

Effect of Music Therapy on Mood and Social Interaction Among Individuals With Acute Traumatic Brain Injury and Stroke

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ABSTRACT. *Objective:* To investigate the efficacy of music therapy techniques as an aid in improving mood and social interaction after traumatic brain injury or stroke. *Design:* Eighteen individuals with traumatic brain injury or stroke were assigned either standard rehabilitation alone or standard rehabilitation along with music therapy (3 treatments per week for up to 10 treatments). *Measures:* Pre-treatment and posttreatment assessments of participant self-rating of mood, family ratings of mood and social interaction, and therapist rating of mood and participation in therapy. *Results:* There was a significant improvement in family members' assessment of participants' social interaction in the music therapy group relative to

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the control group. The staff rated participants in the music therapy group as more actively involved and cooperative in therapy than those in the control group. There was a trend suggesting that self-ratings and family ratings of mood showed greater improvement in the music group than in the control group. **Conclusions:** Results lend preliminary support to the efficacy of music therapy as a complementary therapy for social functioning and participation in rehabilitation with a trend toward improvement in mood during acute rehabilitation.

A large body of research supports the effectiveness of music therapy within many areas of physical, cognitive, communicative, social, and emotional rehabilitation (Standley & Prickett, 1994). The emotional sequelae that frequently accompany both stroke and traumatic brain injury (TBI) can interfere with an individual's reentry into the community and ability to obtain maximum benefit from rehabilitation. Although there has been little research conducted on the social and emotional benefits of music and music therapy for individuals with stroke or TBI, research with a variety of populations has shown that music therapy is associated with a decrease in depression (Hanser & Thompson, 1994), improved mood (Thaut, 1989), and a reduction in state anxiety (McKinney, 1990). Music therapy has also been shown to improve various aspects of social interaction in adults with and without disabilities, including those with emotional problems (Cassity, 1976) and Alzheimer's disease (Pollack & Namazi, 1992) and their caregivers (Clair & Ebberts, 1997).

The precise mechanisms underlying these influences are not fully understood (Behrens, 1988; Hodges, 1980), but there are several theories in the literature regarding possible reasons for the impact of music on altering emotions and behavior. Because music is laden with emotional associations and memories, it provides an effective medium for evoking emotional responses (MacRae, 1992). Furthermore, the rhythm in music can structure behavior by simultaneously influencing emotions directly and altering physiological functioning such as heart rate, muscle tone, blood pressure, and respiration (Steckler, 1998). Finally, music therapy sessions provide a comfortable, nonthreatening milieu in which to encourage successful interaction among patients and between the patient and therapist. Although reports suggest that music therapy may be useful in changing mood and improving social skills, there is a paucity of well-controlled research on TBI or stroke. In a study of individuals with mild TBI, Eslinger, Stauffer, Rohrbacher, and Grattan (1993) found improved emotional empathy (as reported by family members and friends but not participants) in those assigned to a 10-week music therapy group but not a social support group. However, they did not find any significant reductions in depression. In another study of 40 stroke survivors (Purdie, cited in Marwick, 1996) that compared a music therapy group (daily music therapy sessions for 12 weeks) with a control group that received standard care, the individuals in the music group showed signs of being less depressed and anxious and more emotionally stable.

The primary objective of this study was to evaluate whether music therapy is

effective as an aid to enhance a patient's mood, social interaction, and involvement in therapy (physical and occupational) during acute rehabilitation. If effective, music therapy would provide a cost-effective and time-efficient adjunct to acute rehabilitation.

METHOD

Participants

Eighteen participants with TBI or stroke were recruited from the inpatient facility at Kessler Institute for Rehabilitation. Only participants with moderate to severe impairments at admission, defined by an admission average Functional Independence Measure (Hamilton, Granger, Sherwin, et al., 1987) score of 4.5 or lower and a depression score of 4 or higher on the 7-point Faces Scale (McDowell & Newell, 1996) were included. If the patient's self-reported rating of mood on the Faces Scale did not meet the inclusion cutoff, a family member was also asked to rate the patient's mood. If the family member rating was 4 or higher, the individual was eligible to participate in the study. Patients with nasogastric tubes, intravenous lines, uncontrolled agitated behavior, or any serious medical conditions were not included. Also, those with sensory, perceptual, or marked cognitive impairments (e.g., hearing difficulties or aphasia) that might have interfered with their ability to participate in the study were not included. As part of the standard rehabilitation program, all patients are evaluated for depression at admission and seen by a rehabilitation psychologist once a week for counseling. All participants in the music and control groups received counseling at least once a week for the duration of the study. The participants ranged in age from 31 to 84 years, with a mean age of 59.89 years ($SD = 16.3$). The sample included 6 men (4 in the music and 2 in the control group) and 12 women (6 in the music and 6 in the control group). Informed consent was obtained from all participants and their family member(s). Participants were assigned to one of two conditions: music therapy or control.

Measures

All of the measures described subsequently were administered by a research assistant to participants, their family, and a staff member before the onset of treatment (Time 1) and again just before participants were discharged from the hospital (Time 2).

Self-report. Participants rated their own mood on the Faces Scale (McDowell & Newell, 1996), a 7-point scale made up of stylized faces. Each face consists of a circle with eyes that do not change and a mouth that varies from a smile (upright semicircle) to gloom (inverted semicircle). Participants were asked to select the face that came closest to expressing how they felt on that day. This

scale was selected because it is easy to administer and its nonverbal format made it especially advantageous to use with this group of participants. Test-retest reliability of the Faces Scale is about .70, and the validity coefficient is .70 (McDowell & Newell, 1996).

Family rating of participant's mood. A 7-point visual analog rating scale was used to obtain a family member's assessment of the participant's mood. The scale consists of a horizontal line with the anchors *not depressed at all* and *very depressed* at either end on the top and the numbers 1–7 below the line. Two ratings were obtained: mood in the previous 24 hr and the previous week.

Therapist rating of participant's mood. The physical or occupational therapist who regularly worked with the participant was asked to rate the participant's mood in the previous 24 hr on a 7-point visual analog rating scale. Higher scores indicated more depression.

Family rating of social interaction. Seventeen questions adapted from the social interaction subscale of the Sickness Impact Profile (Bergner, Bobbitt, Carter, & Gilson, 1981) were completed by family members using a 7-point Likert scale.¹ Test-retest reliability and Cronbach alpha coefficients of the psychosocial dimension of the instrument, from which this scale is extracted, are .79 and .91, respectively (de Bruin, de Witte, Stevens, & Deideriks, 1992). Correlations with other scales of depression and adjustment range from .45 to .72 (McDowell & Newell, 1996). A total score was computed for the 17 items. Lower scores indicated better social interaction-behavior.

Staff rating of participation in therapy. This questionnaire includes three items in which staff rate participants on a 7-point scale on their level of involvement in therapy. A physical or occupational therapist who worked closely with the participant completed this scale. The items addressed cooperation, motivation, and how actively involved the participant was in therapy; higher scores represented better outcomes.

Design and Procedure

A between-groups, repeated measures design was used. Participants were assigned to either a treatment condition (music therapy along with standard rehabilitation) or a control condition (standard rehabilitation alone). The goal of random assignment was not fully achieved because we attempted to treat participants in the music therapy condition in groups of 2 to 3 people to provide them with an opportunity for social interaction. This process required that 2 or more patients available at the same time be assigned to the same condition, thus compromising the randomization process. Despite the attempts to have patients

¹ Examples of items are "My family member does not show interest in conversation while people are visiting." "My family member talks less with those around her/him," and "My family member shows less affection."

in groups, on a few occasions participants received treatment individually (with only the music therapist present) in one or more sessions as a result of the occasional unexpected lack of availability of other members of the group.

Music therapy plus standard rehabilitation. Ten participants in this group met two or three times a week for the duration of their stay in the hospital and received up to a maximum of 10 treatment sessions in addition to their standard rehabilitation ($M = 5.9$, $SD = 1.73$; range: 4–10). A variety of music therapy procedures was used to enhance mood and social interaction. The specific music activities used, and their selection, were based on the needs of the group and are typical of music therapy practice.

Each session began with an opening song or activity designed to set the mood and to help participants become involved in the session. This was frequently some type of instrumental improvisation in which participants used simple percussion and melodic instruments along with the therapist. In some sessions, participants were asked to play together in a manner that expressed how they were feeling at that time. This was accomplished by having each group member select a simple percussive instrument from among a collection. A number of sessions involved simple pitched instruments (bells or chimes); each participant was assigned several pitches—instruments and played his or her pitch when cued. Instruments included drums, tambourines, maracas, xylophones, and tone bars (each bar is an individual note, beaten with a stick to produce the sound). The therapist would then structure the improvisation by asking participants to play their instruments to express how they were feeling or first asking a participant to describe how he or she was feeling and then asking that member and the rest to play their instruments in a manner reflecting their mood. Both of these approaches were followed by a brief discussion of how well the musical improvisation reflected and supported the feelings being experienced. In other sessions, participants were asked to simply play together and then later cued verbally to listen to one another as they played or took turns playing musical leadership or supportive roles.

One or two additional music therapy activities, such as singing, composing, playing instruments, improvising, performing, and listening, formed the core of each group. The specific musical activities were chosen on the basis of the interests and abilities of the participants, and consideration was given as to whether the activity could be used to address the goals of enhancing mood and social interaction. The music therapist provided physical cues or participants read from a color- or letter-coded chart. Another activity that was used frequently was composition, accomplished by substituting words of participants' choice for the normal words of a song. These compositions helped participants to express how they were feeling or what they were thinking. Singing was frequently incorporated. Each group of people had favorite songs, most of which were on song sheets or charts. All activities involved verbal processing, including some focus on mood. The amount and quality of verbal processing varied depending on the abilities and needs of the participants.

Standard rehabilitation control condition. Eight participants were assigned to a standard rehabilitation control group. This group received all of the standard therapies that are part of the inpatient rehabilitation regimen.

RESULTS

Analyses of covariance (ANCOVAs) were conducted to examine the effect of treatment group on each of the outcome measures. Because large mean differences were observed at admission on some measures, scores at Time 1 were used as covariates on all of the tests comparing the music therapy and control groups. Gender was also entered as a covariate to reduce error variance attributable to gender. However, before the ANCOVAs were conducted, the homogeneity of covariate regression on each outcome measure was tested between the two treatment conditions via F tests. If regression slopes were dissimilar in the two groups, ANCOVAs were not performed, and beta coefficients are reported and discussed. Means and standard deviations on all outcome measures are shown in Table 1. Alpha levels were set at .05; however, because of the small sample size and the exploratory nature of this study, trends at the .10 level are also discussed.

The test for equality of slopes indicated a significant difference between the two groups on the social interaction scale, $F(1, 14) = 8.34, p < .02$. The relations (beta values) between preintervention and postintervention scores were .93 in the control group and .76 in the music therapy group ($p < .02$), indicating that the more impaired a participant's social behavior at the outset, the more likely he or she was to benefit from music therapy. The occupational and physical therapists reported, at the conclusion of the interventions, that the music group was significantly more involved in therapy, $F(1, 14) = 8.64, p < .01$, and tended to be more motivated to participate, $F(1, 14) = 4.12, p = .06$, than the control group. There was no statistically significant difference between the groups in terms of staff-perceived cooperativeness during therapy sessions. The main effect for treatment showed trends on three of the four mood measures: self-report, $F(1, 14) = 3.27, p < .10$; family rating of mood in the previous 24 hr, $F(1, 14) = 3.39, p < .10$; and family rating of mood in the previous week, $F(1, 14) = 4.52, p < .06$. On the fourth mood measure, staff rating of participant mood, the test for equality of slopes indicated a trend suggesting a difference between the two groups ($F = 3.46, p < .10$). The relations (beta values) between preintervention and postintervention scores were .88 in the control group and $-.15$ in the music therapy group ($p < .09$). This trend suggests that the music group did not benefit from treatment, whereas those in the control group showing greater levels of impairment at baseline appeared to improve over time.

DISCUSSION

When differences between groups on pretreatment scores were statistically controlled, several notable treatment effects emerged, indicating a positive effect

Table 1. Means and Standard Deviations for Mood, Social Interaction, and Participation in Therapy Ratings

Measure	Music (n = 10)				Control (n = 8)				Group main effect	
	Time 1		Time 2		Time 1		Time 2		F	dfs
	M	SD	M	SD	M	SD	M	SD		
Mood										
Self-reported mood	4.60	1.71	2.80	1.32	5.00	1.41	3.88	1.36	3.27*	1, 15
Family-rated mood	3.80	1.48	2.60	0.70	4.88	1.13	3.88	1.46	3.39*	1, 15
Previous 24 hr	4.50	1.18	3.50	0.85	5.13	0.99	4.75	1.28	4.52*	1, 15
Staff-rated mood	4.60	0.97	4.20	0.92	4.63	0.92	3.88	0.64	— ^a	
Social interaction										
family rating	37.60	7.55	29.60	4.50	44.50	7.19	42.88	8.34	— ^a	
Participation in										
therapy										
Cooperation	4.10	0.99	5.20	0.42	3.88	0.84	4.63	1.06	2.62	1, 15
Motivation	3.90	0.88	5.10	0.88	4.00	0.54	4.75	0.46	4.12*	1, 15
Level of involvement	4.20	0.79	5.60	0.70	4.13	0.64	4.88	0.35	8.64**	1, 15

Note. Time 1 scores and gender were entered as covariates in the analysis of variance.

^a F value not reported as a result of heterogeneity of covariate regression slopes (see text for alternate analysis).

* $p < .10$. ** $p < .01$.

of music therapy on social interaction and participation in therapy and trends suggesting some improvement in mood. The improvement in mood among participants in the music group approached statistical significance on three of the four mood measures: self-report ($p < .10$), family rating of mood during the previous 24 hr ($p < .10$), and family rating of mood during the previous week ($p < .06$). Family members of those in the music therapy group reported a significant improvement in social interaction (relative to the control group) among participants who were more impaired at the outset ($p < .02$). These social behaviors could have been facilitated by the very nature of music therapy, which builds on the social aspects of music and musical participation. In addition, music therapy sessions in this study focused on encouraging social interaction through providing activities that promoted musical and verbal interaction and through verbal processing of what occurred in the sessions.

The mood outcome is consistent with the report of Purdie (cited in Marwick, 1996), who found a decrease in depression in patients with stroke after 12 weeks of music therapy. However, these results are unlike those reported by Eslinger et al. (1993), who found that there was no mood benefit for those with mild TBI. The difference between the samples in Eslinger et al.'s study and ours is that our sample included individuals in an acute rehabilitation setting. It is possible that music therapy has a more pronounced effect on mood early on after injury rather than later, a notion that will have to be confirmed with further research.

The music therapy group was seen by staff as more actively involved ($p < .01$), and there was a trend indicating that the music group was more motivated to participate in therapy ($p < .06$), suggesting that alterations in mood had a positive effect on participation in the rehabilitation process. No differences emerged on staff ratings of cooperation.

Limitations

The results of this study support the effectiveness of music therapy in improving mood and social interaction among people who have had a stroke or TBI. However, this study involves some limitations due to several unexpected problems. Substantial difficulties in recruiting, irregular attendance, and early discharge from the hospital contributed to imperfections in the research design. As indicated earlier, the goal of random assignment was not fully achieved because we attempted to treat participants in the music therapy condition in groups of 2 to 3 people to provide them with an opportunity for social interaction. In addition, the number of individuals participating in a treatment session varied because some participants were unexpectedly unavailable for one or more of the scheduled group sessions, usually as a result of feeling too tired or ill to participate or because of an unexpected visit by family members.

The apparent benefits of music therapy may have resulted from the effects of increased social interactions provided by, if not required by, a group session involving several other patients. Because of the recruitment and scheduling

difficulties outlined earlier, a comparison intervention (i.e., art therapy) that would have controlled for the effects of attention and participation in a group had to be eliminated. Future research needs to explore the extent to which the particular content or type of therapy contributes to or facilitates the effects found here.

Conclusion

The results of this study indicate that music therapy had a positive effect on social and behavioral outcomes and showed some encouraging trends with respect to mood. In particular, it appears that these effects facilitate participation in the standard rehabilitation process. These findings have relevant clinical implications for the rehabilitation psychologist. Because mood and social functioning are frequently goals in acute rehabilitation for patients with brain injuries and stroke, music therapy could provide an effective means for addressing these goals.

Rehabilitation psychologists might consider encouraging increased inclusion of music therapists on the interdisciplinary treatment team. Given the needs of individuals in acute rehabilitation for improved mood and social interaction and the preliminary findings of this study, the skills of the music therapist could complement those of the psychologist. Psychologists might consider conducting groups with music therapists serving as co-therapists, with the music therapist using the nonverbal qualities of music and the structure and pleasurable aspects of this type of therapy to facilitate interaction and the psychologist using this interaction and setting to address common goals (e.g., developing social skills and coping mechanisms, minimizing emotional distress, and working on community reintegration). These groups could serve as a complement to goals being addressed in individual sessions and could help patients transfer what they learn in therapy to other contexts. Introducing music, a structured but emotionally expressive medium, into the acute rehabilitation treatment setting would allow rehabilitation psychologists access to a cost-effective, pleasant, and entertaining adjunct to traditional psychotherapy.

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