The Effect of Music on Repetitive Disruptive Vocalizations of Persons With Dementia

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Key Words: outcome and process assessment (health care)

Objective. This study examined the effect of classical music and favorite music on the repetitive disruptive vocalizations of long-term-care facility (LTCF) residents with dementia of the Alzheimer’s type (DAT).

Method. Three subjects diagnosed with DAT who had a history of repetitive disruptive vocalizations were selected for the study. Three single-subject withdrawal designs (ABA, ACA, and ABCA) were used to assess subjects’ repetitive disruptive vocalizations during each phase: no intervention (A); relaxing classical music (B); and favorite music (C).

Results. Classical music and favorite music significantly decreased the number of vocalizations in two of the three subjects (p < .05).

Conclusion. These findings support a method that was effective in decreasing the disruptive vocalization pattern common in those with DAT in the least restrictive manner, as mandated by the Omnibus Budget Reconciliation Act of 1987.

The therapeutic use of music has been documented from the sixth century BC (Radhakrishnan, 1991); however, only recently has music been examined seriously as a potential intervention by occupational therapists working in the clinical setting. One reason for this newfound interest is the Omnibus Budget Reconciliation Act of 1987 (OBRA 1987) (Public Law 100–202), which requires that long-term-care facilities (LTCFs) provide and maintain the highest meaningful and practical level of physical, mental, and psychosocial well-being for their residents. To fulfill this OBRA requirement, occupational therapists, as well as other health care professionals employed in LTCFs, are being challenged to find the least restrictive manner in which to treat the repetitive disruptive vocalizations common in those diagnosed with dementia of the Alzheimer’s type (DAT). Therefore, it is important to ascertain viable interventions to decrease undesirable verbal behaviors.

Literature Review

Dementia has become a leading health concern in the United States as the overall population continues to increase in age. It is estimated that approximately 10% of persons older than 65 years, 19% of those older than 75 years, and 47% of those older than 85 years could be diagnosed with dementia (Evans et al., 1989). LTCFs are becoming increasingly responsible for the housing and treatment of these persons; approximately 58% of their residents have dementia. Half of those persons older than 65 years who are in psychiatric hospitals have dementia (Binder, 1992).

Alzheimer’s disease, a subcategory of dementia, is estimated to occur in 50% to 70% of all persons with dementia (Matteson, 1984; Smith, 1990). The progression of this disease and its accompanying behaviors have been described by Matteson (1984) as occurring in three stages. The first 2 to 4 years are characterized by memory loss, disorientation to time, and lack of spontaneity. The following 5 to 10 years are marked by the symptoms of aphasia, wandering, repetitive movements, agitation, confusion, and changes in appetite. The final stage of DAT often lasts only 1 to 2 years and ends in death. During this time, the person may become emaciated, incontinent, and unable to communicate, and may have grand mal seizures.

Repetitive movements, which often present during the second stage of DAT, may manifest themselves as a repetitive verbal behavior pattern (Matteson, 1984). This verbal behavior could be thought of as a stereotypic behavior (STB), that is, “a disturbance of motility characterized by purposeless yet repetitive movement patterns that occur with high frequency” (Iwasaki & Holm, 1989, p. 171). The STB is thought either to enable the person to withdraw from aversive stimuli or to provide the means for additional sensory input (Norberg, Melin, & Asplund, 1989).
Two treatment approaches exist for repetitive disruptive vocalizations (RDV) exhibited by persons with DAT: provide medication or modify the environment. In the past, medicating patients in LTCFs who demonstrated undesirable verbal behaviors was the primary intervention. Psychotropic medications such as haloperidol and thioridazine have shown the most success in controlling disruptive behaviors (Knopman & Sawyer-DeMaris, 1990; Matteson, 1984; Nicholi, 1988). Unfortunately, use of these drugs has been associated with disabling side effects including rigidity, gait impairment, dysphagia, and decreased dexterity (Knopman & Sawyer-DeMaris, 1990). These side effects may have prompted a reevaluation of the use of psychotropic drugs for behavior control. OBRA 1987 thus required the medical staff members of LTCFs participating in either Medicare or Medicaid programs to reevaluate their methods of behavior control. In effect, OBRA 1987 stipulated that “each resident’s drug regime must be free from unnecessary drugs” (Smith, 1990, p. 44), and specific medications and dosages were outlined as appropriate or inappropriate.

Because of the provisions set forth in OBRA 1987, the second avenue of treatment, environmental modification, has begun to receive consideration. It has been proposed that the environment provides sensory input to persons that either understimulates or overloads the nervous system, resulting in behavioral abnormalities (Iwasaki & Holm, 1989). Burgio and Burgio (1990) noted that “the loss of adaptive functioning in many institutionalized, elderly individuals is not solely a result of biological decline, but to a large extent, the result of an environment that predisposes them toward and reinforces ineffective and dependent behavior” (p. 288). Altering the environment with the needs of the patient with dementia in mind is therefore a possible method for the treatment of RDV that can minimize the need for medication (Knopman & Sawyer-DeMaris, 1990).

The use of music to alter the environment of LTCFs has gained attention primarily because of its demonstrated physical and psychological effects. In particular, increases and decreases in heart rate, changes in the frequency and depth of respiration, and constriction and dilation of blood vessels have been noted in persons listening to music (Fried, 1990). Knopman and Sawyer-DeMaris (1990) found that “music is usually appreciated and enjoyed by dementia patients, particularly if it is relaxing, soothing classical, traditional, or religious music” (p. 30).

One study (Norberg et al., 1986) monitored the behaviors of two subjects in the final stage of DAT when exposed to familiar music that the subjects, according to relatives, had listened in the past. One subject demonstrated behaviors that were interpreted as orienting to the music (opening her eyes, raising her head, and moving her mouth), and the other subject decreased the number of finger-to-mouth self-stimulation behaviors while the music was played, which the authors interpreted as a relaxation response. The importance of considering individual preferences when selecting music as a form of treatment was emphasized by Cook (1981), who noted that many persons respond differently to the same music and that one person will respond differently to many pieces of music.

Music appears to alter the abnormal or disruptive behaviors of persons with DAT residing in LTCFs (Burgio, Scilley, Davis, & Cadman, 1993). Therefore, music may provide occupational therapists with a means to decrease the incidence of RDV. Theoretically, this intervention would allow therapists and nursing home staff members to focus their time and attention on functional activities rather than on behavior modification. In addition, it would improve the environment of LTCFs by diminishing irritating noise. The purpose of this study was to determine the effect of the presence and absence of music on the frequency of repetitive disruptive vocalizations in three LTCF residents with DAT.

Method

Three single-subject withdrawal designs were used to assess subjects’ RDV during three phases: (A) no intervention; (B) relaxing, classical music; and (C) favorite music. Subjects were randomly assigned to one of the three designs: ABCA (Subject 1), ACA (Subject 2), and ABA (Subject 3).

Subjects

The population for this study was LTCF residents with DAT who also exhibited RDV. For inclusion in the study, a physician’s diagnosis was required to establish DAT. In addition, subjects were required to have a history of disruptive vocalizations severe enough to interfere with their functional abilities and the functioning of the facility, according to nursing personnel. Residents were excluded from consideration if they had a history of disrobing or physical aggression, had a known hearing impairment, or wore a hearing aid that would interfere with the headset, or if nursing personnel judged that they might become agitated upon donning a headset. From a pool of five residents who met the inclusion and exclusion criteria, three residents of a single facility in Washington state were chosen by nursing personnel because they were deemed the most disruptive. After these potential subjects were selected, their relatives or legal guardians were contacted by the facility, and for those persons who were interested, a meeting was arranged to describe the study. Consent was obtained, as well as information regarding the subjects’ favorite relaxing music in the past.
Subject 1 was an 87-year-old white woman whose disruptive vocalization consisted of screaming. She was confined to her bed or a modified recliner chair situated by the door to her room during all observations. Subject 1 received classical music during the first 4 days of intervention, followed by 4 days of her favorite music, before the interventions were withdrawn. Relatives identified gospel music as being meaningful in the past to Subject 1.

Subject 2 was a 77-year-old Hispanic woman whose disruptive vocalization consisted of screaming alternated with sing-song words in garbled Spanish. She was able to ambulate but remained in an easy chair in her room during all observations. Relatives identified Spanish music as being meaningful in the past to Subject 2.

Subject 3 was a 69-year-old white man whose disruptive vocalization consisted of unintelligible words and screams. He was confined to bed except for meals, and all observations took place in his room. Subject 3 received only classical music as the intervention.

Apparatus

For Subjects 1 and 3, the music for the intervention phases was provided through a personal cassette player with headphones. For Subject 2, the use of a headset was not a viable method for transmission because she exhibited paranoia; therefore, the music was provided through a standard cassette player. The volume indicators on the personal and standard cassette players were set at a level found to be suitable to the subject. Apparatus for each phase of the study included the following:

- Phase A (baseline): No music, no headsets
- Phase B (intervention, relaxing classical music (Fried, 1990]): Pachelbel's *Canon in D*
- Phase C (intervention, favorite music): Subject 1: *The Old Rugged Cross*; Subject 2: *Los Gitanos Canasteros*

Procedures

Data were collected on each subject individually during the times of day that the incidence of disruptive vocalizations was the greatest, according to nursing personnel. A modified event recording method of data collection was employed, using 10-sec intervals for a total of 10 min for each of the three phases. Thus, a tally mark was recorded for each verbal outburst that occurred during each 10-sec period. Recording began after the researcher stood quietly in a subject's room for an accommodation period of 2 min, and continued for 10 min. For each phase (i.e., A, B, C), data were collected during two 10-min sessions each day over 4 days, for a total of 12 observation days for Subjects 2 and 3 and 16 observation days for Subject 1.

Data Analysis

The mean and the standard deviation in the number of verbal behaviors were calculated for each subject during each of the three phases. The possibility of serial dependency between data points for each subject was determined by computing the degree of autocorrelation in each phase. Bartlett's test was used to determine whether the autocorrelation coefficient was statistically significant. If the autocorrelation coefficient was greater than 2/√n, where n is the number of observations in each phase, the autocorrelation coefficient was considered to be significant (Ottenbacher, 1986). Graphic analyses of the data were provided to illustrate changes in mean level and variability in each phase. In addition, the celeration line approach was used to determine the trend in the data. Bloom's probability table was used to determine whether the change in the proportion of data points below the celeration line was statistically significant (Ottenbacher, 1986).

Results

The Bartlett test revealed no significant degree of autocorrelation between data points in any phase across subjects (see Table 1). Therefore, the data were not considered to be serially dependent.

Figures 1 and 2 illustrate the results of the intervention on the dependent variable for each subject. For each subject, there was a change in the mean level of RDV across phases (see Figure 1). A change in the mean level across phases refers to a modification in the average rate of response (Ottenbacher, 1986). For all subjects, there was an average decrease in the mean level of verbal behaviors during each of the intervention phases as compared to the mean level during the first baseline phase. This information suggests that the presence of music did affect the frequency of RDV. During the return-to-baseline phase, however, there was no increase in the mean level of verbal behaviors, as one might have expected.

*Variability* refers to the amount of fluctuation of

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Mean and Standard Deviation Computed for Repetitive Disruptive Vocalizations Presented in Each Phase</th>
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<tbody>
<tr>
<td>Subject</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>SD</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
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<tr>
<td>SD</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>43</td>
</tr>
<tr>
<td>SD</td>
<td>48</td>
</tr>
</tbody>
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Note: Value of X represents no data for this particular phase for the subject.
Figure 1. Mean level of repetitive disruptive vocalizations across phases.
Figure 2. Celeration line calculated in baseline phase and extended into intervention phases.
data points in a series. Excessive variability, especially in
the baseline phase, indicates that the data are unstable
and may limit the validity of conclusions about the
changes in mean level (Ottenbacher, 1986). Although a
stable pattern of behavior was not established in the
baseline phase, there was a decrease in the amount of variabil-
ity across the intervention phases for all but one subject.
This decrease suggests that the presence of music may
have affected the variability in the verbal behaviors in at
least two of the subjects.

For Subjects 2 and 3, there was an accelerating trend
in the baseline phase, indicating a general pattern of an
increasing number of verbal behaviors over 4 days (see
Figure 2). For Subject 2, all data points during the inter­
vention phase were below the celeration line. According
to the Bloom probability table, this indicated a significant
treatment effect ($p < .05$). The presence of the subject's
favorite music did decrease the number of RDV. For
Subject 3, all but one data point in the intervention phase fell
below the celeration line; therefore, this pattern was not
significant ($p > .05$).

For Subject 1, there was a slight decelerating trend in
the baseline phase, indicating a pattern of a small de­
crease in the number of verbal behaviors over 4 days.
During both intervention phases, the data points were
below the celeration line. According to the Bloom probabili­
ty table, this indicated a significant treatment effect
($p < .05$). Both the relaxing, classical music and the sub­
ject's favorite music decreased the number of RDV.

Discussion
The results of this study indicated that the presence of
music did significantly decrease the number of RDV in
two subjects diagnosed with DAT. In particular, both clas­
sical music and favorite music decreased the frequency of
RDV. This finding is consistent with those of Norberg
and colleagues (1986) who reported a decrease in repetitive
finger-to-mouth self-stimulatory behaviors when patients
listened to music. In addition, it could be postulated that
the decrease in the frequency of RDV was due to the
subjects' appreciation and enjoyment of the music as

The lack of significant decrease in the number of
RDV in Subject 3, who was exposed only to classical mu­
sic, might indicate that this music was not particularly
relaxing to this subject. As Cook (1981) pointed out, it is
important to select music that coincides with the pa­
tient's preferences if one expects treatment to be effec­
tive. In addition, this was the only subject who had a
medication regime that included antianxiety medication
prescribed to decrease RDV.

A possible explanation for the lack of increase in RDV
in the return-to-baseline phase, specifically for Subjects 1and 3, is the status of their medication regime. Subject 1
was administered a pain relief medication the day before
return-to-baseline data were collected. This medication
was continued for the duration of the study. Similarly, the
dosage of an antianxiety medication for Subject 3 was
doubled the first day that return-to-baseline data were
collected. This dosage remained constant throughout
data collection.

As is the case with all single-subject designs, the
degree of generalizability to a larger population is limited.
In addition, it may not be appropriate to generalize about
the effectiveness of music beyond the population of per­
ssons with DAT. Future research would benefit from inves­
tigations that include a larger sample or different diag­
noses. In addition, choosing subjects who are not on
medication may allow more substantial inferences about
the music's effect. Furthermore, the method of music
provision should be investigated in more detail to deter­
mine whether headphones alone, headphones with mu­
ic, and music in the room yield comparable results.

In this study, the effect of the music was only investi­
gated as it related to one variable, RDV. To assess all
possible benefits that music may provide, future research
should evaluate other behaviors that may be positively
influenced by music. One such area of investigation may
be to measure persons' physiological responses to music,
such as blood pressure and heart rate changes, as Fried
(1990) reported. Future research should then broaden
the realm of investigation and ask whether the decrease
in RDV and other physiological responses ultimately in­
crease a patient's ability to function.

Conclusion
This study was conducted in response to the question
posed in the American Journal of Occupational Ther­
apy, "Should Music be Used Therapeutically in Occupa­
tional Therapy?" (MacRae, 1992). In essence, few studies
have been conducted to document the effects of music on
patients' behaviors; however, music continues to be used
as an adjunct to treatment in occupational therapy, as
well as in other health care professions. This study sup­
ports the theory that altering the environment through
music can be a viable method for decreasing repetitive
disruptive vocalizations of LTCF residents diagnosed with
DAT. As such, the results of this study indicate a realistic
method for complying with the provisions set forth in
OBRA 1987 that LTCFs provide and maintain the highest
meaningful and practical level of physical, mental, and
psychosocial well-being for their residents.

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References


Omnibus Budget Reconciliation Act of 1987 (Public Law 100-203), § 101.


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