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The Effects of Specific Music Therapy Interventions on  
Pediatric Oncology Patients

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Hospitalization can be a stressful and anxiety-provoking experience for pediatric patients and their families; the diagnosis of cancer for that child serves only to elevate that anxiety. In general, children with cancer are subjected to a variety of experiences including physical examinations, diagnostic tests, changes in physical appearance, side effects of treatment, fears of disability, pain, harmful procedures, and separation from family and friends; all of these contribute to increased levels of fear and anxiety (Cook, 1986; Frank, 1985; Standley, 1989; Pfaff, Smith, & Gowan 1989). Therefore, anxiety reduction is identified as an important clinical objective for care givers, and one that can be addressed by music therapy.

Anxiety is defined by Merriam-Webster's Collegiate Dictionary (1994) utilizing both physiological and psychological (emotional/behavioral) components:

“Anxiety- an abnormal and overwhelming sense of apprehension and fear often marked by physiological signs (as sweating, tension, and increased pulse), by doubt concerning the reality and nature of the threat, and by self-doubt about one's capacity to cope with it.”

For cancer patients, physiological responses to anxiety could include aggravation of unpleasant side-effects such as pain (Pfaff et al., 1989) or nausea (Standley, 1989), increases in heart rate, blood pressure, respiratory rate, and muscular tension (Kibler & Rider, 1983). Additionally, according to the fields of psychoneuroimmunology, anxiety could result in elevated levels of cortisol in the peripheral bloodstream (a glucocorticoid shown to inhibit the healing process [Male, 1991]) (Glaser & Kiecolt-Glaser, 1991).

According to Cowan (1991), emotional and behavioral responses to anxiety include tearfulness, restlessness, trembling, shortness of breath, loss of appetite, and fatigue. These responses interfere with maintaining healthy psychosocial stability and decrease patient

compliance with medical staff during procedures. Together, these physiological and psychological components to anxiety present a barrier to recovery for the pediatric cancer patient.

The use of music and music therapy in addressing anxiety, in a variety of settings, is replete in the literature. In an early study (Biller, Olson, & Breen, 1974), the effects of music and active/passive participation (playing or not playing a tambourine) on state and trait anxiety were studied. While none of the results were significant, there appeared to be a strong tendency for “sad” music to decrease state anxiety more than the “happy” music condition. Stoudenmire (1975) examined the effects of both muscle relaxation training and music on anxiety in 108 college females. Results indicated that both treatment conditions significantly reduced state but not trait anxiety. In another study using college students (N=18), Davis and Thaut (1989) assessed the effects of subject-selected music on state anxiety, perceived relaxation, and physiological measures. Findings showed that for all participants state anxiety was reduced and perceived relaxation increased; however, physiological parameters (muscular and autonomic) demonstrated an excited or aroused activity. Finally, while music appeared to have had significant effects on measures in the previous studies, in another study by Thaut and Davis (1993) there were no such differences found between music (experimenter-selected versus subject-selected) and no-music conditions on reducing anxiety.

While the previous studies appear to make a case for the use of music in addressing anxiety in a research setting, some of the results appear inconsistent. Therefore, a look at more clinically-based research is warranted. In general medical settings, several research investigations have been carried out using music to decrease anxiety in a variety of situations. Davis (1992) identified music listening and relaxation instruction as an effective means of reducing pain and anxiety in a number of patients undergoing painful, gynecological procedures. In the surgical arena, Cowan (1991) described the effectiveness

of a music therapy protocol using recorded music and the therapist (as a transitional object) to alleviate anxiety before, during, and after procedures.

Several studies have been carried out using music therapy as a means of addressing anxiety for pediatric patients. Chetta (1981) utilized music as a means to deliver information about a surgical experience in an effort to reduce anxiety in pediatric surgical patients. Additionally, the music intervention was coupled with the medical-play procedure of giving a doll a “shot” (the shot being an event which was identified as particularly anxiety-provoking). Findings showed that individuals receiving music and verbal instruction the night before and prior to induction of preoperative medications exhibited fewer anxiety-related behaviors (i.e. crying, screaming, thrashing arms/legs). Again, in the surgical arena, Robb et al. (1995) found that music assisted relaxation (MAR) procedures (music listening, deep breathing, progressive relaxation, and imagery) effectively reduced anxiety in pediatric surgical patients on a burn unit. Results in this study were obtained through a state anxiety inventory and further supported by a staff-completed anxiety-behavior questionnaire. For another medical procedure, cardiac catheterization, Micci (1984) described a music therapy procedure for children as a means to: a) establish rapport; b) deliver information regarding catheterization; and c) choose music to be used during the procedure. Through the use of staff observations and questionnaires, results indicated that music therapy provided a supportive and relaxing intervention, decreasing patient anxiety and increasing patient compliance. In a series of case studies of children with end-stage disease (Fagen, 1982), music therapy was utilized as a means to explore feelings related to death and loss, encourage socialization among hospitalized peers, foster the expression of feelings, and address isolation issues. This was accomplished through a variety of techniques: lyric analysis, instrument playing, and group singing. According to the author, the music therapist’s role was to facilitate “a less frightening” movement through the “anxiety block” (p. 21) experienced by patients and

family.

Other investigations have been carried out using music therapy with pediatric oncology patients. Brodsky (1989) described how music therapy, incorporating song activities, could be used to resolve anxiety in pediatric oncology patients confined to isolation rooms. Decreases in socialization, motor activity, and stimulation were addressed through singing and song writing with instrumental accompaniment. These musical experiences afforded individuals the opportunity to express emotions associated with their hospitalization and strengthen coping strategies. Pfaff, Smith, and Gowan (1989) utilized a self-report scale (for pain and fear) and a behavioral observation scale to assess the effectiveness of MAR techniques for children undergoing bone marrow aspirations. Using a within-subjects experimental design, the authors examined whether or not MAR had a significant effect on fear and pain. Self-reports indicated that the use of MAR was useful in reducing anxiety and pain, however, no indication of a reduction in total observed behavioral distress was found.

In closing this discussion on the music therapy literature related to anxiety, it appears that interventions incorporating an interactive component with the music (e.g. medical play, MAR, socialization, imagery, instrumental accompaniment) were more useful in effecting positive changes in anxiety states than those that incorporated passive music procedures. In a previous study by the author (Waldon, 1996), just such an intervention was determined to be effective at significantly reducing state anxiety in pediatric oncology patients. Participants for this study were selected at random from an out-patient pediatric hematology-oncology clinic at a community hospital. A pretest-posttest design was used to determine the effects of a 30-minute music therapy session on levels of state anxiety, as measured by the State-Trait Anxiety Inventory for Children. Participants in the experimental group (n=8) received an identical, individual, 30-minute music therapy session during the intervention period. The music therapy session

consisted of an instrumental playing/singing intervention, an instrumental improvisation intervention, a choice of one music intervention, and a music listening/relaxation intervention. Participants in the control group (n=8) did not receive music therapy as part of the research study. Instead, participants in the control group were allowed to participate in activities of their choice: watching TV, playing video games, reading, drawing. The dependent measure (a questionnaire) was verbally administered by the medical social worker prior to and after the intervention period. The researcher administered the music therapy intervention to the experimental group while the control group remained in the activity room of the pediatric clinic under the supervision of the clinical staff. Results indicated that the group receiving music therapy experienced less post-treatment anxiety than the no-music group. A one-way, between-subjects ANOVA showed that the mean gain scores were significantly different,  $F(1, 14)=28.22, p<.0001$ .

#### Method

The present study has been designed as a sequel to the study summarized above. In short, the purpose of this investigation is to examine the efficacy of specific music therapy interventions (instrument playing/singing, improvisation, music listening, and free choice of a music experience) on reducing levels of state anxiety in pediatric oncology patients. The results of this study may help identify which music therapy interventions prove more effective in reducing levels of state anxiety in pediatric oncology patients. The hypothesis states that while all participants who take part in the study will experience a decrease in state anxiety, individuals given a choice of music therapy interventions will exhibit the greatest decrease, overall. Additionally, this study, in its design, closely represents music therapy as it exists within a medical setting: 1) music therapy administered for a brief period of time with an individual to attain a maximum effect; and 2) music therapy administered to patients receiving different treatments (before, during, and after) and who possess a variety of malignant diagnoses. Because this study closely resembles music

therapy in these two ways, results may represent effects achieved under clinical conditions. Finally, records were kept as to the kinds of procedures being received by study participants (chemotherapy, IV starts, et al.) to determine the effectiveness of the music therapy interventions. Preliminary data was collected over a 5-week period of time.

### Participants

Participants were selected at random from patients receiving inpatient and outpatient treatment at the University Hospitals of Cleveland. Criteria for subject selection included the following: a) participants must be between the ages of 6-18 years; b) participants must be receiving treatment for a malignant disorder; and c) participants' parents must sign a consent form and verbal assent must be obtained from participants. An N=15 was initially achieved at the completion of this paper. Additionally, there were no financial commitments from study participants or their families. Interventions were administered in participants' hospital rooms (for inpatients) and examining rooms (for out-patients).

### Procedure

A pretest-posttest design was used to determine the effects of specific music therapy interventions on levels of state anxiety, as measured by the State-Trait Anxiety Inventory for Children (STAIC) (Spielberger, Edwards, Lushene, Montuori, & Platzek, D., 1973). The STAIC (see Appendix A) was administered to all participants prior to and after the intervention period by a hospital volunteer and the researcher administered the music therapy interventions. Participation in the study involved a one-time commitment of 30 minutes which included approximately 10 minutes of pretesting, 10 minutes of the music therapy intervention, and 10 minutes of posttesting.

After selection criteria had been met, participants were placed, at random, in one of four experimental/intervention groups (all participants engaged in the music therapy interventions on an individual basis):

1) Instrumental/Singing Group- (n=4) Participants were introduced to the Omnichord™ (an electronic musical instrument) and were shown how to play, using the “strumpad.” Participants were then asked to think of songs that they would like to play/sing, using the Omnichord™. If participants had difficulty in thinking up a song, a list was compiled to aid in selection (see Appendix B).

2) Improvisational Group- (n=4) Participants were introduced to the electronic keyboard and were shown how to change its different settings. After participants became comfortable with the keyboard, two improvisational interventions were initiated (one utilizing only white keys and the second only black keys). Attention was focused on positive aspects of participants’ playing techniques.

3) Music Listening/Relaxation Group- (n=4) Participants were asked to make themselves comfortable (e.g. lying down, sitting up, having the lights turned off, shutting the door) while the therapist played a recording of *Adagio for Strings* by S. Barber. Participants were given a few suggestions on what to listen for in the music and how they might facilitate their relaxation.

4) Choice Group- (n=3) Participants were given a choice of one of the three interventions listed above.

The music therapy procedures utilized in this study, similar to those used in the previous study, were selected based on their wide-spread use amongst music therapists. The use of song-singing has been effectively utilized with individuals with communication disorders (Cohen & Masse, 1993) and increasing trust and cooperation in adults in a continuing education workshop (Anshel & Kipper, 1988). Musical improvisation, another technique common in the literature, has been shown to increase socialization between children with and without developmental disabilities (Gunsberg, 1991, 1998), encourage appropriate interaction between therapists and patients with schizophrenia (Pavlicevic, Colwyn, & Duncan, 1994), and increase the communicative behaviors (prosody,

structure/form, pitch, intent, et al.) among children with autism (Edgerton, 1994). Music listening, in addition to promoting anxiety reduction, has been investigated as a means of promoting relaxation and increasing immune response (by increasing the hormone interleukin-1, associated with positive changes in immune responses) and decreases in cortisol (previously identified as a contraindicated hormonal substance in the population under investigation) (Bartlett, Kaufman, & Smeltekop, 1993). Finally, the effects of participant/patient choice on positive clinical outcomes is widely accepted by professionals practicing in the field (Kallay, 1997) and has been investigated in several studies (Davis & Thaut, 1989; Davis, 1992; Thaut & Davis, 1993). The point being made here is that the common music therapy practices identified above were applicable in the current study because by the very nature of music therapy as a process, any music intervention can be structured to foster positive changes in client/patient behavior; in the case of this study, anxiety reduction.

Finally, during testing procedures, if significant levels of anxiety were detected, the attending physician or other care-provider was notified and support was provided as needed. No participants exhibited significant levels of anxiety. After posttesting was completed, participants were thanked, given a copy of the consent form, and were allowed to return to their desired activity.

### Results

Table 1 contains the pretest and posttest means, mean gains, and standard deviations for STAIC scores for all experimental groups. A t-test for paired samples indicated that there was a statistically significant reduction in anxiety from pre test to posttest for all groups (combined) ( $t=-3.65$ ,  $p=.003$ ). In terms of identifying which music therapy intervention was involved in the most significant reduction in anxiety, a one-way, between-groups ANOVA showed that pretest scores were not significantly different,  $F(2, 29)=.3347$ ,  $p=.8006$ ; this indicated that all group were essentially equal before the music

therapy interventions were administered. Subsequent t-tests for paired samples for each group were administered, and indicated that Group 2 (Keyboard Improvisation) fostered the most significant decrease in anxiety ( $t=-3.64$ ,  $p=.036$ ). In this case, the hypothesis was not supported.

### Discussion

In summary, it appears that the implementation of music therapy procedures would be advantageous for pediatric oncology settings in reducing state anxiety. These results are concordant to findings in similar studies (Fagen, 1982; Micci, 1984; Robb et al., 1995; Waldon, 1996). Further analysis indicated that the group receiving a keyboard improvisation intervention exhibited the most significant decrease in anxiety. The results presented here are based on preliminary data; any conclusions drawn here should be made cautiously (due to the relatively small sample size).

During data collection, records of types procedures were kept (it was noted that several patients were not expecting or undergoing any procedures). Procedures included waiting for a lumbar puncture, receiving intra-venous chemotherapy, undergoing a doctor's examination, and coming in for a blood count. Data was scrutinized to ascertain differences between types of procedures being carried out: no significant differences were discovered. Similarly, no significant effects were discovered for age or gender.

Staff and volunteer observations during data collection were also recorded. One participant experiencing a significant level of pain (as evidenced by body contortions and facial grimaces) reported a relatively high, pretest level of anxiety. After the music therapy intervention (music listening/relaxation), she was experiencing a much lower level of anxiety and reported little to no pain. Additionally, the participant no longer exhibited pain-related behaviors (body contortions and facial grimaces). Another patient, placed into the improvisation group, had just experienced what appeared to be an anxiety provoking encounter with medical staff. During the study explanation he was very quiet and

somewhat tearful but still expressed an interest in participating. After the intervention, staff and parents stated “that’s the first time I’ve seen him smile since he’s been here.” Other observations included reports of increased patient compliance, increased socialization, and decreased anxiety-related behaviors to newly encountered medical personnel.

Another area requiring discussion with regards to this study involves the differences in music therapy in a true clinical setting and music therapy in a research setting. Specifically, this study makes apparent that music therapy is a process and not the act of simply playing music for an individual, expecting some significant change to occur. While music therapy interventions were shown to significantly reduce state anxiety in the participants of this study, that effect might have been greater had the intervention been specifically prescribed for the participants. By many definitions, music therapy is “prescribed” and this prescription comes about after a music therapist assesses the strengths and needs of the individual and deems the type of intervention appropriate. Had the interventions in this study been specifically prescribed for individuals and not been randomized (in accordance with the research protocol) results may have been even more significant. In future studies investigating music therapy as a means of reducing anxiety, research could include combining music therapy with other creative arts therapies, replicating the present study in a general pediatric medical setting, and comparing the effectiveness of active music participation (e.g. singing, instrument playing) versus passive music participation (e.g. music listening, discussion).

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Appendix A  
**How-I-Feel Questionnaire (Posttest)**  
**Subject Code \_\_\_\_\_**

**Assessment of Anxiety:** (State portion [form C-1] of the State-Trait Anxiety Inventory for Children developed by C.D. Spielberger, C.D. Edwards, J. Montuori and R. Lushene)  
 Circle the word or phrase that indicates how you feel *at this very moment*.

- |     |             |                 |            |                |
|-----|-------------|-----------------|------------|----------------|
| 1.  | I feel..... | very calm       | calm       | not calm       |
| 2.  | I feel..... | very upset      | upset      | not upset      |
| 3.  | I feel..... | very pleasant   | pleasant   | not pleasant   |
| 4.  | I feel..... | very nervous    | nervous    | not nervous    |
| 5.  | I feel..... | very jittery    | jittery    | not jittery    |
| 6.  | I feel..... | very rested     | rested     | not rested     |
| 7.  | I feel..... | very scared     | scared     | not scared     |
| 8.  | I feel..... | very relaxed    | relaxed    | not relaxed    |
| 9.  | I feel..... | very worried    | worried    | not worried    |
| 10. | I feel..... | very satisfied  | satisfied  | not satisfied  |
| 11. | I feel..... | very frightened | frightened | not frightened |
| 12. | I feel..... | very happy      | happy      | not happy      |
| 13. | I feel..... | very sure       | sure       | not sure       |
| 14. | I feel..... | very good       | good       | not good       |
| 15. | I feel..... | very troubled   | troubled   | not troubled   |
| 16. | I feel..... | very bothered   | bothered   | not bothered   |
| 17. | I feel..... | very nice       | nice       | not nice       |
| 18. | I feel..... | very terrified  | terrified  | not terrified  |
| 19. | I feel..... | very mixed-up   | mixed-up   | not mixed-up   |
| 20. | I feel..... | very cheerful   | cheerful   | not cheerful   |

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**SCORE**

Appendix B  
Song List

Achy Breaky Heart  
All That She Wants  
Amazing Grace  
Barney (I Love You...)  
Beauty and the Beast  
Bingo  
Bridge Over Troubled Waters  
Can You Feel the Love Tonight  
Circle of Life  
Closer to Free  
Colors of the Wind  
Friends  
Georgia On My Mind  
Getting to Know You  
Hakuna Matata  
Hero  
How Great Thou Art  
House at Pooh Corner  
I Believe I Can Fly  
I Can See Clearly Now the Rain is Gone  
If All of the Raindrops (Oh What a World This Would Be)  
I'll Be There for You  
King of Wishful Thinking  
Lean on Me  
Ob-la-di Ob-la-da Life Goes On  
Old McDonald  
Opposites Attract  
Take Me Out to the Ballgame  
The Rainbow Connection  
The Sign  
Straight Up  
Tears in Heaven  
Twinkle Twinkle Little Star  
Two Princes  
A Whole New World  
You Are My Sunshine

Table 1.  
Analysis of Variance for STAIC Scores

	Mean				Mean Gain
	Pretest	Posttest	SD Pretest	SD Posttest	
Group 1 (n=4)	32.50	30.50	1.732	1.291	2
Group 2 (n=4)	32.50	28.75	1.732	1.258	3.75
Group 3 (n=4)	31.50	29.75	3.109	.957	1.75
Group 4 (n=3)	31.00	30.33	3	.577	.67