

# Efficacy of Music Therapy in the Treatment of Behavioral and Psychiatric Symptoms of Dementia

Alfredo Raglio, MT,\*† Giuseppe Bellelli, MD,‡ Daniela Traficante, PsyD, PhD,§  
Marta Gianotti, MT,\* Maria Chiara Ubezio, MD,\* Daniele Villani, MD,\*  
and Marco Trabucchi, MD||¶

**Background:** Music therapy (MT) has been proposed as valid approach for behavioral and psychological symptoms (BPSD) of dementia. However, studies demonstrating the effectiveness of this approach are lacking.

**Objective:** To assess MT effectiveness in reducing BPSD in subjects with dementia.

**Method:** Fifty-nine persons with dementia were enrolled in this study. All of them underwent a multidimensional assessment including Mini Mental State Examination, Barthel Index and Neuropsychiatry Inventory at enrolment and after 8, 16, and 20 weeks. Subjects were randomly assigned to experimental (n = 30) or control (n = 29) group. The MT sessions were evaluated with standardized criteria. The experimental group received 30 MT sessions (16wk of treatment), whereas the control group received educational support or entertainment activities.

**Results:** NPI total score significantly decreased in the experimental group at 8th, 16th, and 20th weeks (interaction time × group:  $F_{3, 165} = 5.06$ ,  $P = 0.002$ ). Specific BPSD (ie, delusions, agitation, anxiety, apathy, irritability, aberrant motor activity, and night-time disturbances) significantly improved. The empathetic relationship and the patients' active participation in the MT approach, also improved in the experimental group.

**Conclusions:** The study shows that MT is effective to reduce BPSD in patients with moderate-severe dementia.

**Key Words:** dementia, behavioral disorders, music therapy

(*Alzheimer Dis Assoc Disord* 2008;22:158–162)

The occurrence of behavioral and psychological symptoms of dementia (BPSD) is one of the major problems of subjects with dementia in moderate to severe

phases.<sup>1</sup> BPSD are usually treated with a pharmacologic approach, including the use of neuroleptics, sedatives, and antidepressants.<sup>1</sup> However, pharmacologic approaches are not easy to manage and are often burdened by several side effects and complications.<sup>2,3</sup> In a recent study on 421 patients with Alzheimer disease, 24% of patients treated with olanzapine, 16% with quetiapine, and 18% with risperidone, discontinued their assigned treatment at 36 weeks due to intolerability.<sup>4</sup> A recent review by the Cochrane Database claims that the atypical antipsychotics, although useful in reducing BPSD, are associated with serious adverse cerebrovascular events and extrapyramidal symptoms.<sup>5</sup> Because of these difficulties, recent guidelines from national and international associations recommend that the pharmacologic approach should not be the first-line treatment.<sup>3,6</sup>

Nonpharmacologic approaches are longtime known to be useful in the treatment of BPSD. In a multicenter study on 55 patients with moderate to severe dementia,<sup>7</sup> it has been shown that agitation and irritability significantly decreased with environmental adaptations and individually designed care planning. In this study, BPSD decreased at 6 months without using neuroleptics and/or physical restraints.<sup>7</sup>

Music therapy (MT) is a promising nonpharmacologic approach for BPSD. It is based on the systematic use of musical instruments to improve communication between music therapist and patients. MT is now used with increasing frequency, especially for the treatment of some BPSD, namely agitation and aggressiveness.<sup>8–15</sup> Despite these premises, studies demonstrating MT effectiveness are few or have methodologic flaws,<sup>12</sup> and this significantly limits the generalizability of this approach. The aim of this controlled trial is to evaluate MT effectiveness in the treatment of BPSD among subjects with moderate to severe dementia.

## MATERIALS AND METHODS

### Sample Characteristics and Selection Criteria

The research project took place from January 2004 to August 2006. A preliminary screening of all nursing homes (NHs) in Northern Italy using the same MT approach (use of musical instruments to improve communication between music therapist and patients)

Received for publication May 7, 2007; accepted November 14, 2007.

From the \*Sospiro Foundation; †Alzheimer's Evaluation Unit, Ancelle della Carità Hospital, Cremona; ‡Interdem Group (Psycho-Social Interventions in Dementia); §Department of Psychology and Education Technologies Research Center, Catholic University, Milan; ||Tor Vergata University, Rome; and ¶Geriatric Research Group, Brescia, Italy.

Reprints: Alfredo Raglio, MT, Fondazione Sospiro, P.zza Libertà, 2 26048, Sospiro, Cremona, Italy (e-mail: raglio@tin.it; musicoterapia@fondazioneospiro.it).

Copyright © 2008 by Lippincott Williams & Wilkins

for BPSD management was provided. Among 5 initially identified NHs, 3 accepted to participate in this study (Sospiro Foundation, Cremona; Ulivi NH, Salò, Brescia; and Piccinelli Foundation, Bergamo, Italy). These NHs were skilled in the care of patients with BPSD; moreover, physicians working in these facilities were either geriatricians or psychiatrists. Music therapists had attended a 5-year training focusing on this approach and were familiar with the care of subjects with dementia.

Patients were selected among all residents in the 3 NHs. Eligibility criteria were:

- A diagnosis of dementia of the Alzheimer type or vascular dementia according to Diagnostic and Statistical Manual IV criteria.<sup>16</sup>
- A Mini Mental State Examination (MMSE)<sup>17</sup> score lower or equal to 22/30 and a Clinical Dementia Rating (CDR)<sup>18</sup> score higher or equal to 2/5.
- A NeuroPsychiatric Inventory (NPI)<sup>19</sup> total score higher or equal to 12/144, or equal to the maximum score in 1 of the 12 NPI subscales.
- NH admission lasting at least 6 months.

Exclusion criteria were:

- Previous MT treatment.
- Any new psychotropic medications (ie, neuroleptics and/or sedatives) or any psychotropic medications not taken at a stable dosage during the previous month.
- A current diagnosis of severe cardiovascular, pulmonary, or gastrointestinal disease.
- A current diagnosis of malignancy in the last year.

Patients were enrolled in this trial among all potentially eligible ( $n = 65$ ) after 2 sessions that specifically aimed at evaluating the patient's acceptance of the MT setting. Patients who showed negative acceptance (ie, they refused this approach in both sessions) were excluded from the study ( $n = 6$ ).

The patients were assigned to experimental or control group using nonstandardized randomization criteria. Fifty-nine patients were therefore enrolled and listed in alphabetical order. The patients corresponding to odd numbers ( $n = 30$ ) were assigned to the experimental, whereas the others ( $n = 29$ ) to the control group. In addition to the multidimensional assessment required to determine the eligibility criteria (ie, MMSE, CDR and NPI), subjects on admission were also evaluated with the Barthel Index<sup>20</sup> for the functional status. A multidimensional assessment (MMSE, Barthel Index, NPI) was repeated after 8 weeks (halfway through treatment), 16 weeks (end of treatment), and 20 weeks later. The MMSE, the Barthel Index and NPI scales were administered by a single physician, blind to the patients' membership in the control and experimental groups and unaware about the changes in cognitive, functional, and behavioral status that occurred during the survey.

Informed consent was obtained from proxies of all patients. The protocol was approved by the Ethics Committee of Gerontological Sciences of the Geriatric Research Group, Italy.

During the study, only 2 patients dropped out (1 patient refused to continue after the first MT session and another 1 was admitted to a local hospital because of the worsening of his clinical conditions).

## MT Approach and Evaluation

In the dementias (as in other diseases with an impairment of the communicative functions), a viable hypothesis is the possibility of reactivating and expanding the archaic expressive and relational nonverbal abilities that persist across the individual's life span as modes of interpersonal experience. The MT philosophy is mainly based on this hypothesis. In this study, a nonverbal MT approach was chosen, using both rhythmical and melodic instruments to promote the intersubjects communication.<sup>21</sup> Through nonverbal behavior and sound-music performances, the patient conveys his/her emotions and feelings, establishes an "affect attunement" with the music therapist and is stimulated to modify the global emotional and affective status.<sup>22,23</sup> MT aims to achieve a positive patient's adaptation to the social environment through the establishment of an harmonious inner condition. MT can promote the maintenance of the sense of identity in people with dementia and can stimulate the global cognitive functions.

The experimental group received 3 cycles of 10 MT sessions (30 min/session), whereas the control group underwent educational (ie, personal care, lunch, bath, cognitive stimulation, etc) and entertainment activities (ie, reading a newspaper, playing cards, occupational activities, etc) customized to the patients' preferences. Each MT session was videotaped with a fixed camcorder on a tripod in a corner of the room. This aimed to minimize possible interferences and inattention owing to the presence of a camera. At the end of each session, 2 observers, not directly involved in the study, assessed the behaviors of each patient by viewing the videotapes. The behaviors were categorized using some items of the MTCS (Music Therapy Coding Scheme) (Cohen  $k$  coefficient = 0.84;  $\alpha$  coefficient = 0.87).<sup>24</sup> The first part of the scheme assessed 2 possible behaviors:

- (1) Empathetic behavior (EB): the patients actively participate in MT sessions, establishing an empathetic relationship with the music therapist.
- (2) Nonempathetic behavior (n-EB): both patients and music therapist play musical instruments without establishing an empathetic relationship.

The second part of the scheme assessed the level of acceptance of the MT approach, measured by remarking the presence of:

- Smile: the patient laughs or smiles according to the context.
- Body movements: the patient moves the body synchronically with the music.
- Singing: the patient sings during MT session.

## Statistical Analysis

All analyses have been carried out using SPSS (*Statistical Package for Social Sciences*) 11.5 for

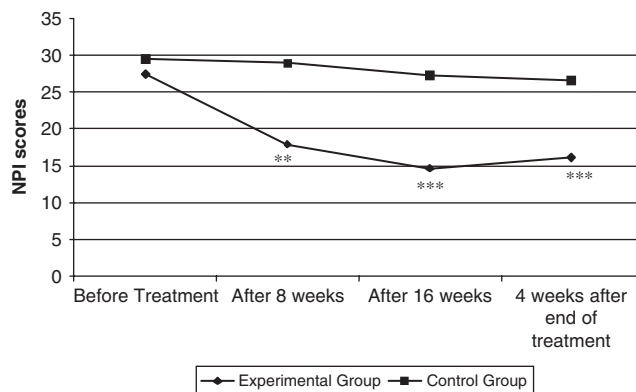
Windows. The cognitive, functional, and behavioral scores were submitted to a mixed analysis of variance, with 1 repeated (time: before, after 8 wk, after 16 wk and 4 wk after end of treatment) and 1 independent factor (group: experimental and control). Dementia severity was considered as covariate.

Each NPI item score was submitted to Friedmann’s analysis of variance for nonparametric data,<sup>25</sup> comparing the variations occurred in the 4 different surveys (before the treatment, 8 wk and 16 wk after beginning of treatment and also 4 wk after end of treatment) between experimental group and control group. The agreement between 2 independent observers of MT sessions was evaluated by Cohen *k* (*k* = 0.67). The effect size (Cohen *d*) was used to show the significance in the changes of NPI global scores and MT evaluation (EB, n-EB, smiles, synchronic body movements and singing).

### RESULTS

Table 1 shows that patients in the 2 groups did not differ with regard to baseline demographic and clinical characteristics. Patients were significantly impaired in cognitive and moderately in functional status and had moderate behavior disturbances. Figure 1 shows the changes in NPI scores during the survey. There was a significant decrease in global NPI score in the experimental group but not in the control group (interaction time × group:  $F_{3,165} = 5.06, P = 0.002$ ). Differences between the 2 groups were significant after 8 ( $F_{1,57} = 9.85; P = 0.003$ ) and 16 weeks ( $F_{1,57} = 21.21; P < 0.0001$ ; Cohen *d* after 16 wk-before treatment = -1.04). This effect persisted 4 weeks after end of treatment ( $F_{1,57} = 12.65; P = 0.0007$ ), suggesting that subjects allocated to MT maintained their improvement over time. The most relevant improvements in NPI score were for delusions, agitation, anxiety, apathy, irritability, aberrant motor activity, and nighttime behavior disturbances (Table 2).

As expected, MMSE did not vary significantly during the study, both in the experimental (MMSE score = 11/30 at baseline vs. 11/30 at the end of the treatment) and in the control group (MMSE score = 10/30



**FIGURE 1.** Average NPI global scores in the experimental and control groups \*\* $P < 0.01$ ; \*\*\* $P < 0.001$  at *t* test comparison between groups.

at baseline vs. 9/30 at the end of the treatment). On the contrary, the Barthel Index scores significantly decreased over time both in the experimental group (Barthel Index score = 59/100 at baseline vs. 52/100 at the end of the treatment) and in the control group (Barthel Index score = 51/100 at baseline vs. 46/100 at the end of the treatment) ( $F_{3,165} = 8.91, P < 0.0001$ ) (Fig. 2).

With regard to the MT evaluation, we observed an average EB improvement ( $F_{3,87} = 10.37; P < 0.0001$ ; Cohen *d* = 0.61) and a reduction in the n-EB pattern ( $F_{3,87} = 5.55; P = 0.0015$ ; Cohen *d* = 1.8) in the experimental group. Also smiles ( $F_{3,87} = 8.14; P < 0.0001$ ), body movements ( $F_{3,87} = 12.41; P < 0.0001$ ), and singing behaviors increased in the experimental group ( $F_{3,87} = 6.98; P = 0.0003$ ) (Table 3).

### DISCUSSION

This study shows that MT may be effective in reducing BPSD in severely demented subjects and may also enhance the communicative relationship between patients and music therapist.

Various studies compared MT with other approaches to evaluate its efficacy on BPSD.<sup>12</sup> Clark et al<sup>26</sup> investigated MT effect on aggressive behaviors in

**TABLE 1.** Baseline Clinical Characteristics of 59 Demented Patients Stratified in 2 Groups (Experimental and Control)

	Experimental Group (n = 30)		Control Group (n = 29)	
	Mean ± SD or N (%)	Range	Mean ± SD or N (%)	Range
Age (y)	84.4 ± 5.5	73-95	85.8 ± 5.4	74-94
Sex (male)	5 (16.6%)		4 (13.8%)	
Education (y)	5.9 ± 3.1	3-17	5.7 ± 1.9	3-10
Alzheimer’s disease	25 (83.4%)		23 (79.3%)	
Vascular dementia	1 (3.3%)		1 (3.4%)	
Mixed dementia	4 (13.3%)		5 (17.3%)	
Duration of disease (y)	4.7 ± 2.4	0.5-10	4.5 ± 2	1-8.6
MMSE (0-30)	11.1 ± 5.5	0-22	10.7 ± 5.7	0-22
CDR (1-5)	2.7 ± 0.4	2-3	2.7 ± 0.4	2-3
Barthel Index Score (0-100)	59.1 ± 18.9	18-94	51.7 ± 25.8	2-96
NPI (global score, 0-144)	27 ± 15	12-60	29.5 ± 15.1	12-57

**TABLE 2.** Changes in NPI Items Score

NPI Test	Before Treatment	After 8 wk	After 16 wk	4 wk After End of Trial	Test di Friedmann ( $\chi^2$ )
<b>Experimental group</b>					
Hallucinations	0.28	0.21	0.18	0.07	2.08
Delusions	3.48	2.62	2.93	2.68	9.70*
Depression	2.07	1.07	1.21	1.57	6.48
Agitation	2.90	2.38	1.25	1.39	17.03***
Euphoria	0.24	0.10	0.04	0.00	5.67
Anxiety	3.00	1.28	1.21	1.50	20.69***
Apathy	1.97	1.21	0.61	1.75	8.10*
Disinhibition	0.38	0.38	0.18	0.46	0.83
Irritability	3.66	2.79	2.18	1.61	10.88**
Aberrant motor activity	5.59	4.17	3.71	3.86	19.60***
Appetite and eating	0.66	0.66	0.07	0.57	2.54
Nighttime behavior disturbances	3.21	1.14	1.07	0.64	16.59***
<b>Control group</b>					
Hallucinations	0.10	0.34	0.14	0.14	1.00
Delusions	3.72	3.69	3.72	3.31	2.94
Depression	2.69	2.93	2.34	2.28	2.72
Agitation	4.93	4.34	3.90	3.48	14.56**
Euphoria	0.31	0.24	0.24	0.31	1.70
Anxiety	3.34	2.93	2.93	3.10	0.86
Apathy	2.03	2.69	1.90	2.28	4.05
Disinhibition	0.59	0.66	0.62	0.48	0.84
Irritability	4.24	4.55	4.24	4.55	1.29
Aberrant motor activity	4.93	5.14	5.00	5.07	1.44
Appetite and eating	0.76	0.48	0.79	0.69	0.69
Nighttime behavior disturbances	1.72	1.10	1.38	1.10	12.88*

Friedmann test average and score (statistical significance: \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ ).

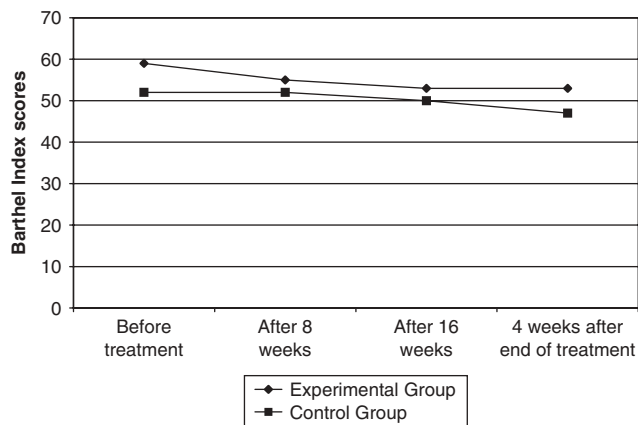
18 subjects with Alzheimer disease, comparing listening to preferred music with no music during 10 bathing sessions. This study found out that subjects in the intervention group decreased aggressive behavior, but the results were devoid of statistical significance. Gerdner<sup>27</sup> found that listening to preferred music on 39 subjects with dementia had more efficacy in reducing agitation than classic music did. The whole treatment lasted 6 weeks and the data collected were not significant. A study by Groene<sup>28</sup> investigated the effect of MT on wandering: 30 subjects with dementia received a 7-day treatment: some did MT activities (sound-music improvisation, listening, singing, and dance) and other did

reading activities. Patients were evaluated with MMSE, which was not different between the 2 groups at the end of the study.

The strength of our study includes the number of patients enrolled, the duration of the treatment, the type of MT approach,<sup>21–23</sup> and the use of standardized criteria to assess patient’s behaviors during MT sessions (ie, fixed camcorder, blinded raters, and MTCS scheme). Furthermore, we used a well-known tool (NPI) to assess the changes in BPSD during the survey.

It is of interest that the BPSD reduction occurred in the experimental group and persisted after 1 month. In particular, the effect of the interaction time  $\times$  group suggests that the result of MT treatment increases over time for subjects allocated to the experimental group, but not for controls. A key point in the results of our study is that improvement in NPI scores did not involve all symptoms, but was more specific for delusions, agitation, anxiety, apathy, irritability, aberrant motor activity, and nighttime behavior disturbances. This is consistent with the comprehensive model of psychiatric symptoms recently theorized by Volicer and Hurley,<sup>29</sup> and suggests that MT might contribute to raise the patients’ threshold in tolerating environmental stimuli that usually trigger disruptive behaviors. MT might be perceived by patients with dementia as a meaningful activity, thus reducing anxiety and aberrant motor behaviors and may enhance the patient’s participation in diurnal activities, thus reducing apathy.

A limit of the study is that the criteria for randomization were not standardized. Another limit is



**FIGURE 2.** Average Barthel Index scores in the experimental and control groups.

**TABLE 3.** Changes in Patient's Behaviors During the 3 Cycles of MT Treatment

Observed Behavior	First Cycle of MT Sessions†		Second Cycle of MT Sessions‡		Third Cycle of MT Sessions§		F	Cohen d
	Mean	SD	Mean	SD	Mean	SD		
EB	0.30	0.29	0.33	0.27	0.49	0.33	10.37***	0.61
n-EB	0.72	0.31	0.70	0.32	0.59	0.28	5.55**	1.8
Smiles	0.15	0.13	0.15	0.12	0.25	0.23	8.14***	0.53
Synchronic body movement	0.11	0.18	0.13	0.17	0.29	0.37	12.41***	0.62
Singing	0.02	0.04	0.04	0.08	0.07	0.10	6.98***	0.62

Mean and ratings of the F test (\*\*P < 0.01; \*\*\*P < 0.001) on repeated measures (effect inside the subjects) and effect size (Cohen d).

†The first 10 MT sessions.

‡11th–20th MT sessions.

§21st–30th MT sessions.

that the assessment for increased communication was done only for the experimental and not for the control group.

Notwithstanding these limitations, this study supports the assertion that MT is an effective treatment for BPSD in demented patients. MT is a low cost approach that NH staff can introduce in their everyday activities with the aim to reduce agitated behaviors, alleviate caregivers' stress and burden of care and to lead to a global improvement in quality of life among patients and relatives. Future studies are needed to definitely confirm our conclusions.

#### ACKNOWLEDGMENTS

The Authors thank Dr Angelo Gasparotti, Dr Giancarlo Raggi (Ulivi NH, Salò, Brescia), Dr Gianpiero Covelli, Dr Gianluigi Viganò (Piccinelli Foundation of Scanzorosciate, Bergamo) for their clinical contribution. They also thank the music therapists Paola Bonomini (Ulivi NH, Salò, Brescia), Simonetta Nava, Mariassunta Torchitti (Piccinelli Foundation of Scanzorosciate, Bergamo).

#### REFERENCES

- Bianchetti A, Ranieri P, Margiotta A, et al. Pharmacological treatment of Alzheimer's disease. *Aging Clin Exp Res*. 2006;18:158–162.
- Schneider LS, Dagerman K, Insel PS. Efficacy and adverse effects of atypical antipsychotic for dementia: meta-analysis of randomized, placebo-controlled trials. *Am J Geriatr Psychiatry*. 2006;14:191–210.
- Sink KM, Holden KF, Yaffe K. Pharmacological treatment of neuropsychiatric symptoms of dementia: a review of the evidence. *JAMA*. 2005;293:596–608.
- Schneider LS, Tariot PN, Dagerman KS, et al. Effectiveness of atypical antipsychotic drugs in patients with Alzheimer's disease. *N Engl J Med*. 2006;355:1525–1538.
- Ballard C, Waite J. The effectiveness of atypical antipsychotics for the treatment of aggression and psychosis in Alzheimer's disease. *Cochrane Database Syst Rev* [database online]. 2006;25:CD003476.
- Caltagirone C, Bianchetti A, Di Luca M, et al. Guidelines for the treatment of Alzheimer's Disease from the Italian Association of Psychogeriatrics. *Drugs Aging*. 2005;22(suppl 1):1–26.
- Bellelli G, Frisoni GB, Bianchetti A, et al. Special care units for demented patients: a multicenter study. *Gerontologist*. 1998;38:456–462.
- Aldridge D. Alzheimer's Disease: rhythm, timing and music as therapy. *Biomed Pharmacother*. 1994;48:275–281.
- Koger SM, Chapin K, Brotons M. Is music therapy an effective intervention for dementia? A meta-analytic review of literature. *J Music Ther*. 1999;36:2–15.
- Koger SM, Brotons M. Music therapy for dementia symptoms. *Cochrane Database Syst Rev* [database online]. 2000;CD001121.
- Sherratt K, Thornton A, Hatton C. Music interventions for people with dementia: a review of the literature. *Aging Ment Health*. 2004;8:3–12.
- Vink AC, Birks JS, Bruinsma MS, et al. Music therapy for people with dementia. *Cochrane Database Syst Rev* [database online]. 2004;CD003477.
- Goodall D, Eters L. The therapeutic use of music on agitated behavior in those with dementia. *Holist Nurs Pract*. 2005;19:258–262.
- Svansdottir HB, Snaedal J. Music therapy in moderate and severe dementia of Alzheimer's type: a case-control study. *Int Psychogeriatr*. 2006;18:613–621.
- Raglio A, Ubezio MC, Puerari F, et al. The effectiveness of the music therapy treatment for patients with moderate-severe dementia. *G Gerontol*. 2006;54:164–169.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders-IV ed*. Washington, DC: American Psychiatric Association; 1994.
- Folstein MF, Folstein SE, McHugh PR. Mini-mental state. A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*. 1975;12:189–198.
- Morris JC. The clinical dementia rating (CDR): current version and scoring rules. *Neurology*. 1993;43:2412–2414.
- Cummings JL, Mega M, Gray K, et al. The Neuropsychiatric Inventory: comprehensive assessment of psychopathology in dementia. *Neurology*. 1994;44:2308–2314.
- Mahoney FI, Barthel D. Functional evaluation: the Barthel Index. *MD State Med J*. 1965;14:61–65.
- Benenzon RO. *Manual de Musicoterapia*. Barcelona: Editorial Paidós Iberica; 1981.
- Stern D. *The Interpersonal World of the Infant*. New York: Basic Book; 1985.
- Stern D. *The Present Moment in Psychotherapy and Everyday Life*. London: Norton & Company Ltd; 2004.
- Raglio A, Traficante D, Oasi O. A coding scheme for the evaluation of the relationship in music therapy sessions. *Psychol Rep*. 2006;99:85–90.
- Friedman M. The use of ranks to avoid the assumption of normality implicit in the analysis of variance. *J Am Stat Assoc*. 1937;32:675–701.
- Clark ME, Lipe AW, Bilbrey M. Use of music decrease aggressive behavior in people with Dementia. *J Gerontol Nurs*. 1998;24:10–17.
- Gerdner LA. Effects of individualized versus classical "relaxation" music on the frequency of agitation in elderly persons with Alzheimer's disease and related disorders. *Int Psychogeriatr*. 2000;12:49–65.
- Groene RW. Effectiveness of music therapy 1:1 intervention with individuals having senile dementia of the Alzheimer's type. *J Music Ther*. 1993;30:138–157.
- Volicer L, Hurley AC. Management of behavioral symptoms in progressive degenerative dementias. *J Gerontol A Biol Sci Med Sci*. 2003;58:837–845.