

## The Effect of Music Therapy on Anxiety in Patients who are Terminally Ill

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### ABSTRACT

**Background:** The literature supporting the use of music therapy in palliative care is growing. However, the number of quantitative research studies investigating the use of music therapy in palliative care, and specifically anxiety, is limited.

**Objective:** The aim of this research project was to examine the effectiveness of a single music therapy session in reducing anxiety for terminally ill patients.

**Design:** A randomized-controlled design was implemented and the following hypotheses tested. There will be a significant difference between the experimental and control groups on anxiety levels as demonstrated by the anxiety measurement of the Edmonton Symptom Assessment System (ESAS), and heart rate. The experimental group received a single music therapy intervention and the control group received a volunteer visit.

**Setting/subjects:** Twenty-five participants with end-stage terminal disease receiving inpatient hospice services were recruited.

**Results:** The first hypothesis was supported. Results demonstrated a significant reduction in anxiety for the experimental group on the anxiety measurement of the ESAS ( $p = 0.005$ ). A post hoc analysis found significant reductions in other measurements on the ESAS in the experimental group, specifically pain ( $p = 0.019$ ), tiredness ( $p = 0.024$ ) and drowsiness ( $p = 0.018$ ). The second hypothesis was not supported.

**Conclusions:** The study supports the use of music therapy to manage anxiety in terminally ill patients. Further studies are required to examine the effect of music therapy over a longer time period, as well as addressing other symptom issues.

### INTRODUCTION

ANXIETY IS A COMMON SYMPTOM for patients diagnosed with a terminal illness, regardless of whether the patient has a predisposition to anxiety or not. This anxiety presents not only in patients, but also in their family, friends and caregivers.<sup>1,2</sup> For those enduring intrusive treatment and ultimately palliative care, anxiety can become extremely debilitating<sup>3</sup> and

increases as patients become aware of their impending death.<sup>4</sup>

Both clinical and research evidence indicate that the prevalence of anxiety and depression in terminally ill patients is high.<sup>5-10</sup> In a recent study, physicians indicated that 70% of terminally ill patients experienced either moderate anxiety (49%) or severe anxiety (21%).<sup>11</sup> In fact, anxiety and depression have been found to be the most frequent psychological problems

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in palliative care,<sup>12</sup> and in Smith and colleague's study,<sup>13</sup> 25% of terminally ill patients were assessed as suffering from anxiety disorder.

Even after physical symptom issues are controlled, quality of life is still significantly affected by anxiety and depression.<sup>13</sup> The implications of psychological distress, specifically anxiety, can manifest in a number of different ways. Common themes described by anxious terminally ill patients include fears about loss of control and the manner in which they will die.<sup>3</sup> In addition, high levels of anxiety result in a wish to hasten death.<sup>14,15</sup>

It is challenging for palliative care health professionals to manage anxiety for patients and their families, and music therapy, provided by an accredited music therapist, can play an effective role in the management of this debilitating condition.

#### *Music and music therapy in palliative care*

Recorded music has been effective in managing anxiety for patients before, during and after undergoing surgery,<sup>16–20</sup> and in reducing anxiety for patients on ventilators<sup>21,22</sup> and for those undergoing medical examinations/procedures.<sup>23–28</sup>

Music therapy (provided by qualified music therapists, who engage the patient in live music experiences, including singing, songwriting, improvisation, and receptive methods), has an important role to play in the management of symptomatic issues within palliative care. A growing body of clinical work suggests that music therapy is effective in addressing physical<sup>29–34</sup> emotional<sup>35–41</sup> and spiritual<sup>42–46</sup> needs of palliative care patients. Research studies have also demonstrated the benefits of music therapy.<sup>47–51</sup> Rykov and Salmon's review<sup>52</sup> of music therapy literature located 161 music therapy and palliative care citations, while Krout's comprehensive review<sup>53</sup> included 88 clinical reports and 23 experimental reports/studies.

There is evidence that music therapy addresses anxiety in palliative care. In Krout's study<sup>53</sup> of 88 clinical reports in music therapy, the second and third most common patient goals were relaxation ( $n = 58$ ) and reduction of anxiety ( $n = 46$ ). Horne-Thompson and colleagues,<sup>54</sup> also found that symptom-based referrals, including anxiety, were the most common reason palliative care patients were referred to music therapy.

In O'Brien's survey<sup>55</sup> assessing the effectiveness of music therapy in meeting patient needs 45% of patients surveyed ( $n = 52$ ) stated that music therapy was extremely helpful in reducing anxiety, 38% stated it was helpful and 17% stated it was quite helpful. Gallagher and Steele<sup>56</sup> also investigated the effectiveness

of music therapy. Visual analogue scales measured patients ( $n = 90$ ) before and after music therapy sessions on symptoms including pain, anxiety, nausea, and depression. Music therapy was found to significantly reduce anxiety ( $p = 0.012$ ), and pain ( $p = 0.008$ ) as well as improve mood ( $p < 0.001$ ). A further study by Gallagher and colleagues<sup>57</sup> evaluated the effect of music therapy on anxiety, as well as a number of other symptom issues. Visual analogue scales implemented before and after music therapy sessions found that anxiety was significantly reduced ( $p < 0.001$ ).

Three research studies have measured the effect of music therapy on reducing anxiety for terminally ill patients. Krout<sup>58</sup> measured the effectiveness of music therapy to improve pain control, physical comfort, and relaxation. The study involved a single session music therapy intervention. Eighty subjects self-reported levels of pain control, physical comfort, and relaxation. In addition, independent behavioral observations were made immediately before and after the session. Results were significant, and the study found that pain control, physical comfort, and relaxation were effectively increased with a music therapy session, both self-reported by the participant ( $p < 0.005$ ) and reported by the independent observer ( $p < 0.001$ ).

A study by Calovini<sup>59</sup> with 11 terminally ill patients, examined state anxiety levels (defined by Lazarus<sup>60</sup> as unpleasant emotional arousal in face of threatening demands or dangers) within one music therapy session. A four-item questionnaire, and before and after readings of blood pressure, pulse rate, and extremity temperature were taken. The physiologic measures were also taken every 15 minutes during the music therapy intervention. The study found that state anxiety was not statistically significantly affected by one music therapy session. However, systolic blood pressure and pulse rate decreased, and finger temperature increased for the participants, which may indicate a trend toward reduced anxiety.

The effect of music therapy on pain relief, physical comfort, relaxation, and contentment was examined by Curtis.<sup>61</sup> Nine terminally ill patients participated, and three experimental conditions were used: no music (A), background sound (B), and music (C). While significant results were not achieved, individual responses showed that the background sound condition appeared to have a negative effect, and the music intervention a positive affect.

Research studies that have investigated the use of music therapy to manage anxiety for palliative care patients have varied in focus and design. It is the aim of this study to further examine the effect of music therapy on anxiety in palliative care patients.

TABLE 1. AGE AND GENDER FREQUENCIES

	<i>Control</i>	<i>Experiment</i>	<i>Total</i>
Age			
< 50	1	0	1
50–59	1	1	2
60–69	1	2	3
70–79	5	5	10
80–89	4	4	8
90–99	0	1	1
Gender			
Male	6	8	14
Female	6	5	11

The hypotheses for the study were:

1. There will be a significant difference between the experimental and control groups on anxiety levels as demonstrated by anxiety measurement of the Edmonton Symptom Assessment Scale (ESAS).<sup>62</sup>
2. There will be a significant difference between the experimental and control groups on anxiety levels as demonstrated by a decrease in heart rate.

## METHOD

Approval for the study was obtained through the research and ethics committee in the hospital at which this study was conducted, Calvary Health Care Bethlehem, Melbourne, Australia. Written informed consent was obtained from participants.

The participants involved in this study were inpatients receiving palliative care services due to a diag-

nosis of a terminal illness and were recruited by staff members who were not associated with the study. Patients were included if they had been referred to music therapy with anxiety as the main reason for referral, and they did not fall under the exclusion criteria. They were invited to participate in research which would “evaluate various services provided within the hospital, including music therapy and volunteers.” Participants were blinded to both the independent variable, music therapy, as well as the dependent variable, anxiety, minimizing the potential for bias.

The study was a randomized-controlled trial, and participants were randomly assigned (using a numbered envelope system), to one of two groups. Randomization was undertaken by a university statistical consulting service. Once the consent form had been signed by the participant, the numbered envelope was opened, determining the allocation to either group. A pretest–posttest design was implemented, and the experimental condition involved a single music therapy session (undertaken by a registered music therapist) of between 20–40 minutes duration. The session length was determined by accessing the mean length of a standard music therapy session in the hospital (29 minutes). The length of session was purposefully broad to adjust for the clinical state of the patient at the time of the session, while keeping within reasonable time restraints to allow for consistent pre- and postmeasurement. Sessions falling outside this duration were not included in the data.

The music therapy session comprised music therapy methods chosen by the registered music therapist in consultation with the patient as being most appro-

TABLE 2. DIAGNOSIS FREQUENCIES

<i>Diagnosis</i>	<i>Control</i>	<i>Experimental</i>	<i>Total</i>
Amyloidosis	0	1	1
Bowel cancer	1	0	1
Breast cancer	2	2	4
Chronic cardiac failure	1	0	1
Glioblastoma	2	0	2
Lung cancer	1	1	2
Lymphoma <sup>a</sup>	1	1	2
Mesothelioma	0	1	1
Metastatic melanoma	0	1	1
Non-Hodgkin’s lymphoma <sup>a</sup>	0	1	1
Non small cell lung carcinoma <sup>a</sup>	1	2	3
Esophageal cancer	1	0	1
Ovarian cancer	1	0	1
Rectal cancer <sup>a</sup>	1	2	3
Thyroid cancer	0	1	1

<sup>a</sup>Indicates that 1 patient in each diagnosis group also had a comorbidity: atrial fibrillation, chronic cardiac failure, pneumonia, or Parkinson’s disease.

TABLE 3. PREINTERVENTION ESAS ANXIETY RATING—MEAN AND STANDARD DEVIATION

	<i>Control</i>		<i>Experimental</i>	
	<i>Mean</i>	<i>Standard deviation</i>	<i>Mean</i>	<i>Standard deviation</i>
Anxiety	3.2	3.13	3.8	3.21

ESAS, Edmonton Symptom Assessment System.

priate for the patient on the day. These techniques included playing live familiar music, singing, music and relaxation, music and imagery, improvisation, music-assisted counseling, reminiscence, and listening to recorded music. The music therapist was not blinded to the purpose of the study.

The control group received a single session with a volunteer. The volunteer was not blinded to the purpose of the study. Although a control group traditionally receives nothing other than standard care, it is fair to argue that an intervention is obviously more effective than no intervention, and it is also difficult to undertake pre- and posttesting with a group that receives nothing. Therefore, the control sessions involved a volunteer sitting with the participant, undertaking activities that a volunteer would normally do, such as reading to the participant, engaging in conversation, and/or providing emotional support. The volunteers were instructed not to use music. Patients assigned to the control group continued to receive music therapy services outside of this study.

Twenty-five participants aged between 18 and 90 years completed the study, and were randomly assigned to either the experimental group ( $n = 13$ ), or the control group ( $n = 12$ ). An original sample size of 60 (30 in each group) had been set. In order to determine the power of the study, published research was used to estimate the standard deviation between two proximate measures of anxiety.<sup>63,64</sup> Assuming  $n = 30$  in each group and a standard deviation of 25 mm, with standard settings for a two-sample  $t$  test to test the difference between the experimental and control groups

( $\alpha = 0.05$ ), power = 80%. Therefore, comparing the experimental and control groups, if the true effect was an average improvement of more than 18.4 mm, the study would have adequate power to detect this (i.e., greater than 80%).

Exclusion criteria included a Blessed Orientation, Memory and Cognition (BOMC)<sup>65</sup> score of more than 10, indicating that the participant was cognitively impaired and therefore unable to give informed consent. The BOMC<sup>65</sup> is a 28-item cognition test, routinely administered to patients on medical admission to the hospital. Participants were also excluded if they were unable to speak English, and therefore unable to complete the necessary documentation, or had a major hearing impairment.

The following tools were used for the study:

- The ESAS,<sup>62</sup> a commonly used tool devised for a palliative care population by Bruera and colleagues. This is a 0–10 scale, listing 9 common symptomatic issues for palliative care patients and offering a further scale for the patient to add another symptom they may be experiencing. Patients rate the severity of their symptom, with 0 indicating no symptom and 10 indicating worst possible symptom. The ESAS was completed by the patients immediately before and after the intervention. For both groups, these data were collected by an independent staff member not involved with the study (most commonly the primary nurse).
- A pulse oximeter.

Independent staff members not involved with the study (most commonly the primary nurse) took the pre- and postmeasurements of heart rate for both groups.

Because of lower than expected recruitment, only 25 participants completed the study, instead of the expected 60. As the numbers in each group were small, it was appropriate to use a nonparametric technique, which makes fewer assumptions about the underlying distribution of the data. Therefore, a Mann-Whitney test was used to compare the median changes. A  $p$

TABLE 4. RANGE OF IMPROVEMENT ON ESAS ANXIETY SCALE (PRE MINUS POST)

	<i>Negative change</i>		<i>No change</i>	<i>Positive change</i>				
	<i>-2</i>	<i>-1</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Experimental	0	0	8	2	3	1	1	1
Control	1	2	5	1	0	0	0	0

ESAS, Edmonton Symptom Assessment System.

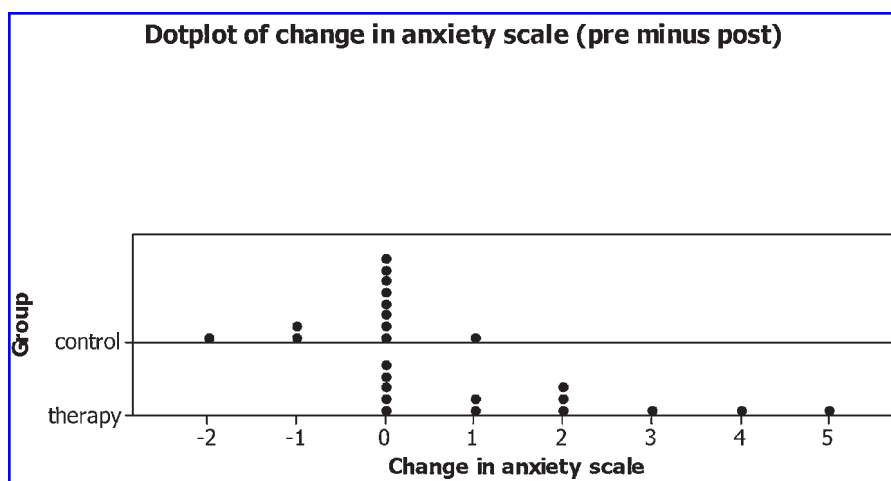


FIG. 1. Results of pre- and postmeasurements on the Edmonton Symptom Assessment System (ESAS) anxiety scale.

value of 0.05 was considered evidence of a statistically significant difference between the therapy and control groups.

## RESULTS

### Baseline demographic

The demographic data were similar for the two groups (Table 1). The mean age for the control group was 71.4 years (SD = 16.05), and 76.2 years for the experimental group (SD = 10.36). Overall the mean age was 73.9 years (SD = 13.32).

Twenty-four participants in the study had a cancer diagnosis, and one participant had a diagnosis of end-stage organ failure (Table 2).

### Hypothesis 1

The first hypothesis, that there will be a significant difference between the experimental and control groups on anxiety levels as demonstrated by the anxiety mea-

surement of the ESAS, was supported. Table 3 shows the preintervention ESAS anxiety rating.

A nonparametric test for independent samples was used to compare the two groups. Table 4 reports the change in the scale for each group. The Mann-Whitney test found that anxiety was significantly reduced for the experimental group ( $p = 0.005$ ). The control group demonstrated no change over the same period of time.

As can be seen in Table 4, eight participants in the experimental group reported a decrease in anxiety of between 1 and 5 points on the ESAS scale. In contrast, only 1 participant in the control group reported a decrease in anxiety of 1 point. Three participants in the control group reported that their anxiety had increased pre-post intervention. Figure 1 graphically represents the change in anxiety on the ESAS for the experimental and control groups.

In addition to the anxiety measure, a post hoc analysis was also performed for the other nine scales on the ESAS. Significant results were obtained for pain, tiredness and drowsiness (Tables 5 and 6). No significant results were obtained for either group on the mea-

TABLE 5. PREINTERVENTION ESAS RATINGS—MEAN AND STANDARD DEVIATION

	Control		Experimental	
	Mean	Standard deviation	Mean	Standard deviation
Pain	2.2	2.62	3.6	3.45
Tiredness	4.3	2.89	6.5	2.44
Drowsiness	2.8	2.95	5.3	2.36

ESAS, Edmonton Symptom Assessment System.

TABLE 6. ESAS RESULTS FOR OTHER SCALES

ESAS scale	p value
Pain	0.019
Tiredness	0.024
Drowsiness	0.018
Nausea	0.2
Depression	0.097
Appetite	0.092
Well-being	0.077
Shortness of breath	0.073

ESAS, Edmonton Symptom Assessment System.

TABLE 7. RANGE OF IMPROVEMENT ON ESAS SUBSCALES (PRE MINUS POST)

ESAS subscale	Group	Negative change				No change	Positive change						
		-4	-3	-2	-1	0	1	2	3	4	5	6	>6
Pain	Exp	0	0	0	0	5	2	1	3	0	1	1	0
	Control	0	1	1	1	7	1	0	0	1	0	0	0
Tiredness	Exp	0	0	0	0	2	5	1	3	0	1	0	1
	Control	0	0	0	3	5	1	1	2	0	0	0	0
Nausea	Exp	0	0	0	1	8	1	1	0	1	0	0	1
	Control	0	0	1	1	9	0	1	0	0	0	0	0
Depression	Exp	0	0	1	0	7	2	0	2	0	1	0	0
	Control	0	0	0	2	10	0	0	0	0	0	0	0
Drowsiness	Exp	0	0	1	2	1	3	2	1	2	1	0	0
	Control	0	0	2	4	4	2	0	0	0	0	0	0
Appetite	Exp	0	0	1	0	4	3	1	2	0	1	0	1
	Control	1	0	1	1	6	1	1	0	0	0	1	0
Well-being	Exp	1	0	0	0	3	3	3	3	0	0	0	0
	Control	0	0	1	1	7	1	1	1	0	0	0	0
Shortness of breath	Exp	0	0	0	0	6	1	0	2	2	2	0	0
	Control	0	0	0	2	6	3	1	0	0	0	0	0

ESAS, Edmonton Symptom Assessment System.

surements of nausea, depression, appetite, well-being, and shortness of breath.

Table 6 demonstrates the *p* value results for the other ESAS subscales and Table 7 demonstrates the range of improvement.

The second hypothesis, that there will be a significant difference between the experimental and control groups in anxiety levels as demonstrated by a decrease in heart rate, was not supported (Table 8).

## DISCUSSION

The results of the study support the use of music therapy as an effective intervention when working with anxious participants who are in the last stages of a terminal illness.

### Hypothesis 2

The first hypothesis, that there will be a significant difference between the experimental and control groups in anxiety levels as demonstrated by the anxiety measure on the ESAS, was supported. This result is particularly important, given that patient self-reporting of symptoms is considered to be the gold standard.<sup>64,66</sup> It was interesting to note that despite participants being referred to music therapy for anxiety management as perceived by staff, three participants in the control group, and three participants in the experimental group, reported 0 anxiety on the ESAS scale prior to the intervention. It is unclear

whether these participants were not willing to report their anxiety, whether staff had been incorrect in their assessment of the participant, or whether participant anxiety had abated by the time they completed the ESAS.

### Post hoc results of the ESAS

It was noteworthy that pain, tiredness, and drowsiness on the ESAS scale were also significantly reduced for the experimental group. Given that the participants in this study had not been referred to music therapy for pain control, it is interesting that pain was significantly reduced for the experimental group (*p* = 0.019). It is known that anxiety and pain are often interrelated.<sup>4,67</sup>

Tiredness and drowsiness were also significantly reduced for the experimental group post music therapy. Lethargy and fatigue are commonly experienced symptoms of palliative care patients,<sup>11</sup> and can be the

TABLE 8. MEAN HEART RATE (bpm), STANDARD DEVIATION, AND *p* VALUE (OUTLIERS REMOVED)

	Control		Experimental	
	Heart rate (bpm)	SD	Heart rate (bpm)	SD
Pre	88	13.34	85	15.61
Post	87	14.32	84	14.92
Median change	2		1.5	
<i>p</i> value	0.8			

bpm, beats per minute; SD, standard deviation.

most distressing.<sup>68</sup> The results of this study indicate that music therapy may be a stimulating or an uplifting experience for palliative care patients, and that reduction in anxiety does not necessarily lead to a drowsy patient. The fact that both tiredness ( $p = 0.024$ ) and drowsiness ( $p = 0.018$ ) were significantly reduced for the experimental group, demonstrates that music therapy can be an effective intervention in managing this common problem.

Significance was not obtained on the other scales on the ESAS, specifically nausea, depression, appetite, well-being, and shortness of breath. However, trends were noted toward a positive improvement for the experimental group.

### *Hypothesis 2*

The second hypothesis, that there will be a significant difference between the experimental and control groups on anxiety levels as demonstrated by a decrease in heart rate was not supported. However, Davis and Thaut<sup>69</sup> reported that physiologic data from their study investigating the use of preferred relaxing music on state anxiety, relaxation, and physiologic responses suggested that music may energise participants rather than having a relaxation effect. Given that the participants in the experimental group in the current study had significantly reduced tiredness and drowsiness after music therapy, it could suggest that increased energy levels may be reflected through an increase in heart rate.

### *Methodological issues*

The main limitation of the study was in recruitment, considered to be a common problem for palliative care researchers.<sup>70,71</sup> Attrition rate is another challenge faced in undertaking research with palliative patients.<sup>72</sup> Seventeen percent ( $n = 5$ ) of the participants in this study who had signed a consent form either died or were discharged before the intervention was undertaken.

A further difficulty in recruitment was that patients did not qualify for the study due to the exclusion criteria. Cognitive impairment and non-English-speaking backgrounds were the most frequent reasons for exclusion. Multisite data collection, which could provide a much larger sample size, or alternatively a long data collection period would improve the study design.

## **CONCLUSION AND RECOMMENDATIONS**

This study has been beneficial in demonstrating that music therapy significantly reduces anxiety for termi-

nally ill patients after a single session. The use of self-reporting, considered to be the most reliable method of determining symptom issues, has demonstrated that a single session music therapy intervention can reduce anxiety and thereby improve quality of life for these patients. Results contribute to the limited literature that is currently available addressing the impact of music therapy with the anxious terminally ill. In addition, this study has also demonstrated that music therapy significantly reduces pain, tiredness and drowsiness in palliative care patients.

Evidenced-based studies that provide quantitative data are essential to demonstrate the effectiveness of music therapy interventions and to justify financial resources.

Further studies are needed to test the effects of music therapy on distressing symptoms such as anxiety and pain. As these symptoms are in a state of flux in patients who are in the palliation stage of illness, research must focus on brief interventions over days, not weeks. This study has shown the benefits of music therapy after a single session, however further studies are needed to explore the effects on other symptoms, and over a marginally longer time.

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