., Truax, P., Logsdon, R., Uomoto, J., Zarit, S., & Vitaliano, P. P. (1992). Assessment of behavioral problems in dementia: The Revised Memory and Behavior Problems Checklist. *Psychology and Aging, 7*, 622–631.
- Zarit, J. M., & Zarit, S. H. (1982). *Measuring burden and support in families with Alzheimer's disease elders*. Paper presented at the 30th Annual Scientific Meeting of the Gerontological Society of America, Boston.
- Zarit, S. H., & Zarit, J. M. (1987). *The Memory and Behavior Problems Checklist and the Burden Interview: Technical document*. University Park, PA: Pennsylvania State University.
- Zepelin, H., Wolfe, C. J., & Kleinplatz, F. (1981). Evaluation of a year long reality orientation program. *Journal of Gerontology, 36*(1), 70–77.