

**The Effectiveness of Music Therapy for the  
Reduction of Anxiety in Women Undergoing  
Stereotactic Breast Biopsies**

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**Abstract**

This clinical study measured the effectiveness of music therapy, the interaction of music and a trained music therapist, in the reduction of anxiety in women undergoing stereotactic breast biopsies. Fourteen participants were divided between a control group and an experimental group. Those patients in the experimental group received 15 to 20 minutes of music therapy, including listening to recorded music while participating in either a progressive muscle relaxation exercise or a guided imagery exercise, the presence of a trained music therapist, and listening to recorded music during the biopsy.

Participants in the control group received no music therapy. Anxiety was measured using the Spielberger State-Trait Anxiety Inventory, systolic and diastolic blood pressure, and heart rate. Results indicated that music therapy had a largely significant effect on the reduction in perceived anxiety before the biopsy and produced a significant decrease in mean heart rate after the biopsy was completed. Music therapy appeared to have little or no effect on blood pressure, perceived anxiety after the biopsy, or heart rate before the biopsy.

## The Effectiveness of Music Therapy for the Reduction of Anxiety in Women Undergoing Stereotactic Breast Biopsies

Anxiety, an emotion characterized by feelings of apprehension and helplessness, is nearly always present in people undergoing medical procedures. Although most patients would prefer to relieve anxiety because of the psychological discomfort it causes, medical professionals are also aware of the physiological complications anxiety may invoke. Anxiety is known to cause increased blood pressure, heart rate and respiration rate (Tusek et al, 1997; Hinojosa, 1995; Zimmerman, Pierson, Marker, 1988; Heitz, Symreng, Scamman, 1992), all of which lead to poor circulation, and can cause fluctuations in body temperature, urinary urgency, enlarged pupils, and loss of appetite (Aldridge, 1993). It has been found that anxiety leads to increased cortisol levels, which inhibit the immune system and blood clotting. Lastly, conditions that arouse anxiety increase pain (Mulooly, Levin, & Feldman, 1988). Thus, it is to the patient's advantage to keep anxiety at a minimum.

### *Music and Anxiety*

Music has been frequently utilized in the medical field as a method of reducing anxiety. Mulooly et al. (1988) investigated the use of music for postoperative anxiety and found that abdominal hysterectomy patients reported lower anxiety levels after listening to ten minutes of easy-listening music as compared to patients who were not exposed to this intervention. The use of music was compared to the use of verbal distraction in a study by Steelman (1990), who concluded that although the methods were comparable for the reduction of anxiety, music was more effective in the reduction of blood pressure. In a study by Schuster (1985), adult patients listened to music during

hemodialysis. These patients were found to have significantly lower blood pressure before and after their treatment, suggesting that simply knowing that they would have the opportunity to listen to music may have influenced anxiety levels. Cruise et al. (1997), in a study of elderly outpatients undergoing cataract surgery, were unable to show objective evidence of reduction in anxiety due to music listening, although they observed that patients who received relaxing music were more satisfied with the operative experience and felt more relaxed than patients receiving white noise, relaxing suggestions, or operating room noise. In other studies the effectiveness of music in the reduction of anxiety has been measured in myocardial infarction patients (Bolwerk, 1990) (White, 1992), with women during Cesarean births (Stein, 1991), and in coronary care units (Zimmerman, 1988).

Music has been paired with other therapeutic techniques to reduce anxiety. Davis (1992) measured the effects of music and basic relaxation techniques on pain and anxiety of women undergoing in-office gynecological procedures. Although application of a Mann-Whitney U test revealed no significant differences, the mean scores of self-report data suggested a higher anxiety level reported by control subjects than by subjects receiving music and relaxation techniques. In a study of pediatric patients, group music therapy sessions, including singing, action songs, and instrument playing, were found to decrease observed anxiety in children before surgery (Aldridge, 1993). Guided imagery and music together were found to decrease pain and anxiety in patients undergoing elective colorectal surgery in a study by Tusek, et al. (1997).

*Music Therapy*

Music therapy incorporates music and the direction of a trained music therapist. Although many of the studies described above measured only the effects of music listening, it is the belief of most professionals in this field that the interaction that occurs between therapist and client is as important in reaching therapeutic goals as is the music. "...It is not merely the music, but the intervention by the therapist that is crucial..." (Cowan, 1991). This applies to goals of anxiety reduction. In all but one of the studies mentioned above, music was prescribed without the presence of a music therapist.

*Stereotactic Breast Biopsy and anxiety*

Core needle biopsy of the breast under stereotactic guidance can eliminate the need for surgery in many women with breast lesions. This procedure can be done without scarring, postbiopsy breast deformity, or multiple visits to the physician and hastens the diagnosis of breast disease. It is also done on an outpatient basis and is considerably less expensive than surgical biopsy. The decision to biopsy a lesion with the stereotactic method is made by a surgeon, who takes into account the location and consistency of the lesion and the likelihood that the lesion is malignant. This method of biopsy is not appropriate for all cases (Dershaw, 1996).

For most women, a breast biopsy is a significantly stressful event. Many studies indicate that the most stressful time in the diagnostic procedure is the time immediately prior to the biopsy (Seckel and Birney, 1996). In a study by Dershaw (1996) it was found that 51% of women undergoing stereotactic breast biopsies were unable to return to their normal activities on the day of the procedure. "This finding was largely the result of the emotional stress of the biopsy."

The study described in this paper measures the effects of music therapy, the combination of a music intervention and the interaction of patient and therapist, on the reduction of anxiety in women undergoing stereotactic breast biopsies.

## **Method**

### *Participants*

Fourteen women who had been scheduled for stereotactic breast biopsies at University Hospitals of Cleveland MacDonald Breast Center served as participants. The women were selected solely on a basis of appointment time, as the research was conducted two mornings each week. The ages of the women ranged from 34 to 65 years. After being contacted by the researcher prior to the day of the biopsy, each of the women voluntarily agreed to participate in the study.

### *Apparatus and instruments*

A Sony boom box, a Sony Walkman cassette player, and Audiophase Ear Buds were used to play recorded music. A cassette tape compiled by the researcher and containing selections of music by a variety of artists was available in each of the following genres: classical, jazz, and 60's and 70's. Tapes featuring additional genres would have been compiled had a patient requested another style. One patient did request to use her own CD, which was permitted by the therapist.

A medical assistant, nurse, or radiology technician using a standard manual cuff and gauge measured blood pressure. Heart rate was also taken manually by either a medical assistant or the music therapist.

The state anxiety portion of the Spielberger State-Trait Anxiety Inventory (STAI) was used to measure self-report anxiety. Anxiety increases as a person perceives a stressful situation as threatening. This instrument measures an individual's perception of the threat of that stress. The STAI is reported to require of the participant a fourth to fifth grade reading level, and contains twenty questions (Spielberger, 1983).

### *Procedure*

Prior to the day of the biopsy, the researcher spoke with each participant to request her participation in the study and to assess musical preferences. On the day of the biopsy, each participant in the experimental group received 15 - 20 minutes of music therapy, which included listening to recorded music, guided imagery or progressive muscle relaxation, and the presence of a trained music therapist. Blood pressure, heart rate, and the STAI, were measured prior to and immediately following the music therapy intervention. The participant continued to listen to the recorded music during the biopsy, either through the boom box or the Walkman, and the music therapist was present throughout the procedure, offering verbal support and a familiar presence. The music therapist also controlled the volume of the music during the procedure, if the patient or medical staff requested changes. The measurements were taken again following the biopsy procedure. Each patient chose between guided imagery and progressive muscle relaxation and chose the style of music to which she would listen. Although the boom box was used during the relaxation intervention, the patient also could choose to use the boom box or the Walkman during the biopsy.

A control group was utilized in this study and compared to the music therapy group to determine the effectiveness of music therapy. Blood pressure, heart rate, and the self-report anxiety test were measured in the control group twice before the procedure (one set of measurements being taken fifteen minutes after the first) and immediately following the procedure.

### **Results**

The mean systolic blood pressure for the control group did not change before the biopsy occurred. The mean systolic blood pressure for the experimental group did show a decrease, although in this experiment it was not a statistically significant decrease. The results for diastolic blood pressure showed an even smaller non-significant decrease.

Music Therapy certainly seemed to have an effect on the patients' heart rates. The mean heart rate for the control group dropped from 82.3 to 75.7 beats per minute before the biopsy, not a significant decrease. ( $t = 0.90$ ,  $p = 0.39$ ). However, the experimental group's mean heart rate dropped from 80.9 to 72.9 beats per minute after the music therapy intervention. This was a marginally significant change ( $t = 2.09$ ,  $p = 0.06$ ). The change in heart rate after the biopsy was completed was even more striking. Those patients that received music therapy experienced a decrease in mean heart rate to 70 beats per minute after the biopsy was completed. This was an extremely significant decrease ( $t = 3.36$ ,  $p = 0.006$ ).

A one-way analysis of variance was conducted on the STAI scores. This statistical test showed that the music therapy treatment had an astoundingly significant effect on the reduction in anxiety before the biopsy ( $F = 24.71$ ,  $p = 0.0003$ ). Those in the control group experienced a mean percent reduction in perceived anxiety of 2.5%. Perceived anxiety was reduced an average of 20.7% in those patients who had received music therapy. The reduction in perceived anxiety after the biopsy was not significant for either group.

### **Discussion**

In this study, music therapy appears to have been most effective in reducing perceived anxiety before the biopsy. In addition, those patients who received music therapy experienced a larger decrease in heart rate after the biopsy than those patients receiving no music therapy.

Other methods of measurement showed little change in participants due to music therapy. Statistical analysis showed no significant decrease in systolic or diastolic blood pressure. Also, patients who have received music therapy are shown to perceive no less anxiety after the biopsy than those without music therapy. Although no significant change in heart rate was proven statistically, a large decrease in heart rate was measured immediately following the music therapy intervention in approximately one-half of the patients. Because music is an art form to which all people react differently, this discrepancy may demonstrate that music therapy is more effective for some patients than for others.

The results of this study are consistent with those of Mullooly et al. (1988), who demonstrated that music listening is effective for the reduction of anxiety. It can also be

compared to the study by Aldridge (1993), which used music therapy to produce a significant reduction of observed anxiety in pre-operative pediatric patients.

It is also important to recognize the perceptions of music therapy voiced by patients and medical staff. Many participants commented that they felt music therapy had been helpful to them, and several asked if a music therapist would be available at other times or for other procedures. The technicians and doctors assisting in the biopsies frequently showed interest in music therapy and this study, asking about the therapy techniques, sharing suggestions, and inquiring about the study results. Many staff members also mentioned that they would appreciate having an anxiety-reducing music therapy session for themselves.

As stated earlier, studies show that the most stressful time in the diagnostic procedure is the time immediately prior to the biopsy (Seckel and Birney, 1996). It is important to note that this is also the point at which music therapy seemed to be most effective in decreasing perceived anxiety. With this knowledge, health professionals may be able to implement this type of music therapy intervention before stereotactic breast biopsies or other similar procedures in order to reduce the anxiety of women immediately prior to, and possibly during, the procedure.

Music therapy is a cost-effective and appealing intervention. It is important that practitioners know of its use and validity, and the existence of trained music therapists. Nurses, doctors, and technicians should also be aware of appropriate instances in which to consult or refer a patient to a music therapist. Ideally, a music therapist should be available in any facility where procedures such as these are performed.

As a result of this study, recommendations for further research can be made. The effectiveness of different genres of music should be examined. Other music therapy interventions and group interventions might be studied. The effectiveness of music listening and music therapy interventions could be compared. Other populations should also be studied to assess the effectiveness of this type of intervention. The effectiveness of music therapy in the reduction of perceived anxiety in this study supports the need for further research in this area.

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