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A Comparison of the Effectiveness of Differing Types and Difficulty of Music Activities in Programming for Older Adults with Alzheimer's Disease and Related Disorders

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Abstract

The purpose of this study was to compare the effectiveness of three different types of music activities (movement, rhythm, and singing) presented at two levels of difficulty (high demand and low demand) for persons at three stages of cognitive functioning (high, medium, and low) as a result of Alzheimer's disease and related disorders (ADRD). Trained observers, using a time sampling tool, documented the quality of participation of 51 persons with ADRD during 12 weeks of music therapy group sessions in 5 different treatment settings. Quality of participation was documented using the following five categories: high response, low response, passive Involvement, passive disruption, and active disruption. Participants at all three stages of cognitive functioning showed a significantly greater amount of high response during movement activities than during singing activities. A significantly greater amount of passivity occurred during singing activities than during movement activities. Participants were more purposefully involved in rhythm and singing activities when those activities were presented at lower levels of demand. Disruptive behaviors occurred less than 10% of the time but were more frequently observed among those persons in the group with the most cognitive dysfunction.

Alzheimer's disease and related disorders (ADRD) affect millions of Americans and their loved ones. It occurs in 10% of the population over age 65, and 47% of the population over age 85. It has been estimated that 12 to 14 million cases of this disease will occur by the

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year 2040 unless a cure or preventive approach is found (Alzheimer's Disease and Related Disorders Association, 1990). At least half of all nursing home residents in the United States have some degree of dementia, with the prevalence of dementia rising dramatically with age (National Center for Health Statistics, 1989).

At present, there is no cure for ADRD. Individuals with ADRD inevitably decline in mental and social functioning and consequently are able to participate in fewer and fewer purposeful activities as the diseases or disorders progress. Furthermore, agitation and severe behavior problems occur frequently in more advanced stages (Teri, Larson, & Reifler, 1988), quite possibly to a greater extent when individuals with ADRD are challenged by tasks or environmental factors beyond their present coping abilities (Hall & Buckwalter, 1987).

One theoretical description of the interplay between cognitive decline and environmental stresses is called the Progressively Lowered Stress Threshold (PLST) model (Hall & Buckwalter, 1987). As cognitive and social skills decline over the course of ADRD, the individual's "stress threshold" deteriorates. Factors that can contribute to stress include fatigue, change in environment or routine, internal or external demands to function beyond their ability, competing stimuli, or physical stresses such as illness or medication side effects. According to Hall and Buckwalter (p. 402), "maximum functional levels can be achieved by supporting losses in a prosthetic manner," rather than by challenging persons with ADRD to regain lost function.

The support of losses in a prosthetic manner is consistent with the person-environment fit approach to health care provision (Roberts & Algase, 1988; Wolanin & Phillips, 1981). With this model, the caregiver designs environmental interventions that are therapeutic, focusing on restitution, compensation, and accommodation of impaired functions and dysfunctional behaviors. Accommodation includes the reduction of demands on the resources of the person with dementia and the selection of routines and activities that are within the cognitive, social, and physical abilities of the individual. As decline progresses, caregivers need to provide further accommodations so that the environmental demands fit the reduced functional skills of the individual. This may help prevent anxiety, stress reactions, or excess disability (Hall & Buckwalter, 1987). In the later stages of decline, when verbal skills and memory deteriorate considerably, it becomes increasingly challenging to identify activities that are suitable.

One type of activity that often has been recommended for persons with ADRD is music therapy (Bright, 1988; Dietsche & Pollmann, 1982; Shively & Henkin, 1986). Through informal observation, caregivers have noted that some persons with ADRD, who can no longer communicate verbally, may still be able to sing or hum along to favorite songs (Dietsche & Pollmann, 1982). Other people have noted a reduction in agitated behavior or wandering in response to some types of music (Shively & Henkin, 1986).

An overly general recommendation of "music" for all persons with ADRD, however, is questionable in light of the PLST model. First of all, the progressive nature of ADRD means that coping skills of individuals in early stages of the illness are considerably greater than those of persons in later stages of decline. In particular, verbal skills and cognitive abilities

associated with memory and decision making tend to decline earlier in the course of the disease than do motor skills. Second, music activities encompass many different types of involvement, some considerably more challenging than others. Because verbal and cognitive skills decline at an earlier stage of the disease than do motor skills, we might anticipate that some types of musical activity (for example, singing) are inherently more demanding than are other forms of activity (for example, gross motor movement) at more advanced stages of the disease. Furthermore, within a category of musical activity, there exists a continuum of task demand. For example, participation in a singing activity can be as challenging as singing an operatic aria in a foreign language, or as simple as listening quietly while others sing.

In short, a generic recommendation of music for persons with ADRD fails to consider the continuum of cognitive functioning across the course of disease as well as the widely divergent forms of music activity, some which may be far too challenging and subsequently frustrating for persons in more advanced stages of ADRD. Music activity, as an environmental demand, should “fit” the abilities of the individuals in order to promote optimal participation and to reduce the possibility of increased agitation or disruptive behavior

Are there particular types of music activities that are more or less appropriate for persons in specific stages of ADRD? To date, a modest number of empirical studies have examined the extent to which persons with ADRD are able to participate purposefully in specific types of music activities. A study by Millard and Smitli (1989) focused on one type of musical activity, singing. In this study, persons in middle stages of ADRD ($N = 10$) attended singing activities and discussion groups. The researchers compared social, physical, and vocal/verbal response to these two types of activities and found that participants were significantly more vocal/verbal during singing as compared with discussion activity.

Another study involving persons in more severe stages of decline, however, points to the limitations of singing activities over the course of the illness. Glair and Bernstein (1990a, 1990b) compared the participation in instrumental rhythm activities and singing (measured in duration of involvement) of a small number of persons in stages 5 and 6 of ADRD. Participants maintained involvement for longer periods of time during instrumental playing (especially when the drum provided some vibrotactile stimulation to the individual) than during singing activities. Further, they continued to participate purposefully in instrumental rhythm activities over the 14 weeks of intervention, even after singing response ceased.

More recent studies have examined movement as well as instrumental or singing activities. Rather than focusing directly on participation during the activity itself. Pollack and Namazi (1992) investigated the social responses of persons with moderate or severe levels of ADRD ($N = 8$) following individualized, preferred music activity (singing, moving, or playing instruments). The researchers noted an increase in social behaviors and a decline in non-social activities in the time period immediately following the activities compared with social behaviors observed before the session. These data suggest that these three types of musical activities may be beneficial for persons with moderate or severe ADRD. Pollack and Namazi did not, however, attempt a comparison of the relative effectiveness of the three different

types of activities, either during or following the activities, since individuals were involved in only the activities of their own choosing.

A study by Groene (1993) compared the amount of time that persons with ADRD ($N = 30$) spent seated in proximity to either group music therapy activities or group reading activities. Increased time spent seated (even if individuals were not purposefully involved in the activity) was considered a positive outcome, since these participants, who were at more advanced stages of ADRD (stages 6 or 7), had a history of wandering. The researcher found that participants stayed seated in proximity to the group activity significantly longer during the music activities, which consisted of listening, playing instruments, singing, and movement or dance, than during reading groups. The significant reduction of wandering during music activities compared with that during reading activities is a valuable therapeutic outcome, but Groene's study does not provide us with information about the relative merits of the various types of activities included in the music therapy sessions.

Such a comparison of different types of music activities can be found in a study by Brotons and Pickett-Gooper (1994). Their study compared the involvement of persons in stages 5 or 6 of ADRD ($N = 20$) to five different types of music activities: (a) singing, (b) playing instruments, (c) dancing, (d) musical games, and (e) composition/improvisation. The mean percentage of time during which participants were purposefully involved is listed in order of greatest to least percentage of time: playing instruments, dancing, musical games, singing, and composition or improvisation. The results of an ANOVA indicated that participation in composing/improvising was significantly lower than involvement in playing instruments, dancing, or playing games.

These data suggest that some types of musical activities elicit more purposeful participation than others. For this particular group of subjects, who represent lower functioning stages of ADRD, playing instruments and dancing seem to be the two most successful activities. The fact that singing and composition were the two least "successful" activities is not particularly surprising if one considers the decline of verbal and decision making skills in more advanced stages of ADRD. According to the PLST model, the lack of cognitive skills necessary for participation in these types of activities may result in more passivity or off-task behaviors.

Brotons and Pickett-Cooper's study (1994) provides a direct and useful comparison of five commonly-recommended forms of music activity for this population. However, since the study only included individuals in stages 5 or 6, the findings cannot be generalized to earlier stages of ADRD. In addition, each individual participated in only one 30 minute session exemplifying each category of music activity. That constitutes a limited sampling of response to an activity category, which can be problematic since considerable day-to-day fluctuations in lucidity, cooperation, and agitation are commonly observed among persons with ADRD. Observation of responses to specific activity types over a more sustained period of time would provide a more complete and in-depth view of activity effectiveness.

While prior studies have compared the relative benefits of different categories of music activities, no studies to date have addressed the differing levels of difficulty found within the

various categories of activities themselves. For example, the general category of rhythmic activity can be as challenging as imitating a complex syncopated pattern using several drum sticks, or as simple as tapping or rubbing a hand drum at will. Since the Progressively Lowered Stress Threshold model suggests that persons with ADRD are more likely to demonstrate passive or disruptive behavior when challenged with environmental demands beyond their abilities, it seems as important to consider the difficulty of a given task as the type of task itself.

Therefore, in this study, we wished to explore further the relative effectiveness of three different types of music activities (movement, rhythm, and singing) in conjunction with two other factors: the difficulty of the musical activity (high demand and low demand), and the cognitive functioning of the participant (high, medium, or low).

The following research questions were examined:

1. Which types of music activity, specifically movement, rhythm, or singing, are more effective for persons with ADRD? Activities were considered more effective if participants responded with high, or at least low, on-task responses as opposed to passivity or disruption during a significantly greater amount of time during the activity. We hypothesized that those activities requiring the least verbal response (expressive or receptive language) such as movement or rhythm activities would result in the greater amount of purposeful behavior across levels of cognitive functioning. Because the rhythm activities in our study tended to require more fine-motor skills and greater precision components than did our movement activities, we hypothesized that persons with ADRD would show significantly greater amounts of high response to movement than to rhythmic activities.
2. Does the facilitation of activities at particular levels of task demand (high demand or low demand) result in more purposeful and less passive or disruptive behavior across stages of cognitive functioning? In keeping with the Progressively Lowered Stress Threshold model, we hypothesized that more demanding tasks would result in greater levels of passivity or disruptive behavior, particularly for those individuals with greater cognitive decline.

Method

Participants

Fifty-one older adults completed the 12 week music therapy program (41 women, 10 men, mean age of 82 years). Three other individuals did not complete the program for the following reasons: One was transferred to a different nursing home and therefore was no longer available to participate, one died due to natural causes, and one stopped participating in the project as a matter of personal choice. Table 1 provides demographic information on the participants in the project.

All participants were enrolled in or resided in one of five programs for older adults in a midwestern state. These programs, representing a continuum of care for older adults,

included: an adult day program, a residential care facility, a nursing home (general), an Alzheimer's unit within a hospital, and an Alzheimer's unit within a long-term care facility.

All procedures for the study, including recruitment methods, were in compliance with federal guidelines for the ethical treatment of human participants in research. In order to identify potential participants, we contacted the nursing or activity directors of the five cooperating facilities who provided a list of individuals in their program who had diagnoses of probable AD/DR. We contacted by phone, or in person, all potential participants and a family member or legal representative about the project. If the individual or family member expressed interest in the project, program descriptions and informed consent forms were mailed to the individual and his or her representative. We obtained informed consent from any individual competent to understand the form and from all family or legal representatives.

Staging severity of dementia.—Once informed consent was obtained, the geropsychiatric clinical nurse specialist on our team gathered demographic data from each participant's chart and evaluated the cognitive functioning of each person using Reisberg's Global Deterioration Scale (GDS). The GDS is specifically designed to measure the cognitive functioning of persons with dementias, including the progressive nature of the disorder. Acceptable reliability (ranging from .87 to .92) and validity indices have been established for the GDS (Foster, Sclan, Wilkowitz, Boksay & Seeland, 1988; Gottlieb, Gur, & Gur, 1988; Reisberg, Ferris, Borenstein, et al., 1986; Reisberg, Ferris, De Leon, & Crook, 1982, 1988; Reisberg, Ferris, Steinberg, et al., 1989; Reisberg, Sclan, et al., 1994).

The GDS is divided into seven categories corresponding to distinct, clinically identifiable stages of the disease process: stage 1, Normal, no cognitive decline; stage 2, Forgetfulness, very mild cognitive decline; stage 3, Confusional, mild cognitive decline; stage 4, Late Confusional, moderate cognitive decline; stage 5, Early Dementia, moderately severe cognitive decline; stage 6, Middle Dementia, severe cognitive decline; and stage 7, Late Dementia, very severe cognitive decline (Reisberg et al., 1982).

After observation, a GDS score was assigned to each individual before implementation of the music therapy intervention. This assessment was completed again at the end of the 12 weeks of treatment to discern if any changes had occurred in cognitive status over the period of the project. None of the subjects changed GDS scores from baseline to the end of the project. An independent co-rater (director of nursing or program director) assigned a GDS score to all the individuals at the baseline interview to ensure reliability of the assessment. The inter-rater agreement between the geropsychiatric clinical nurse specialist and the co-raters was 87%.

For purposes of statistical analysis, stages 1 through 6 were grouped into three levels of cognitive functioning as follows: stages 1 and 2, high cognitive functioning; stages 3 and 4, medium cognitive functioning; and stages 5 and 6, low cognitive functioning. Persons in stage 7, who were often room bound, non verbal, and unaware of others, were beyond the scope of this study. Individuals in stages 1 through 6 were assigned to small groups of four to six participants for the music therapy intervention. Table 2 illustrates the distribution of participants at each level of cognitive functioning in each treatment facility.

Music Therapy Intervention

Music therapy intervention consisted of 12 weeks of bi-weekly sessions for small groups of four to six participants. In order to ensure consistency of programming across the groups and settings, activity plans were developed to be used by the music therapists in each of the settings. A team of three music therapists, each having professional experience working with older adults with ADRD, developed activity plans that could be facilitated in a 30 minute time period. Activity plans were designed to include equal exposure over the 12 week period to the three activity categories (movement, rhythm, and singing) and two difficulty levels (high demand and low demand). Each activity plan included the elements indicated in Table 3. The following sections describe in greater detail the categories and levels of difficulty included in the activity plans.

Type of activity: movement, rhythm, and singing.—We compared the effectiveness of three different types of musical activities commonly cited in the literature on music therapy with older adults: movement, rhythm, and singing activities. The following provides examples of activities in each category:

1. Movement activities were those in which participants moved large and small muscle groups in response to music such as moving scarves or doing simple in-seat exercises to music.
2. Rhythm activities were those in which participants created or imitated rhythmic patterns by playing drums and rhythm instruments or by clapping or tapping.
3. Singing activities included singing or humming along to well-known songs or participating in cloze procedure (fill-in-the-blank) songwriting activities with familiar tunes.

Task demand: low and high.—While the general categories of movement, rhythm, and singing differentiate activities by the basic types of cognitive, verbal, or physical requirements for participation, within each of those three categories, tasks can vary considerably in difficulty. For example, rhythm activities can require the precise imitation of a complex rhythmic pattern or the production at will of a spontaneous rhythmic response.

The different levels of difficulty found within each of the categories of music activity (movement, rhythm, or singing) is particularly important in light of the Progressively Lowered Stress Threshold model. Some types of musical activities may be more demanding and complex than others, and thus beyond the skills and abilities of persons in more advanced stages of ADRD. Requesting participation in an activity beyond the person's coping skills results in a poor person-environment fit and could potentially foster passivity, agitation, or disruptive behavior.

Therefore, this project included not only different categories of activities, but also activities representing two different levels of difficulty, or response demand. High demand activities required more expressive or receptive verbal skills, included more active involvement, and were more complex than those activities classified as low demand.

Validation of activity type and difficulty—In order to assure that the activity examples developed for the intervention were representative of the three types of activity categories (movement, rhythm, and singing) and two levels of difficulty (high demand and low demand), we analyzed the participation requirements for each activity. From that analysis, we compiled a master list of responses, which resulted in 32 different types of musical responses.

We then sent the master list to a panel of seven music therapists, all with extensive clinical experience with either geriatric or low functioning clientele. Each panelist was asked to determine for each behavioral item the type of activity (movement, rhythm, or singing) and the level of difficulty (high demand or low demand). Each panelist worked independently and returned the checklist to the project manager who then calculated agreement on type and difficulty of activity for the seven panelists.

Of all the behaviors listed, all seven panelists agreed on the type of music activity (movement, rhythm, or singing) except for two items in which one panelist deviated from the other six in their response. All seven panelists agreed on the difficulty of 15 of the items (high demand or low demand). On 10 of 32 items, one panelist responded differently from the other panelists; on 7 of 32 items, two or more panelists deviated from the others in their response.

When only one panelist disagreed with the other six, the project manager coded the item as “high demand” or “low demand” according to the other six responses. In cases where two or more panelists showed disagreement, the project manager referred to examples of clinical characteristics from the GDS to determine if the task would cause difficulty for both higher and lower functioning individuals or only lower functioning individuals. Items subsequently were coded “high demand” in the former case and “low demand” in the latter.

Following the validation of activity types and difficulty, we then finalized the therapy plans to be used in all the settings. The 12 weeks of intervention consisted of implementing 12 different therapy plans that included a total of 24 different music activities. Each activity plan was used for two separate sessions. Over the 12 week period, the activity plans included an equal proportion (four activities each) of the three categories of activities (movement, rhythm, and singing) and the two demand levels (high demand and low demand).

Design and Procedure

Table 4, the study design, presents the levels of the three independent variables for this study: level of cognitive functioning of the participant, type of musical activity, and difficulty of activity.

Implementation of the intervention.—We provided music therapy sessions for 10 small groups in five different facilities in a midwestern state. In each setting, the music therapist conducted 12 weeks of music therapy programming with the 30 minute sessions being held two times weekly (see schedule of intervention in Table 5). All individuals who consented to participate in the project were approached prior to each session by music therapy or nursing staff and invited to attend music therapy.

Measuring purposeful participation: Time sampling.—In order to measure individual response to each activity, we used a time-sampling observation sheet designed specifically for quantifying the purposefulness of participation by each individual during the movement, rhythm, and singing activities. There were six possible categories of response from most to least purposeful: (a) high response on-task, (b) low response on-task, (c) passive response, (d) passive disruption off-task, (e) active disruption off-task, and (f) out of the room. The category “out of the room” indicated that the individual left the group area. We did not judge this particular category as either negative or positive, since a person might leave the area for a variety of reasons, some unrelated to the effectiveness of the activity (e.g., the person may need to use the toilet or have an appointment). On the other hand, a participant may leave the room if he or she is feeling overwhelmed by the activity in progress. Since we could not ascertain with certainty the cause for leaving, we noted the mean length of time that participants were out of the room, but we did not conduct an in-depth analysis of those data points.

The time sampling observation sheet included cells for coding the response category for each participant every 60 seconds throughout each 10 minute activity during the “treatment” portion of the session (see Table 3). Observers were trained to use the observation sheet, and were expected to achieve an 85% inter-rater reliability coefficient before commencing observation of the interventions.

Two trained observers watched each activity for each group using the time sampling data collection sheet described earlier in this article. The quality and quantity of response by each participant were noted on the observation sheet throughout the 20 minutes of movement, rhythm, or singing activities. The inter-rater reliability was expressed as percent of agreement on behavioral codes achieved by pairs of observers during the intervention phase of the study. The average over all pairs of raters was $r = .85$; the range was .71 to .97. All data were collected using ID numbers rather than names in order to maintain the confidentiality of all participants.

Evaluation of program effectiveness.—In addition to collecting data on participant involvement during the activities themselves, we also sought evaluation of the program’s overall effectiveness through an opinion survey distributed to the facility directors in the five different settings. The survey consisted of seven items regarding how readily the music therapy programming was integrated into the facility milieu, the perceived appropriateness and effectiveness of programming for the participants, and the value of the programming. Responses were given using a four point Likert-type scale (Strongly Agree = 4 points to Strongly Disagree = 1 point).

Results

We determined the most effective activities to be those in which group members participated in the activity with a high response level for the greatest proportion of time and in passive or disruptive behavior for a lesser proportion of time. In order to compare the relative effectiveness of the different types and difficulty of activities with people at various stages of cognitive functioning, we analyzed the data using a $3 \times 2 \times 3$ analysis of variance (ANOVA).

Unequal variance *t*-tests with Satterthwaite's degree of freedom approximation were used to compare groups of participants. Because of the substantial number of *t*-tests, we adopted the .01 level as the criterion of statistical significance.

Participation During High Demand Tasks

An ANOVA revealed significant differences among the three types of activity (see Table 6). The follow-up *t*-tests, which indicate the source of differences and the level of significance, appear in Table 7.

Figure 1 shows the mean length of time during a ten minute activity that participants at three levels of cognitive functioning responded at a high level during the three different types of high demand activities. As can be seen in Figure 1, people at all levels of cognitive functioning (high = GDS stages 1–2; medium = GDS stages 3–4; and low = GDS stages 5–6) participated with high responses for significantly longer periods of time during movement activities than during singing activities. Participants in the high level of cognitive functioning participated for a significantly longer period of time with high responses during movement activities than during rhythm activities.

Figure 2 shows the mean length of time that participants responded with low responses to high demand tasks. In general, participants responded to high demand activities with low response for only a small proportion of time, and no significant differences were found across activity types or levels of cognitive functioning.

Figure 3 shows the mean length of time that participants were passive (sat quietly and observed others) during the three different types of high demand activities. A visual comparison of high response (Figure 1) and passive response (Figure 3) to high demand activities shows an inverse relationship between these two categories of response. As the proportion of high response declines in the three types of activities, we see a concomitant increase in the proportion of time spent in passive involvement. Participants at all three levels of cognitive functioning were passive significantly more often during singing than during movement activities. In addition, participants at high and medium levels of cognitive functioning were passive significantly more often during rhythm than during movement activities. Participants at the high level of cognitive functioning were passive significantly more often during singing than during rhythm activities.

Figures 4 and 5 show the mean length of time that participants demonstrated either passive disruption or active disruption during the three different types of high demand activities. An ANOVA showed no significant differences for the length of time that participants at any level of cognitive functioning spent in either passive or active disruption during the different categories of activities. There were significant differences across levels of cognitive functioning, however, for observed time spent in passive disruption (Table 8). Those participants at the lowest level of cognitive functioning (GDS stages 5 and 6) were involved in passive disruption for a significantly longer period of time than persons in the highest level of cognitive functioning (GDS stages 1 and 2) during movement, rhythm, and singing activities. The participants at the lowest level of cognitive functioning (GDS stages 5 and 6)

were involved in passive disruption significantly longer than were persons at the medium level of cognitive functioning (GDS stages 3 and 4) during movement and rhythm activities.

Participation During Low Demand Tasks

Table 9 shows the ANOVA analyzing participation during low demand tasks. The follow-up *t*-tests which indicate the source of differences and the levels of significance appear in Table 10.

Figure 6 shows the mean length of time that people participated with high responses during the three different types of low demand activities. The category “high response” indicates that individuals reacted to an instruction from the music therapist with a response that was more difficult (or requiring a higher response level) than that specified in the music therapist’s instructions.

Figures 7 and 8 show the mean length of time that participants responded at a low and passive level during the three different types of low demand activities. There were no significant differences among the types of activities for any levels of cognitive functioning for high, low, or passive response during low demand tasks.

Figures 9 and 10 show the mean length of time that participants responded with passive disruption or active disruption during the three different types of low demand activities. There were no significant differences for any level of cognitive functioning across the types of activities. There were significant differences across levels of cognitive functioning, however, for observed time spent in passive disruption (Table 11). Those participants at the lowest level of cognitive functioning (GDS stages 5 and 6) were involved in passive disruption for a significantly longer period of time than persons at the highest level of cognitive functioning (GDS stages 1 and 2) during movement, rhythm, and singing activities. The participants at the lowest level of cognitive functioning were involved in passive disruption significantly longer than were persons at the medium level of cognitive functioning (GDS stages 3 and 4) during singing activities.

Evaluation of Program Effectiveness by Facility Directors

Mean scores for the opinion survey of facility directors were calculated in order to assess general program effectiveness. Table 12 shows the mean scores ($N = 5$) of responses to the seven questions in the opinion survey regarding the effectiveness of the program. As can be seen, the mean scores for all seven questions range between 3.5 and 3.8 out of a possible 4, indicating that the program directors found the program to be very beneficial to residents and readily integrated into the milieus of the facilities.

One additional indicator of program effectiveness is that of subject compliance, especially since subjects were free to discontinue participation at any time and group involvement was voluntary. We considered program completion by 51 out of 54 recruited subjects a positive indicator of the appropriateness of this program for persons with ADRD. Only one participant chose not to complete the program. The other two individuals who did not complete the program had either been transferred to another facility or died during the period of the project.

Discussion

The purpose of this project was to determine whether different types and difficulties of music activities would be more or less effective for persons whose cognitive functioning was at various levels of decline due to ADRD as measured by the Global Deterioration Scale. In keeping with the Progressively Lowered Stress Threshold model, which emphasizes the importance of matching environmental demands to the current abilities of the individual, we hypothesized that participants would demonstrate greater purposeful involvement and less passivity or disruption when engaged in music activities appropriate for remaining skills. Since verbal skills decline at earlier stages of ADRD than do gross motor skills, we anticipated that persons with ADRD could be more purposefully engaged over the course of the illness in activities such as movement (which can include little or no receptive or expressive language) as opposed to singing activities (which often require more verbal skills).

While individual responses may vary somewhat depending on the personal background and preferences of participants, as a group, people with ADRD across the stages of decline (high, medium, and low levels of cognitive functioning) did exhibit the most purposeful participation during movement activities, somewhat less purposeful participation during rhythm activities, and least purposeful participation during singing activities.

We noted a higher proportion of passive involvement or passive disruption during singing activities than either rhythm or movement activities. Though we could not determine precisely why participants occasionally left the area, we did observe that, as a group, participants left the area for a slightly longer period of time during singing (mean of .57 second out of a 10 minute activity) than during movement or rhythmic activities (mean of .41 second out of a 10 minute activity). This may be because the verbal demands of active involvement in singing activities are beyond the skills and abilities of persons experiencing greater decline, since by that time verbal skills have deteriorated significantly.

It is not particularly surprising that passive disruption was observed significantly more often in those persons at the lowest level of cognitive functioning. In addition, those persons at the lowest stage of cognitive functioning left the area for a longer period of time (mean of .92 second out of a ten minute activity) than did those persons at the medium stage (mean of .35 second out of a ten minute activity) or high stage (mean of .12 second out of a ten minute activity). The higher incidence of disruption and agitation among those in stages of greater decline and during activities with greater verbal requirements is consistent with the Progressively Lowered Stress Threshold model described in the introduction of this paper.

It is important to note, however, that even during singing activities, the incidences of active or passive disruption were very limited (10% or less for most of the activities), even among those at the lowest level of cognitive functioning. Furthermore, even those participants at the lowest level of cognitive functioning stayed with the group approximately 90% of the time. Since agitation or behavioral disruption are commonly observed characteristics in this population, the low proportion of disruptive behavior during even the least effective activity category in this project is a positive indicator of the overall effectiveness of the program.

In general, we noted a higher proportion of high response during high demand movement activities by participants at all levels of cognitive functioning. This finding suggests that music therapists can present movement-type activities at a more challenging level than is warranted for rhythmic or singing activities across the stages of decline. This may be explained by the fact that motor skills tend to be some of the last skills to decline in ADRD, and because many movement activities can be facilitated with only physical demonstration by the therapist, thus reducing the demand for interpreting verbal instructions, which can require considerable receptive language skills.

Participants at all levels of cognitive functioning seemed to respond more purposefully to both rhythm and singing activities when those types of activities were designed to be less demanding (for example, when participants were allowed to make up their own rhythm, as opposed to imitating a pre-determined rhythm or humming along rather than singing specific lyrics).

While our project has a number of theoretical and pragmatic implications for music therapy practice, there are a number of questions not addressed by this study. This particular project was designed to address primarily the cognitive and social functioning of persons in the first six stages of ADRD as determined by scores on Reisberg's Global Deterioration Scale. This project did not attempt to address the needs of those most frail elderly (stage 7) who are in the final stages of ADRD and are typically bedridden and unresponsive. Oftentimes, individualized music therapy provided in the room is required for these individuals who may have special low-stimulus needs, and was beyond the scope of this project.

While we utilized a variety of movement, rhythm, and singing activities in our study, our activities cannot fully represent the range of possible activities within each of the categories of music activity. The activities we used perhaps can best be described as "prototype" activities representative of the three categories of music activity that we have found commonly recommended in methodological literature.

The focus of this study was on the effectiveness of activities of varying kinds and degrees of difficulty for individuals functioning at various stages of cognitive decline. We did not contrast the general effectiveness of music programming with alternative forms of activity programming or no programming at all. Nor did we address whether the level of cognitive functioning is prolonged or the rate of decline is reduced as a result of these activities. Future studies are needed to address those questions.

The fact that we were able to complete the study effectively in five different health care settings suggests that this type of programming can be readily administered in various types of treatment facilities and by different group facilitators. However, our population consisted primarily of Caucasian adults from the midwestern United States. The types of music and activities that we used may need adjusting for participants who are from other cultures and locales.

The key practicable finding of this study is that one music therapy activity is not equally suitable for all participants, even though they may all have a diagnosis of probable ADRD. Music activities differ in the extent to which they require of participants verbal, cognitive,

and physical skills. Furthermore, even categories of activities such as singing or movement can differ in difficulty or complexity.

We also observed informally that participants who were similar in cognitive functioning showed considerable variability in musical preferences. Some individuals seemed most responsive to “Big Band” music, others liked favorite religious songs, and still others appeared most motivated by folk songs. Individual musical preferences and cultural background should be given serious consideration when selecting musical materials for movement, rhythm, or singing activities. Undifferentiated uses of music, such as simply setting up a radio or record player, may result in too stimulating a situation for some individuals and subsequently may contribute to agitation or confusion.

Because persons with ADRD typically show a reduced ability to tolerate stress or stimuli as these diseases or disorders progress, activities designed to suit the present abilities of the individual are crucial in optimizing purposeful participation and in reducing disruption and agitation. Thus, the effectiveness of the music therapy treatment depends upon accurate assessment of the participant’s skills and abilities and the subsequent selection and judicious facilitation of activities that are truly suitable to individual needs and abilities.

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Figure 1.
High response involvement in high demand activities.

Figure 2.
Low response involvement in high demand activities.

Figure 3.
Passive involvement in high demand activities.

Figure 4.
Passive disruption in high demand activities.

Figure 5.
Active disruption in high demand activities.

Figure 6.
High response involvement in low demand activities.

Figure 7.
Low response involvement in low demand activities.

Figure 8.
Passive involvement in low demand activities.

Figure 9.
Passive disruption in low demand activities.

Figure 10.
Active disruption in low demand activities.

Table 1

Summary of Subject Demographics

Category	Item	Frequency	Missing
Gender	Male	10	0
	Female	41	
Marital status	Married	9	0
	Widowed	32	
	Divorced	7	
	Single	3	
Race	White	50	0
	Native American	1	
Education	6th grade	2	9
	8th grade	8	
	10th grade	1	
	High school degree	13	
	Business/Trade	3	
	Some college	6	
	Associate degree	2	
	Baccalaureate degree	3	
	Masters degree	2	
	PhD degree	1	
Occupation (before retirement)	Other	1	
	None	1	2
	Homemaker	13	
	Farmer	5	
	Blue collar	16	
Residence	Professional	14	
	Home	2	2
	Apartment	4	
	Nursing home	30	
	Other	13	

Note. $N = 51$; mean age = 82 ($SD = 9.9$).

Table 2

Global Deterioration Scale (GDS) Cognitive Functioning Level Distributions

Location	<i>n</i>	Percentage of Cognitive Functioning Levels		
		High (GDS 1–2)	Medium (GDS 3–4)	Low (GDS 5–6)
Adult day program	5	100%	0%	0%
Adult day program	5	60%	0%	40%
Nursing home	4	0%	2.5%	75%
Hospital	6	0%	0%	100%
Hospital	6	16.7%	33.3%	50%
Residential care	4	25%	75%	0%
Residential care	5	0%	20%	80%
Alzheimer's unit	4	0%	0%	100%
Alzheimer's unit	6	0%	0%	100%
Alzheimer's unit	6	0%	0%	100%
	<i>N</i>	<i>Totals in each category (combined locations)</i>		
	51	19.6%	13.7%	66.7%

Table 3

Music Therapy Sessions

Activity	No, Minutes
Introduction	5
Treatment	20
Close	5

Note. Treatment portion of session included 10 minutes each of two of the three activity categories (movement, rhythm, singing) presented at high or low demand.

Table 4

Study Design

Cognitive Functioning	Activity Type	Demand	Response
High	Movement, Rhythm, or Singing	High or Low	High (on-task)
			Low (on-task)
			Passive
			Passive disruption
			Active disruption
			Out of room
Medium	Movement, Rhythm, or Singing	High or Low	High (on-task)
			Low (on-task)
			Passive
			Passive disruption
			Active disruption
			Out of room
Low	Movement, Rhythm, or Singing	High or Low	High (on-task)
			Low (on-task)
			Passive
			Passive disruption
			Active disruption
			Out of room

Note. High cognitive functioning = Global Deterioration Scale (GDS) stages 1–2; medium cognitive functioning = GDS stages 3–4; low cognitive functioning = GDS stages 5–6.

Table 5

Schedule of Intervention

	Implementation in Weeks																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Adult day program (1.60)	P	1	2	3	4	5	6	7	8	9	10	11	12											
Adult day program (3.20)	P	1	2	3	4	5	6	7	8	9	10	11	12											
General nursing home (5.00)	P	1	2	3	4	5	6	7	8	9	10	11	12											
Hospital Alzheimer's unit (5.38)				P	1	2	3	4	5	6	7	8	9	10	11	12								
Hospital Alzheimer's unit (4.33)				P	1	2	3	4	5	6	7	8	9	10	11	12								
Residential care facility (2.83)										P	1	2	3	4	5	6	7	8	9	10	11	12		
Residential care facility (5.33)										P	1	2	3	4	5	6	7	8	9	10	11	12		
Nursing home Alzheimer's unit (5.33)											P	1	2	3	4	5	6	7	8	9	10	11	12	
Nursing home Alzheimer's unit (5.75)											P	1	2	3	4	5	6	7	8	9	10	11	12	
Nursing home Alzheimer's unit (5.83)											P	1	2	3	4	5	6	7	8	9	10	11	12	

Table 6

Analy.sis of Variance for High Demand Tasks (Activity Type X Task Difficulty X Functional Level)

Source	<i>df</i>	<i>F</i>	<i>Type III SS</i>	<i>MS</i>	<i>p</i>
GDS	2	0.31	16.22	8.11	0.7359
ID (GDS)	48		1,261.49	26.28	
Activity	2	35.04 *	102.33	51.16	0.0001
Activity × GDS	4	0.21	1.21	0.30	0.9338
Activity × ID (GDS)	96		140.19	1.46	
Task	1	1.28	1.97	1.97	0.2630
GDS × Task	2	1.85	5.90	2.95	0.1677
Task × ID (GDS)	48		73.55	1.53	
Activity × Task	2	9.03 *	14.26	7.13	0.0003
GDS × Activity × Task	4	5.01 *	15.83	3.96	0.0010
Error	102		75.82	0.79	

*
 $p < .01$.

Table 7

Follow-up t-Tests (High Demand Tasks)

Activity	Response					
	GDS 1–2	GDS 3–4	GDS 5–6	GDS 1–2	GDS 3–4	GDS 5–6
	High (on-task)			Low (on-task)		
Movement vs. Singing	0.0002	0.0015	0.0028	0.7138	0.1	0.0543
Rhythm vs. Movement	0.0037	0.0406	0.3122	0.5889	0.2862	0.9732
Singing vs. Rhythm	0.0707	0.0509	0.047	0.8353	0.2205	0.059
	Passive involvement			Out of the room		
Movement vs. Singing	0.0001	0.001	0.0005	—	0.3559	0.3893
Rhythm vs. Movement	0.0048	0.0008	0.1705	—	0.3559	0.9786
Singing vs. Rhythm	0.0099	0.0646	0.0267	—	—	0.3892
	Passive disruption			Active disruption		
Movement vs. Singing	0.9757	0.3965	0.4056	0.3434	0.173	0.1643
Rhythm vs. Movement	0.5478	0.3928	0.9721	0.3434	0.7358	0.2875
Singing vs. Rhythm	0.4851	0.7072	0.3759	—	0.3559	0.6862

Note. Dash (—) indicates that the behavior was not observed.

$p < .01$.

Table 8

Follow-up t-Test (High Demand Tasks: Passive Disruption)

Activity	GDS Comparisons		
	1-2 vs. 3-4	3-4 vs. 5-6	1-2 vs. 5-6
Movement	.833	.002 *	.003 *
Rhythmn	.630	.011 *	.003 *
Singing	.416	.018	.000 *

*
p .01.

Table 9 Analysis of Variance for Lot Demand Tasks (Activity Type $\times$ Task Difficulty $\times$ Functional Level)

Source	<i>df</i>	<i>F</i>	<i>Type III SS</i>	<i>MS</i>	<i>p</i>
GDS	2	2.27	6.87	3.43	0.1143
ID (GDS)	48		72.63	1.51	
Activity	2	0.59	0.37	0.19	0.5552
Activity $\times$ GDS	4	1.94	2.43	0.61	0.1096
Activity $\times$ ID (GDS)	96		30.01	0.31	
Task	1	0.25	0.14	0.14	0.6219
GDS $\times$ Task	2	0.15	0.17	0.09	0.8588
Task $\times$ ID (GDS)	48		26.85	0.56	
Activity $\times$ Task	2	6.96*	2.68	1.34	0.0015
GDS $\times$ Activity $\times$ Task	4	0.92	0.71	0.18	0.4554
Error	102		18.5	0.19	

*
p < .01.

Table 10

Follow-up t-Tests (Low Demand Tasks)

Activity	Response					
	GDS 1–2	GDS 3–4	GDS 5–6	GDS 1–2	GDS 3–4	GDS 5–6
	High (on-task)			Low (on-task)		
Movement vs. Singing	0.5257	0.1186	0.0217	0.3320	0.2159	0.7544
Rhythm vs. Movement	0.0971	0.65	0.2872	0.7503	0.4582	0.1575
Singing vs. Rhythm	0.0406	0.236	0.2051	0.4335	0.7288	0.127
	Passive involvement			Out of the room		
Movement vs. Singing	0.9006	0.5144	0.0581	0.3434	0.3559	0.4188
Rhythm vs. Movement	0.0821	0.9972	0.5685	0.3434	0.3559	0.9022
Singing vs. Rhythm	0.1037	0.436	0.1387	0.6486	0.4656	0.4719
	Passive disruption			Active disruption		
Movement vs. Singing	0.1744	0.2534	0.0583	0.3434	—	0.598
Rhythm vs. Movement	0.1687	0.9051	0.4012	0.3434	—	0.836
Singing vs. Rhythm	0.7091	0.2612	0.2094	—	—	0.6948

Note. Dash (—) indicates that the behavior was not observed.

p .01.

Table 11

Follow-up t-Test (Low Demand Tasks: Passive Disruption)

Activity	GDS Comparisons		
	1-2 vs. 3-4	3-4 vs. 5-6	1-2 vs. 5-6
Movement	.253	.210	.010 *
Rhythm	.336	.031	.002 *
Singing	.174	.001 *	.001 *

*
 $p < .01$.

Table 12

Evaluation of Program Effectiveness by Facility Directors

Item	Mean Score
1. The music therapy program was a valuable addition to programming 3.80 for our clients.	3.80
2. The music therapy program was readily integrated into the regular 3.50 milieu of our facility.	3.50
3. The music therapy activities seemed appropriate for our clients.	3.75
4. Facility staff noted a reduction in disruptive behaviors during the music therapy sessions.	3.50
5. Facility staff noted positive and purposeful participation during the music therapy sessions.	3.60
6. Facility staff noted a positive carry-over in the social behaviors of participants immediately following music therapy sessions.	3.50
7. I would recommend the continuation of music therapy programming 3.80 for clients in our facility based on this demonstration project.	3.80

Note. Mean scores based on a four-point scale. Point assignment for responses: strongly agree = 4 points; agree = 3 points; disagree = 2 points; strongly disagree = 1 point.