



# The Effect of Music Listened to During the Recovery Period After Day Surgery on the Anxiety State and Vital Signs of Children and Adolescents

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## ABSTRACT

**Aim:** To evaluate the effect of music listened to during the recovery period after day surgery on the anxiety state and vital signs of child and adolescent patients.

**Materials and Methods:** A pre-test/post-test control group design. Intervention group (listened music) and control group were compared.

**Results:** Patients (n=65) who listened to music demonstrated less anxiety than those who did not listen to music (n=65). Also, in the intervention group, pulse rates, diastolic and systolic blood pressure values and respiratory rates decreased after music therapy.

**Conclusion:** Music listened to during the post-operative recovery period decreases the anxiety level of patients. Music therapy is a method which shows a positive effects on pulse rate, diastolic and systolic blood pressure values and respiratory rate without any side effects. Music therapy may be included in nursing care procedures applied to patients after day case surgery during the recovery period.

**Keywords:** Music, anxiety, vital signs, day surgery, child and adolescent

## Introduction

It has been reported that the decision to make a surgical intervention makes individuals feel anxious regardless of the type of surgical procedure. Anxiety may also result from a fear of the unknown, a fear of the inability to wake up or death after anesthesia, a loss of control, pain, being isolated, leaving loved ones and being isolated from social life (1-3). Many reasons such as the strange hospital environment, the health team using medical terms and the application of strange devices have also been reported to be effective in anxiety levels of individuals (4). Surgical interventions make children feel stressed, which is expressed as anxiety, fear

or anger. This situation may cause negative physiological and psychological reactions throughout the surgical process and increases pain and the need for analgesia in the early post-operative period (5-7). Complementary treatment modalities are applied in addition to medical treatment to support patient care and increase the quality of life. Complementary treatment modalities provide relaxation by activating sensory perceptions. In addition to decreasing some physiological indicators such as pulse rate, blood pressure and respiration, the relaxing effect may also be beneficial in controlling or preventing some intensive care related complications such as sleep disorder, pain and anxiety. Music is one of the complementary treatment methods (8-10).

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Music therapy makes individuals express their emotions such as pain, stress and fear. It helps in meeting individuals' physical, emotional and psychological requirements (6,11). Furthermore, it is an alternative treatment modality which decreases blood pressure, the heart rate, body temperature and the respiratory rate. Many recent studies revealed that music decreased the level of anxiety, pain, analgesic need and stress hormone levels of patients (4,10,12-21). Studies which examined the effect of music listened to by children in the preoperative period revealed that their level of anxiety decreased (1,4,15,22). In the literature, it is stated that the vital signs and anxiety levels of patients who listened to music in the post-operative period were lower than the control group (1,10,13,17,20,23-26). At present, music is used in palliative care for therapeutic purposes, surgical operations, pediatric departments, intensive care units, departments of psychiatry, oncology, obstetrics and gynecology, coronary care, radiotherapy and chemotherapy procedures to treat some symptoms such as pain and anxiety (6,10,18).

The aim of this study was to evaluate the effect of music listened to during the recovery period after day case surgery on the anxiety state and vital signs of child and adolescent patients.

## Materials and Methods

This study is a pre-test post-test and control group design. This study examined the effect of music listened to during the recovery period after day case surgery performed in the pediatric surgery department on the anxiety states and vital signs of children.

### Setting and Data Collection

The participants in this study were children and adolescents aged 9-17 years who underwent day case surgery at Ege University, Pediatric Surgery Clinic between June-September 2014. The inclusion criteria were as follows: 1) those who understood the purpose of the study and who voluntarily agreed to participate; 2) between the ages of 9-17, 3) no mental retardation in the child, 4) patient's daily surgical intervention, 5) the patient is operated on with general anesthesia. A power analysis was used to calculate the sample size for a finite population. In order to ensure a sample size for 80% power, a pilot study was performed on 15 subjects from an experimental group and 15 subjects from a control group at the beginning of the research. In both groups, pulse, diastolic blood pressure, systolic blood pressure, saturation, body temperature, total duration of sleep in the recovery room and the mean anxiety scores obtained before and after music therapy/operation were evaluated. Power analysis determined a total number of 130 children and adolescents, with 65 in the experimental group and 65 in the control group, to be involved in the study sample. The children were randomly assigned to either the

study or the control group (Figure 1). Inclusion criteria were that the patient: 1) wake up from surgery and be aged 9-17 years, 2) had not undergone surgery before, 3) had not been diagnosed with a hearing impairment, 4) had been operated on with general anesthesia.

### Measuring Instruments

The socio demographic characteristics of the participants included gender, age, level of education, place of residence, income status. "State-Trait Anxiety Inventory (STAI) for Children" to evaluate anxiety states of children and

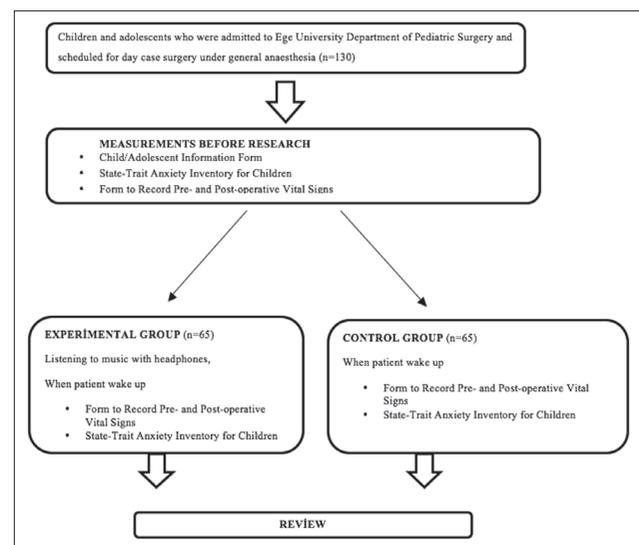


Figure 1. Flow-chart of the study

adolescents, a music player and "Form to Record Pre- and Post-operative Vital Signs" were used.

### State-Trait Anxiety Inventory for Children

In the State Anxiety scale, the children were requested to mark one of 3 choices about how they felt at that time point. The aim of the scale is to evaluate the emotions related to their state of anxiety such as feeling of tightness, nervousness, hurry and uneasiness. Half of the items indicate the presence of some situations such as tightness, hurry and uneasiness, while the others do not. The presence of a feeling of tightness, hurry and uneasiness is rated as 3 when children feel them "much", while 1 point is given if these are not felt by children at all. Maximum and minimum scores that can be obtained from the State Anxiety scale are 60 and 20 points respectively. The aim of the Trait Anxiety scale is to measure permanent individual differences in the predisposition to anxiety. The scale consists of 20 items. The child is requested to score how he/she "usually" feels. He/she is requested to choose the most appropriate choice considering the order of frequency of the situation given in the item. When the choice "very often" is chosen, the highest point 3 is scored, the lowest point 1 is scored when the choice "almost never"

is selected. The highest and lowest scores are 60 and 20 respectively (27,28).

### Listening to Music Tool

The classical music to be listened to by the study group ("The Art of The Fugue" by Bach) was chosen by a professor from a university department of musicology. The experimental groups listened to the music at the same volume with same type of headphone and music player for 20 minutes during the recovery period. We ensured that the headphones were externally covering all parts of the ear and filtered all external voice and noise. The Art of the Fugue is more than an hour and consists of 18 episodes. The patients listened to Contrapunctus Episode 3 of this work. This section consists of 4 sound bangs. It is preferred because the piece moves slowly and smoothly (29).

### Form to Record Pre- and Post-operative Vital Signs

A form was prepared to record the pre- and post-operative vital signs of the patients (pulse, systolic-diastolic blood pressure, oxygen saturation, body temperature) and the duration of recovery in post-anesthesia care unit.

### Procedure

The interventions for each of the experimental and control groups were as follows:

**Control group:** In the preoperative period, following the explanation of the aim of the study, the sociodemographic form and STAI Scale for Children were filled out by a researcher 15 minutes before the operation. And then, we recorded the vital signs (diastolic and systolic blood pressure, pulse, respiratory rate and body temperature). When the participants came to the ambulatory unit, the time was recorded. Their vital signs were measured after waking up. The patients in the control group did not listen to music. The STAI Scale for Children was re-applied when the patients in the control group woke up. The STAI scale was filled out about 20 minutes after the surgery was over.

**Experimental group:** Following the explanation of the aim of the study, the headphone and music player that were to be used were introduced. The patients were informed that they would be wearing the headphone when they woke up. After giving information, the information form and STAI for Children were filled out by a researcher 15 minutes before the operation. The pre-operative vital signs of the patients who accepted enrolment in the study were recorded on the pre- and post-operative Vital Signs form. In the postoperative period, participants listened to the chosen classical music from the headphones. When they came to the ambulatory unit, we recorded the time. Until the doctors said that participants had woken up fully, they continued to listen to music for about 20 minutes. The music was stopped in the cases of early recovery. Vital signs were measured and the time of recovery was recorded after the procedure. "State Anxiety Scale for Children" was re-applied when the patients woke

up. This study's protocol was approved by the Institutional Review Board of Ege University Faculty of Nursing, Scientific Ethics Committee (approval no: 2014/59) and The Hospital of Ege University Scientific Ethics Committee (approval no: 14-5/13). Participation in the survey was on a voluntary basis. All participants were informed that they could withdraw from the study at any time before the commencement of the study.

### Statistical Analysis

The data were analysed using the Statistical Package for the Social Sciences for Windows (SPSS for Windows, Client Version 16.0). The socio-demographic characteristics of the children included in the study were assessed in numbers and percentages. In the evaluation of the children and adolescents in the study and control groups, number and percentage distribution and homogeneity test ( $\chi^2$ ) for gender distribution, Mann-Whitney U test, significance test for difference of two means, t-test and chi-square test were used. The results were evaluated within a 95% confidence interval, while a p value <0.05 was accepted as significant.

### Results

In the study group, 38.5% of the children and adolescents were girls and 61.5% of them were boys, while these percentages were 38.5% and 61.5% in control group respectively (Table I). The economic condition of the children and adolescents in the study group was low for 30.8%, medium for 53.8% and high for 15.4%, while these values were 36.9%, 50.8% and 12.3% in control group respectively (Table I).

### Comparison of the Groups in Terms of Vital Signs

In the analysis of the pre-operative groups' diastolic blood pressure, there was no difference between the groups (Table

Demographic information	Experimental group (n=65) n (%)	Control group (n=65) n (%)	Total (n=130) n (%)
<b>Gender</b>			
Girl	25 (38.5)	25 (38.5)	50 (38.5)
Boy	40 (61.5)	40 (61.5)	80 (61.5)
<b>Economic situation</b>			
Low	20 (30.8)	24 (36.9)	44 (33.8)
Middle	35 (53.8)	33 (50.8)	68 (52.3)
High	10 (15.4)	8 (12.3)	18 (13.8)
<b>Place of residence</b>			
City center	53 (81.5)	50 (76.9)	103 (79.2)
Town	10 (15.4)	12 (18.5)	22 (16.9)
Village	2 (3.1)	3 (4.6)	5 (3.8)

II). However, systolic blood pressure, pulse and respiratory rate values of the experimental group were found to be significantly higher when compared to the control group ( $p < 0.05$  for each value) (Table II).

In the analysis of the pre-operative and post-operation experimental group, the vital signs of the groups, namely the diastolic and systolic blood pressure, pulse and respiratory rate values of the study group were found to be significantly lower when compared to control group ( $p < 0.05$  for each value) (Table II). When the analysis of differences between groups were tested, it was found that the difference in the diastolic and systolic blood pressure, pulse and respiratory rate measurement values before and after surgery for those who listened to music was statistically significant. The analysis of the pre-operative and after operation experimental group's body temperature ( $p > 0.05$ ) and saturation ( $p > 0.05$ ) measurement values revealed no statistically significant difference. The duration music listened to of the study

group was 16.24 minutes, while it was 17.46 minutes in the control group. There was no statistically significant difference between the groups ( $p > 0.05$ ).

### Comparison of the Groups in Terms of Anxiety State

There was no significant difference in the pre-operative State Trait Anxiety scale total scores of the children. The analysis of the trait scale total scores of the groups demonstrated no statistically significant difference ( $p > 0.05$ ). (Table III). The mean pre-operative state anxiety scale total score was 38.5 in the study group, while it was 38.32 in the control group (Table III). No statistically significant difference was detected between the pre-operative state anxiety levels of the study and control groups ( $p > 0.05$ ). In the analysis of the post-operative experimental group mean total points of state anxiety scale of the groups, it was found to be 35.01 in the study group and 41.23 in control group (Table III). The anxiety level of the study group was seen to be lower than that of the control group ( $p > 0.05$ ).

### Discussion

Music has psychological and physiological effects on individuals. Music sometimes allows the intensification of emotions, while it sometimes causes relaxation and calmness. Music activates the parasympathetic nervous system and by this way, it causes a decrease in some physiological signs such as blood pressure, pulse and respiration (6,10,18). The hospital environment, hospital stay or invasive procedures cause anxiety in the patients. The physiological response of the body given in case of anxiety may differ. It was reported that anxiety causes an increase in heart rate, blood pressure, body temperature and respiratory rate of individuals (13-16). Studies in the literature detected positive effects of music on anxiety and vital signs (17,20,23). It has been shown that listening to relaxing, calming music positively affects the pulse rate in the studies mentioned in the literature (1,10,13,17,20,23-25). In our study, it has been found that the pre-operative heart rate of the experimental group was higher than the control group. After surgery, the pulse rate in the control group was increased. Also, there was a decrease in the pulse rate in the study group after listening to music. As the change between the groups was statistically significant, it was concluded that the music played to the awakening children and adolescents had a positive effect on the pulse rate. The results of the research are consistent with our study. In line with these results, it is concluded that the music played during awakening of the children and adolescents from the operation have a positive effect on the pulse rate. When the studies in the literature are examined, only Hatem et al. (17) investigated the effects of music on fever. In this study, there was no statistically significant difference between the control and the study group when the fever rate was compared. According to the

**Table II.** Comparison of the groups in terms of vital signs (n=130)

		Experimental group (n=65) M ± SD	Control group (n=65) M ± SD	P value
Pre-operative	Pulse	103.01±20.24	92.98±18.55	0.000
	*DKB	70.70±9.74	68.46±12.43	0.066
	**SKB	112.90±10.82	106.06±16.84	0.010
	***RR	26.73±3.78	23.16±3.38	0.000
Post-operative/ music	Pulse	90.98±13.78	102.92± 17.29	0.000
	DKB	69.47±10.78	74.30±10.59	0.011
	SKB	107.16±11.92	115.78±23.68	0.000
	RR	22.89±2.84	25.32±3.94	0.001

\*DKB: Diastolic pressure, \*\*SKB: Systolic blood pressure, \*\*\*RR: Respiratory rate, SD: Standard deviation, M: Mean

**Table III.** Comparison of the groups in terms of anxiety state (n=130)

		Experiment group (n=65) M ± SD	Control group (n=65) M ± SD	F value	p* value
Pre-operative	Trait anxiety	42.03±4.06	42.65±4.57	1.00	0.419
	State anxiety	38.58±4.41	38.32±3.79	5.12	0.718
Post-operative	State anxiety	35.01±3.19	41.23±4.34	4.08	0.000

\*Student t test results, SD: Standard deviation, M: Mean

research done, it was concluded that the music played to the children in the intensive care of the cardiology unit is not effective on the fever rate (17). The results of this research are in line with our research. According to the result of the research, music has no effect on the patients' fever rate. In the studies performed, it was stated that the experimental group's diastolic and systolic blood pressure was lower than the control group (1,10,20,21,24-26). However, Sabzevari et al. (23) found that the systolic blood pressure was lower in the group in which the music was listened to, but the diastolic blood pressure was not different. The results of our study are the music played during the awakening of the children and adolescents had a positive effect on the diastolic and systolic blood pressure. In studies investigating the effect of music on respiratory rate, it was determined that the respiration rates of the experimental groups were lower in comparison with the control group (1,10,13,17,25). In our study, there is also a positive effect of music on the respiratory rate. There was no difference found between the experimental and control groups in terms of saturation values similar to the results of our study. There was no difference between the experimental and control groups in terms of oxygen saturation values (13,17,25). Our study shows that the groups are similar in terms of oxygen saturation values. No change in the oxygen saturation value of the control group was observed after listening to music. In the study group, the music ensured the oxygen saturation level remained within the normal limits. The postoperative measurement showed minimal change in the oxygen saturation value of the control group, but this change is not statistically significant. In line with these results, there is no effect on the oxygen saturation value of children and adolescents who listened to music while awakening. There was no difference between the groups in terms of the pre-operative state anxiety score. These results suggest the similarity of the groups in our study. The results of the analysis demonstrated that anxiety levels of the control group increased, while decreases were observed in the anxiety levels of the study group. Music was found to prevent an increase in the post-operative anxiety levels and contribute to a decrease of anxiety. In their study, Pitmann and Kridli (4) re-evaluated 12 studies. As a conclusion, they reported that music caused a significant decrease in anxiety scores of patients and lowered anxiety levels (4). Klassen et al. (9) analysed research examining the effect of music on children who have undergone medical intervention. They assessed 12 data bases and 393 studies. They analysed 19 randomized controlled studies aged 1-18 years which matched the research criteria. The results of the analysis showed that music was an effective method in decreasing anxiety levels of children after medical interventions (9). A study by Hatem et al. (17) revealed that, in children who have undergone pediatric cardiac surgery, classical music listened to for 30 minutes decreased pain and anxiety levels. In the study

by Cooke et al. (22), music was reported to have a positive effect on anxiety levels. Fenko and Loock (15) found that the group who listened to music indicated a lower anxiety score. In a study by Han et al. (25), the music intervention group was found to have a lower anxiety score than the control group. Phumdoung and Good (11) found that music was an effective way to reduce the stress of patients. Nilsson (6) reported that patients who underwent surgery with general anesthesia were played music intraoperatively or postoperatively. According to the result of this research, they stated that the music played during the postoperative period reduced the level of anxiety (6). Kahloul et al. (24) reported that music has a positive effect on anxiety levels in patients undergoing abdominal surgery. Nelson et al. (26) found that music reduced anxiety levels in patients undergoing spinal fusion surgery. Our finding was consistent with the results of other studies and it was concluded that music therapy applied during the recovery period after pediatric day case surgery decreased anxiety levels. We suggest that similar pre-operative state and trait anxiety scores of the groups, enrolment of only the patients who underwent day case surgery and normal gender distribution of the groups might have increased the effect of the music.

#### **Study Limitations**

Our work has several limitations. The first study was conducted in a single center with children who underwent only single day surgical intervention. No evaluation was done in children undergoing intervention with local anesthesia or in younger age groups. Also, children listened to the music we chose. Another limitations of the research was that the vital findings before and after listening to music were not recorded in the post-operative period. For these reasons, the findings of study may not apply to other centers.

#### **Conclusion**

In this study, there was no difference between the groups in terms of their initial state and trait anxiety total scores. In the post-operative period, the State Anxiety scores of control group increased, while the State Anxiety scores of the experimental group decreased. Following music therapy, pulse, respiratory rate, systolic and diastolic blood pressure values of the study group significantly decreased. Music listened to by the children and adolescents during the post-operative recovery period decreased the level of anxiety. It was concluded that music therapy is a method with a positive effect on pulse, diastolic and systolic blood pressure and respiratory rate values. Listening to music may be included in nursing care procedures applied to patients after day case surgery during the recovery period. In order to utilize music therapy which is one of the independent nursing interventions applied in the recovery unit, in-service training activities may be organized and continuity may be ensured. The findings

provide further evidence to support the practice of listening to music to reduce post-operative anxiety and lower systolic and diastolic blood pressure, respiratory rate and heart rate in patients after a day surgery in Turkey. Studies can also be carried out for different groups undergoing different surgery. Music can be listened to for younger age groups who also have daily surgical intervention. The music of the patients themselves or other relaxing music can be used.

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### Ethics

**Ethics Committee Approval:** The Institutional Review Board of Ege University Faculty of Nursing Scientific Ethics Committee (approval number: 2014/59) and Hospital of Ege University Scientific Ethics Committee (approval number: 14-5/13).

**Informed Consent:** A consent form was filled out by all participants.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: Z.B.B., A.K., Concept: Z.B.B., A.K., Design: Z.B.B., A.K., Data Collection and Processing: A.K., Analysis and Interpretation: A.K., Literature Search: Z.B.B., A.K., Writing: Z.B.B., A.K.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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