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Impact of a Structured Music Intervention on Patient Recovery and Nursing Care in Percutaneous Coronary Intervention: A Randomised Controlled Trial

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ABSTRACT

Background: Music is recognised as a holistic therapeutic intervention that enhances evidence-based, person-centred, and humanised nursing care, thereby facilitating patient recovery. This study examined the effects of a structured music intervention on patient recovery and nursing care in individuals undergoing percutaneous coronary intervention (PCI).

Method: The study is a randomised controlled trial. The sample comprised 210 patients, including 105 in the music group (MG) and 105 in the control group (CG), all of whom were scheduled to undergo PCI at a university hospital located in northwestern Türkiye. Data were collected using a Patient Information Form, the Vital Signs Assessment Form, the Numerical Rating Scale, the State-Trait Anxiety Inventory, the Perianesthesia Comfort Scale, and the Patient Satisfaction with Nursing Care Quality Questionnaire. Participants in the MG listened to instrumental pieces in the Rast, Acemashiran, and Hüseyni modes of Classical Turkish Music, whereas those in the CG received routine care only. In both groups, vital signs, pain, anxiety, comfort, and satisfaction with the quality of nursing care were measured before and after the procedure.

Results: Following PCI, patients who received music therapy experienced fewer complications, demonstrated greater physiological stability (lower respiratory and heart rates, reduced systolic and diastolic blood pressure, and increased oxygen saturation levels), had decreased pain intensity, reduced analgesic requirements, lower state anxiety levels, and higher satisfaction with nursing care. Overall, music exerted beneficial effects on the care process for both patients and nurses.

Conclusion: The findings indicate that music can be safely and effectively integrated into routine nursing care as a humane and person-centred intervention. By supporting both physiological and psychological recovery, music contributes to improved patient outcomes and enhances nursing practice. These results highlight its potential applicability beyond PCI, suggesting that music therapy may be valuable across various clinical and interdisciplinary healthcare settings.

1 | Introduction

Throughout history, music has served as a fundamental means of regulating emotions, alleviating stress, and promoting psychological well-being [1–3]. In contemporary healthcare, music is increasingly recognised as a complementary and holistic intervention that supports both physical and mental health [4, 5]. A substantial body of evidence demonstrates that listening to music positively influences physiological parameters

[4, 6, 7], reduces anxiety levels [8–10], modulates pain perception and analgesic requirements [11, 12], and enhances patient comfort and satisfaction [13–16]. In patients with cardiovascular diseases, music interventions decrease stress and anxiety by stabilising heart rate (HR) and blood pressure [17, 18].

In recent years, global interest in art and healthcare has expanded beyond the pursuit of clinical outcomes to embrace a more holistic, person-centred, and humanised model of care [4, 19, 20]. Within this framework, music is regarded not merely as a therapeutic adjunct but as a medium that fosters empathy, communication, and emotional connection between healthcare providers and patients [4, 21]. Music thus emerges as a multidimensional modality that engages the body, mind, and spirit—underscoring that healthcare is not solely a clinical endeavour but also a deeply human experience [4].

Nursing, as a profession that assumes responsibility for the comprehensive care of individuals, inherently necessitates a holistic and humanistic approach to practice [22, 23]. Within this framework, nurses are uniquely positioned to enhance patient outcomes by integrating music into patient care as part of holistic nursing interventions [23]. Evidence showing that music can improve health outcomes has made nurses more likely to use it in their work [7, 23, 24]. Beyond its benefits, the use of music in nursing care contributes to the creation of therapeutic care environments, facilitates effective communication, strengthens empathy, and enhances satisfaction with nursing care through compassionate, person-centred approaches [12, 15, 23, 25]. These findings underscore the potential of music to bridge the gap between technology-driven healthcare and person-centred nursing, thereby reinforcing the humanistic dimensions of care delivery [12, 21]. However, limited research exists on how music interventions affect the experiences of both patients and nurses in relation to humanised, person-centred care [15, 21]. Consequently, it is essential to examine the effects of music not only on specific clinical outcomes but also within the broader framework of holistic and person-centred nursing care [4, 5, 21, 23].

Percutaneous coronary intervention (PCI) is one of the most commonly performed invasive procedures for the management of cardiovascular diseases [26], and represents a clinical context in which patients frequently experience anxiety, pain, and physiological instability [26, 27]. Pain and anxiety occurring before and after PCI can substantially influence recovery, clinical outcomes, and overall well-being; therefore, implementing holistic and person-centred approaches is essential to optimise health outcomes and enhance patient comfort and satisfaction [28]. Previous studies involving PCI patients have mostly focused on parameters such as stress, anxiety, vital signs, pain, and analgesic requirements [26, 27, 29, 30]. However, there is a lack of research investigating the effects of music on patient comfort, satisfaction with nursing care, and the humanisation of care in this population. To address this gap, the present randomised controlled trial was designed to evaluate the effects of music on recovery and nursing care among patients undergoing PCI. Specifically, the study investigated how a structured music intervention, grounded in the principles of holistic and person-centred care, can enhance both the clinical and humanistic dimensions of recovery. It was hypothesised that the application of music would positively influence physiological and psychological recovery, patient comfort, satisfaction with nursing care, and perceptions of holistic, person-centred nursing care among individuals undergoing PCI.

2 | Methods

2.1 | Study Design

The research was a randomised, controlled experimental study. The preparation and implementation process of the study is illustrated in Figure 1. The CONSORT flow chart is presented in Figure 2.

2.2 | Study Setting and Sampling

The study was conducted with patients scheduled for PCI in the cardiology service of a university hospital in Kocaeli province

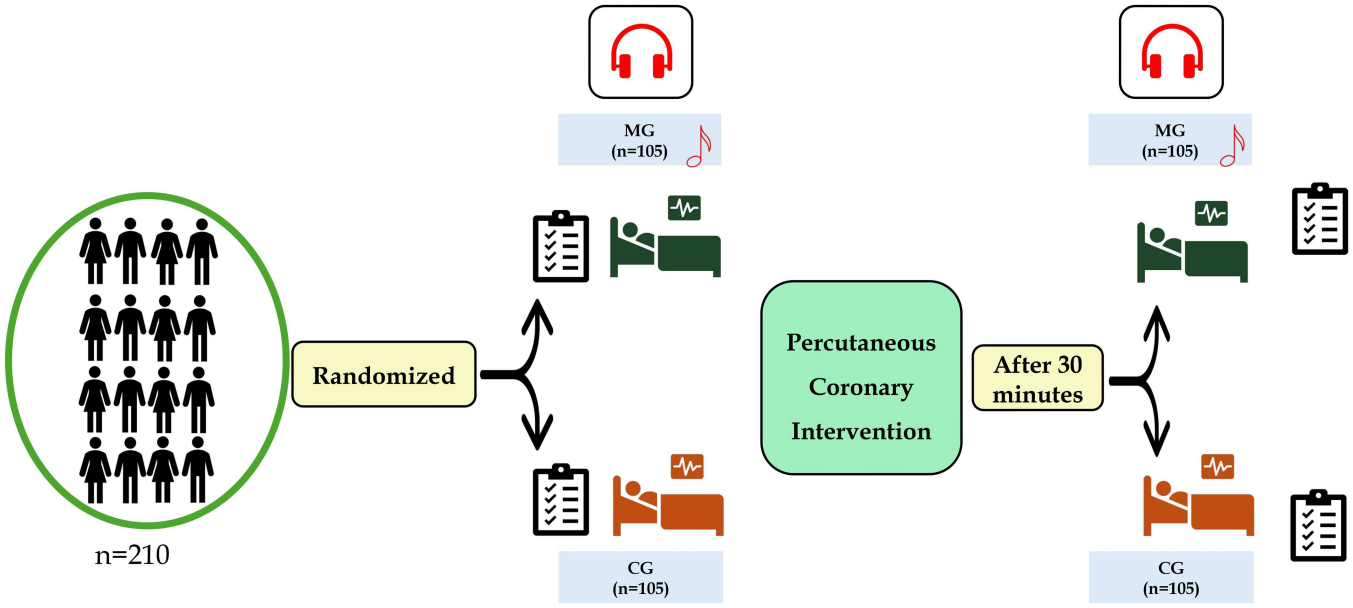


FIGURE 1 | Study design. CG, control group; MG, music group.

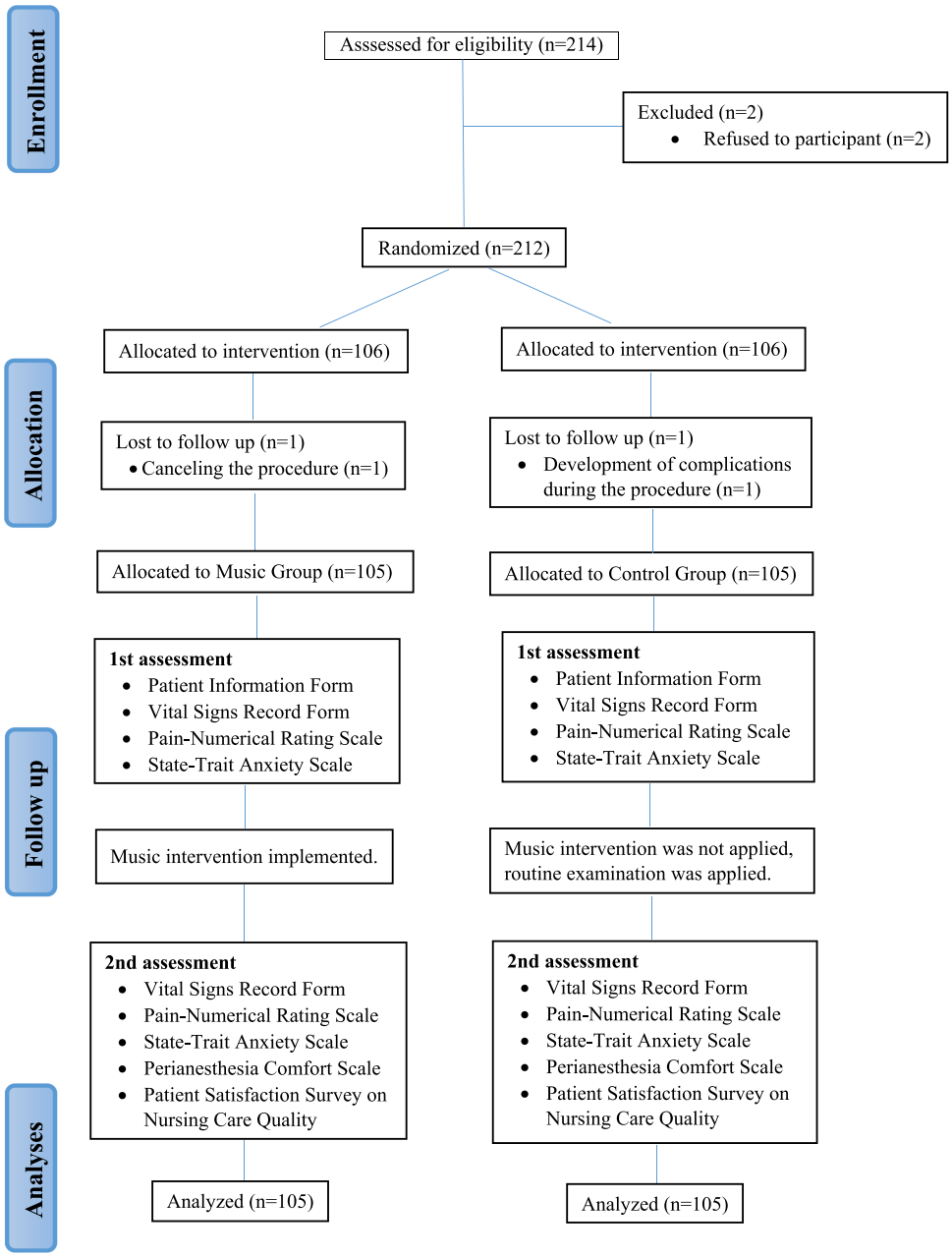


FIGURE 2 | Consolidated standards of reporting trials (CONSORT) flow diagram.

between October 7, 2023, and December 31, 2023. The study protocol is registered at clinicaltrials.gov (NCT06293248) (Figure 3).

Inclusion criteria were consenting to participate in the study; being literate; being between the ages of 18–65; undergoing PCI for the first time; and undergoing PCI with a femoral or radial approach.

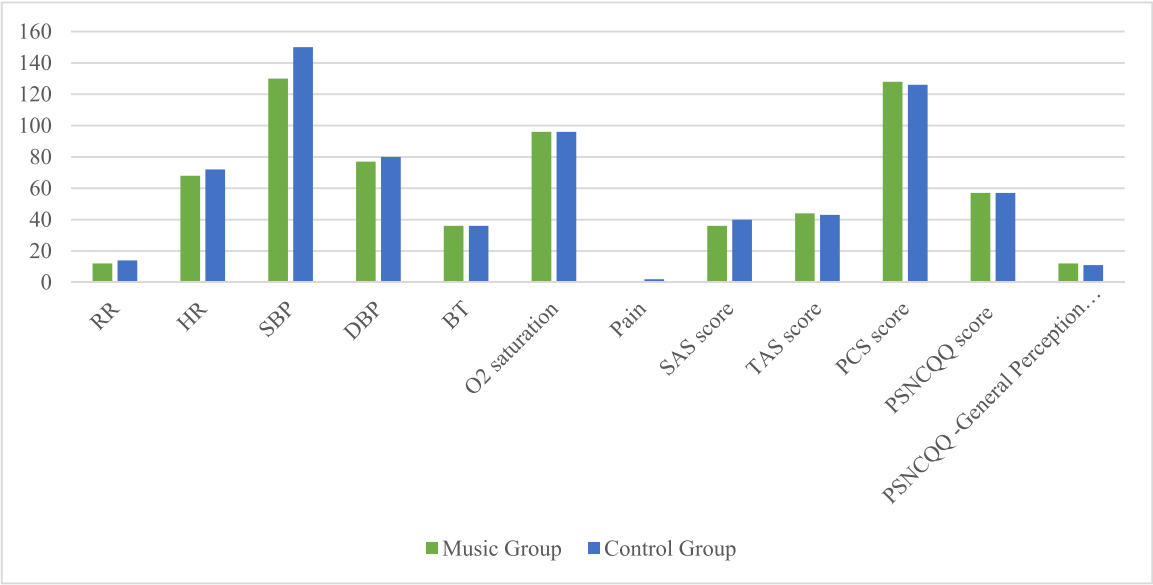
Exclusion criteria were having a communication and/or hearing impairment; having a neurological and/or psychiatric disease; being sedated sufficiently to prevent speech before the procedure; having difficulty wearing headphones; having previous experience of music therapy; and being in the waiting room for over 30 min before the procedure.

2.3 | Randomisation, Allocation, and Blinding

First, randomisation was performed with the patients who volunteered to participate in the study. To protect the identity of the patients, randomisation was performed using odd and even (1:1) numbers on the basis of the patients' protocol numbers. Those whose protocol numbers ended with an even number were assigned to the music group (MG), while patients whose protocol numbers ended with an odd number were assigned to the control group (CG). There was no interaction between the researcher responsible for randomisation and the researcher conducting the intervention. To ensure methodological rigour, the intervention and data collection were carried out by different researchers. The study utilised a single-blind design, in which participants were not informed of their group allocation (MG or CG).

2.4 | Study Intervention

The pre-operative data collection forms (the Patient Information Form, the Vital Signs Assessment Form, the Numerical



RR: Respiratory Rate; HR: Heart Rate; DBP: Diastolic Blood Pressure; SBP Systolic Blood Pressure; BT: Body Temperature
SAS: State Anxiety Scale; TAS: Trait Anxiety Scale
PCS: Perianesthesia Comfort Scale
PSNCQQ: The Patient Satisfaction with Nursing Care Quality Questionnaire

FIGURE 3 | Intergroup comparison of vital signs, TAS, SAS, PSNCQQ, and PCS scores after PCI. BT, body temperature; DBP, diastolic blood pressure; HR, heart rate; PCS, perianesthesia comfort scale; PSNCQQ, The Patient Satisfaction with Nursing Care Quality Questionnaire; RR, respiratory rate; SAS, state anxiety scale; SBP, systolic blood pressure; TAS, trait anxiety scale.

Rating Scale (NRS), and the State and Trait Anxiety Scale (STAS) were administered to the patients in the CG in their rooms in the ward before they were sent to the coronary angiography (CAG) laboratory. CG received routine care, and no music was applied. Approximately 30 min post-PCI, the post-operative data collection forms (the Vital Signs Assessment Form, the NRS, the STAS, the Perianesthesia Comfort Scale (PCS), and the Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ) were completed once the patient returned to the ward.

For MG patients, the Patient Information Form, the Vital Signs Assessment Form, the NRS, and the STAS were also administered in the patient's room in the ward before they were sent to the CAG laboratory. After this, the patients were offered a choice of instrumental pieces of music from the Rast, Acemashiran, and Hüseyni modes of Classical Turkish Music. The selected music was administered continuously for 15–20 min while the patient awaited the procedure in the CAG laboratory. To prevent disturbance to other patients, the music was delivered through headphones. The intervention consisted of instrumental, wordless music with a sound intensity of 60–80 decibels and a tempo of approximately 60 beats per minute. Following the PCI procedure, the same music was played again for 15–20 min, beginning approximately 30 min after the patient's return to the ward. Subsequently, the Vital Signs Assessment Form, NRS, STAS, PCS, and PSNCQQ were administered. All procedures were conducted under the supervision of the researcher in a quiet environment to minimise external stimuli.

Prior to the initiation of the study, the researcher (SM) consulted experts from the Group for the Research and Promotion of Turkish Music (TÜMATA) to obtain suitable musical selections for use with patients in the MG. TÜMATA, established in 1976 by Asst. Prof. Rahmi Oruç Güvenç is an organisation dedicated to investigating the origins, development, therapeutic applications, repertoire, and diversity of Turkish music, as well as promoting its performance and dissemination [31]. The researcher informed the TÜMATA experts that the study would investigate variables such as patients' vital signs, pain, anxiety, and comfort. Based on the experts' recommendations, a music CD containing compositions in the Rast, Acem Aşiran, and Hüseyni *maqams* (melodic modes), featuring works by various composers, was selected. The selected pieces were preloaded onto a portable MP3 player purchased by the researchers and delivered to participants through headphones under the supervision of the responsible researcher. Participants selected their preferred music from a pre-prepared repertoire developed by the researcher based on expert recommendations. The procedure continued until 105 patients had been included in each group. The headphones used were cleaned after each music session to ensure asepsis and prevent infections.

Individuals' perceptions and interpretations of music vary according to the sociocultural context in which they live and the education they receive [32, 33]. People tend to connect more deeply and communicate more effectively with music that reflects their own cultural background, which consequently enhances its emotional and therapeutic impact. According to Balcı Akpınar et al. [22], the American Association of Operating Room Nurses (AORN) recommends that nurses consider patients' individual music preferences when implementing music therapy. Consistent with this recommendation, several studies have demonstrated that music interventions tailored to patients' preferred musical styles produce greater therapeutic benefits compared to interventions that do not account for such preferences

[4, 23, 34]. As the study was conducted with an adult Turkish population, Classical Turkish Music was selected for use in the intervention. Previous research has indicated that Classical Turkish Music can reduce the required doses of sedative medications, alleviate anxiety and pain perception, and thereby facilitate a faster recovery process [33, 35]. In line with this evidence, several *maqams* (melodic modes) comprising instrumental, non-verbal works of Turkish music were employed in the present study. Specifically, the *Rast maqam* is known to alleviate insomnia, elevate pulse rate, and evoke feelings of joy, peace, and comfort; the *Hüseyni maqam* promotes a sense of tranquility and confidence; and the *Acem Aşiran maqam* enhances creativity, revitalises emotions and thoughts, reduces pain, and induces relaxation by relieving muscular tension and spasms [31, 36, 37]. Studies conducted in Türkiye have shown that the *Rast maqam* is the most frequently used melodic mode in research on music therapy, particularly for addressing psychological symptoms such as anxiety, fear, stress, and worry, and is effective in this regard. The *Acem Aşiran maqam* has primarily been examined for its influence on pain perception, with studies reporting favourable outcomes, while the *Hüseyni maqam* has been associated with improvements in various dimensions of well-being [37]. These three *maqams* are among the most commonly employed modes in Turkish music therapy and are considered culturally appropriate for individuals of Turkish background. Accordingly, the present study utilised these *maqams* to examine the effects of music on healing by evaluating variables such as vital signs, pain, anxiety, comfort, and patient satisfaction.

In this study, data were collected by the researcher (Ö.T.) using the face-to-face interview method. To prevent interaction between the study groups, data from patients in the MG were collected on even days of the week, while data from patients in the CG were collected on odd days. All participants in both groups received standardised perioperative care in accordance with protocols established by the cardiology physicians and nursing staff. Analgesic administration was also standardised for all patients to ensure consistency in pain management across groups.

2.5 | Data Collection Tools

Data collection tools included the 'Patient Information Form', the 'Vital Signs Assessment Form', the 'Numerical Rating Scale (NRS)', the 'State-Trait Anxiety Inventory', the 'Perianesthesia Comfort Scale (PCS)', and the 'Patient Satisfaction with Nursing Care Quality Questionnaire (PSNCQQ)'.

2.5.1 | The Patient Information Form

The Patient Information Form consisted of questions about socio-demographic information (12 questions), the intraoperative period (5 questions), and the post-operative period (16 questions).

2.5.2 | The Vital Signs Assessment Form

The form recorded vital signs (Respiratory Rate [RR], HR, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), body temperature, oxygen saturation, and pain) before and after the procedure.

2.5.3 | The NRS

The NRS was used to measure the pain level of the patients related to the procedure. It is a one-dimensional tool that uses 11 numbers, ranging from 0 to 10, to measure pain intensity. Patients are asked to select the number that best reflects the intensity of their pain, where 0 describes no pain, and 10 represents the worst (unbearable) pain. It aims to quantify the severity of pain related to the procedure site, allowing patients to express their pain levels numerically [38].

2.5.4 | The State-Trait Anxiety Inventory (STAS)

The STAS was used to determine the level of anxiety before and after PCI in both groups. Developed by Spielberger et al. [39] to determine state and trait anxiety levels, the reliability and validity for the Turkish population were confirmed by Öner and Le Compte [40]. It consists of two sections with 40 items, based on the two-factor anxiety concept. The first 20 items measure state anxiety, while items 21–40 assess trait anxiety. The State Anxiety Scale (SAS) measures how an individual feels at a specific moment and under certain conditions. To evaluate the scale, the total score for the reversed items is subtracted from the total score for the direct statements. The state anxiety score is then obtained by adding the constant value of 50 to the resulting value. The Trait Anxiety Scale (TAS) is used to determine how an individual usually feels. To evaluate this section, the total score for the reversed items is subtracted from the total score for the direct statements. The constant value of 35 is then added to the final value to obtain the trait anxiety score. Scores from the scale are interpreted as follows: 20–39 points indicate 'mild' anxiety, 40–59 points indicate 'moderate' anxiety, 60–79 points indicate 'severe' anxiety, and 80 points indicate 'panic' [39, 40].

2.5.5 | The PCS

The Turkish validity and reliability of the PCS, developed by Kolcaba [41], were performed by Üstündağ and Eti Aslan [42]. The scale evaluates individuals' thoughts, emotions, and self-perceptions throughout the surgical process and comprises 24 Likert-type items, each rated on a 6-point scale ranging from 1 to 6. Of these items, 12 are positively worded, and 12 are negatively worded, with the latter being reverse-scored. For the positively worded items, a higher score (6) indicates greater comfort, whereas a lower score (1) reflects lower comfort. Conversely, for the negatively worded items, a lower score (1) indicates greater comfort, while a higher score (6) reflects lower comfort. During the scoring process, the negatively worded items are reverse-coded and subsequently summed with the positive items to obtain the total scale score. The total possible score on the scale ranges from 24 to 144. To calculate the mean comfort level, the total score is divided by the number of items, resulting in a mean value represented on a 1-to-6 scale. Lower scores indicate lower levels of comfort, whereas higher scores reflect greater comfort. In Üstündağ and Eti Aslan's study [42], the scale's Cronbach alpha coefficient was 0.83.

2.5.6 | The Patient Satisfaction Regarding the Quality of Nursing Care

The PSNCQQ, developed by Laschinger et al. is a 5-point Likert-type scale with 19 items [43]. It includes four additional

questions that evaluate the patient's general satisfaction with the care and service received during the hospital stay, the nursing care, and the intention to recommend the hospital to others. The 5-point Likert scale ranges from 'excellent' (5) to 'poor' (1). The final four items, which assess overall patient satisfaction, are excluded from the total scoring of the scale. There are no reverse-coded items on the scale. The original form of the scale had a Cronbach's alpha coefficient of 0.98. The scale was adapted into Turkish by Dönmez et al. [44], with a Cronbach's alpha coefficient also calculated as 0.98.

2.6 | Sample Size Calculation

The sample size was determined using statistics from Oyur Çelik et al.'s study, [27] 'The Effects of Music Therapy on Patients with Coronary Artery Disease before the Invasive Procedure: A Randomised Controlled Study'. A power analysis with the parameters '$\alpha = 0.05$, $1-\beta$ (Power) $= 0.95$, and effect size $= 0.5$' indicated a need for 105 patients in each group, for a total of 210. To account for potential dropouts, 214 patients were included in the study.

2.7 | Data Analysis

All statistical analyses were performed using the IBM SPSS for Windows version 20.0 (IBM Corp., Armonk, NY, USA). G*Power version 3.1.9.2 (Kiel University, Kiel, Germany) software was used to determine study power. Kolmogorov-Smirnov tests were used to test the normality of the data distribution. Continuous variables were expressed as mean ± standard deviation and median (25th−75th percentiles), and categorical variables were expressed as counts (percentages). Comparisons of normally distributed continuous variables between the materials were performed using the Student's *t*-test. Comparisons of non-normally distributed continuous variables between the groups were performed using the Mann−Whitney *U* test. Subgroup analyses were performed between the groups. Comparisons of normally distributed continuous paired variables between the times were performed using the paired Samples *t*-test, and comparisons of non-normally distributed continuous variables between the times were performed using the Wilcoxon *t*-test. Comparisons of categorical variables between the groups were performed using Fisher's Exact Chi-Square test, Yates' Chi-Square test, Pearson Chi-square, and the Monte Carlo Chi-Square test. Numerical variables were evaluated by Pearson correlation analysis. A two-sided p value of < 0.05 was considered statistically significant. Additionally, the G*Power version 3.1.9.2 (Kiel University, Kiel, Germany) programme was used to determine the sample size calculation.

2.8 | Ethical Statement

Ethical approval for the study was obtained from the Clinical Research Ethics Committee for Hospital Traditional and Complementary Medicine in the Faculty of Medicine of Maltepe University (decision no: 1; date: 01/03/2023). Additionally, permissions were received from the General Directorate of Health Services of the Ministry of Health (date: July 06, 2023, number: 77979112) and the Chief Physician's Office of Kocaeli University Research and Application Hospital. All the patients involved in the study gave their verbal and written consent. The study has been registered in ClinicalTrials.com (Identifier: NCT06293248).

3 | Results

Two hundred ten patients and 10 nurses participated in the study, and the participants were equally distributed between the MC and the CG. Both groups were similar in terms of gender, marital status, occupation, medication use, and diagnosis (Table 1).

3.1 | Clinical and Physiological Results

A statistically significant difference was observed between the groups in terms of post-PCI complications ($p = 0.004$). Overall, 6.7% of the total sample experienced post-procedural complications, with a significantly lower incidence in the MG (Table 1). Comparative analysis of vital signs revealed significant differences between pre- and post-PCI measurements. Although the MG exhibited slightly higher RR, HR, and SBP, DBP values prior to the procedure compared to the CG, these parameters were significantly lower following the procedure ($p < 0.001$ for all). Conversely, while oxygen saturation was lower in the MG before PCI ($p = 0.010$), it was significantly higher after PCI ($p = 0.001$, Table 2).

3.2 | Pain and Analgesia Requirements

The proportion of participants who reported no pain during PCI was significantly higher in the MG ($p = 0.039$), while the rate of post-PCI analgesic use was significantly lower in this group ($p < 0.001$) (Table 1). Comparison of post-PCI pain scores also revealed significantly lower scores in the MG than the CG ($p < 0.001$) (Table 2).

3.3 | Anxiety and Emotional State

The proportion of participants who described their emotional state regarding PCI as 'good' was significantly higher in the MG ($p < 0.001$) (Table 1). Pre-PCI SAS scores were significantly higher in the MG ($p = 0.004$), whereas post-PCI SAS scores were significantly higher in the CG ($p < 0.001$). Similarly, the TAS scores were significantly higher in the MG both before and after PCI ($p = 0.029$ and $p = 0.038$, respectively) (Table 2).

3.4 | Comfort and Satisfaction

The proportion of patients who reported feeling comfortable before and after PCI was significantly higher in the MG ($p < 0.001$). Both pre- and post-PCI comfort scores ($p < 0.001$), as well as overall satisfaction with the treatment and care provided, were significantly higher among patients in the MG ($p < 0.001$) (Table 1). In addition, PCI ($p = 0.042$), PSNCQQ ($p = 0.001$), and PSNCQQ -General Perception scores ($p = 0.001$) were all significantly higher in the MG (Table 2).

TABLE 1 | Comparison of socio-demographic and PCI-related characteristics of patients by groups ($n = 210$) (median [25th–75th percentile]/n [%]).

Characteristics	Median (25.–75. Percentiles) MG	CG	*p* value
Age	61.00 (53.00–67.00)	66.00 (57.50–72.00)	**0.001**[a]
BMI	28.28 (26.10–31.79)	30.12 (25.51–32.37)	**0.003**[a]

		Group				Total		
		MG		CG				
		n	%	*n*	%	*n*	%	*p* value
Gender	Female	57	54.3	54	51.4	111	52.9	0.678[b]
	Male	48	47.5	51	48.6	99	47.1	
	Total	105	100.0	105	100.0	210	100.0	
Marital status	Single	2	1.9	4	3.8	6	2.9	0.072[e]
	Married	85	81.0	70	66.7	155	73.8	
	Divorced	4	3.8	3	2.9	7	3.3	
	Widow(er)	14	13.3	28	26.7	42	20.0	
	Total	105	100.0	105	100.0	210	100.0	
Education level	Illiterate	4	3.8	4	3.8	8	3.8	**0.015**[e]
	Literate	3	2.9	17	16.2	20	9.5	
	Elementary school	47	44.8	44	41.9	91	43.3	
	High school	35	33.3	29	27.6	64	30.5	
	University	16	15.2	10	9.5	26	12.4	
	Postgraduate	0	0.0	1	1.0	1	0.5	
	Total	105	100.0	105	100.0	210	100.0	
Occupation	Civil servant	5	4.8	4	3.8	9	4.3	0.312[e]
	Worker	7	6.7	7	6.7	14	6.7	
	Housewife	31	29.8	33	31.7	64	30.8	
	Retired	41	39.4	51	49.0	92	44.2	
	Unemployed	1	1.0	0	0.0	1	0.5	
	Others	20	18.1	10	9.5	30	14.3	
	Total	105	100.0	105	100.0	210	100.0	
Constant medication	Yes	90	85.7	96	91.4	186	89.0	0.193[d]
	No	15	14.3	9	8.6	24	11.0	
	Total	105	100.0	105	100.0	210	100.0	
Diagnosis	Coronary artery disease	104	99.0	105	100.0	209	99.5	1.000[c]
	Mitral regurgitation	1	1.0	0	0.0	1	0.5	
	Total	105	100.0	105	100.0	210	100.0	

Information on PCI	Median (25.–75. percentiles) MG	CG	*p* value
Duration of procedure (h)	1.00 (1.00–2.00)	1.00 (1.00–2.00)	0.243[a]
Time between end of procedure and catheter removal (h)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.290[a]
Duration of bed rest after the procedure (h)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.562[a]
Duration of hospitalisation (h)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.685[a]

		MG		CG		total		
		n	%	*n*	%	*n*	%	*p* value
Getting information about PCI	Yes	104	99.0	102	97.1	206	98.6	0.621[c]
	No	1	1.00	3	2.9	4	1.4	

(Continues)

TABLE 1 | (Continued)

		MG		CG		total		
		n	%	*n*	%	*n*	%	*p* value
	Total	105	100.0	105	100.0	210	100.0	
Methods used in stressful situations[f]	Nothing	1	100.0	3	100.0	4	100.0	
	Listening to music	23	100.0	8	100.0	31	100.0	
	Watching TV	46	100.0	58	100.0	104	100.0	
	Walking	47	100.0	44	100.0	91	100.0	
	Gardening	32	100.0	31	100.0	63	100.0	
	Being alone	27	100.0	28	100.0	55	100.0	
	Smoking	16	100.0	21	100.0	37	100.0	
	Talking	38	100.0	42	100.0	80	100.0	
	Crying	10	100.0	15	100.0	25	100.0	
	Sleeping	8	100.0	18	100.0	26	100.0	
	Praying	13	100.0	19	100.0	32	100.0	
	Doing housework	13	100.0	6	100.0	19	100.0	
	Reading	3	100.0	1	100.0	4	100.0	
	Drinking tea, coffee	1	100.0	1	100.0	2	100.0	
Anxiety during the procedure	No	45	42.9	13	12.4	58	27.6	**$p < 0.001$**[e]
	Mild	43	41.0	45	42.9	88	41.9	
	Moderate	13	12.4	36	34.3	49	23.3	
	Severe	4	3.8	9	8.6	13	6.2	
	Very severe	0	0.0	2	1.9	2	1.0	
	Total	105	100.0	105	100.0	210	100.0	
Pain during the procedure	No	33	31.4	19	18.1	52	24.8	**0.039**[e]
	Mild	55	52.4	61	58.7	116	55.5	
	Moderate	13	12.4	23	22.1	36	17.2	
	Severe	4	3.8	2	1.9	6	2.9	
	Very severe	105	100.0	105	100.0	210	100.0	
Complication during the procedure	Yes	1	1.0	2	1.9	3	1.4	1.000[c]
	No	104	99.0	103	98.1	207	98.6	
	Total	105	100.0	105	100.0	210	100.0	
Catheter insertion site	Radial artery	32	30.5	26	24.8	58	27.6	0.354[b]
	Femoral artery	73	69.5	79	75.2	152	72.4	
	Total	105	100.0	105	100.0	210	100.0	
Development of complications after the procedure	Yes	1	1.0	13	12.4	14	6.7	**0.004**[d]
	Yes	104	99.0	92	87.6	196	93.3	
	Total	105	100.0	105	100.0	210	100.0	
Complication	Hypotension			3	23.1	3	23.1	
	Bleeding	1	1.0	5	38.4	6	39.4	
	Hematoma			2	15.4	2	15.4	
	Hypertension			3	23.1	3	23.1	
	Total	1	100.0	13	100.0	14	100.0	
Post-procedure analgesic administration	Yes	2	1.9	19	18.1	21	10.0	**$p < 0.001$**[d]
	No	103	98.1	86	81.9	189	90.0	
	Total	105	100.0	105	100.0	210	100.0	
Perceptions about the PCG	Perfect	16	15.2	1	1.0	17	8.1	**$p < 0.001$**[e]
	Good	70	66.7	44	41.9	114	54.3	

(Continues)

TABLE 1 | (Continued)

		MG		CG		total		
		n	%	*n*	%	*n*	%	*p* value
	Normal	17	16.2	53	50.5	70	33.3	
	Bad	2	1.9	6	5.7	8	3.8	
	Very bad	0	0.0	1	1.0	1	0.5	
	Total	105	100.0	105	100.0	210	100.0	
Feeling comfortable before and after the procedure	Yes	103	98.1	51	48.6	154	73.3	$p < 0.001$[b]
	No	2	1.9	54	51.4	56	26.7	
	Total	105	100.0	105	100.0	210	100.0	

	Median (25.−75. Percentiles)		
	MG	CG	*p* value
Pre-and post-procedure comfort score	7.00 (6.00−8.00)	6.00 (5.00−6.00)	$p < 0.001$[a]
Patient's overall evaluation (satisfaction) score of the treatment and care	8.00 (6.00−9.00)	6.00 (5.00−7.00)	$p < 0.001$[a]

		MG		CG		Total		
		n	%	*n*	%	*n*	%	
Nurse's satisfaction with the patient's compliance with the clinical process	Not satisfied at all	0	0.0	3	2.9	3	1.4	$p < 0.001$[e]
	Not satisfied	0	0.0	21	20.0	21	10.0	
	Undecided	1	1.0	23	21.9	24	11.4	
	Satisfied	55	52.4	57	54.2	112	53.3	
	Very satisfied	49	46.6	1	1.0	50	23.8	
	Total	105	100.0	105	100.0	210	100.0	

Abbreviations: CG, control group; MG, music group; PCI, percutaneous coronary intervention.
[a]Mann−Whitney *U* test.
[b]Pearson Chi-Square.
[c]Fisher's Exact Test.
[d]Yates Chi-Square.
[e]Monte Carlo Chi-Square. Bold-faced values are shown as $p < 0.05$.
[f]More than one answer was given, and percentages were based on.

3.5 | Nurses' Perspectives

From the nurses' perspective, the percentage of those who reported being 'very satisfied' with patient cooperation during the clinical process was significantly higher in the MG ($p < 0.001$) (Table 1). Furthermore, 90% of nurses stated that music contributes to the nursing care process, with 33.3% attributing this to its 'comforting effect' and 22.2% noting its role in 'enhancing patient compliance'. Although 90% of the nurses had never previously allowed patients to listen to music, 70% indicated that they would consider doing so in the future (Table 3).

4 | Discussion

This study investigated the effects of music on patient recovery and nursing care among individuals undergoing PCI and demonstrated how music interventions can enhance both the clinical and humanistic dimensions of healing within a person-centred and holistic care framework. The findings indicated that music serves as an effective nursing intervention that facilitates physiological and psychological recovery while enhancing patient comfort and satisfaction. Moreover, music not only exerts positive effects on clinical outcomes but also promotes the delivery of humanised, person-centred care, consistent with the literature, which supports the integration of music as an essential component of holistic nursing practice [1, 7, 13, 22].

4.1 | Music and Clinical/Physiological Effects: Physiological Recovery

Music is widely recognised as a therapeutic modality that promotes physiological stability across various clinical contexts [4, 7, 22]. Through its modulatory influence on the autonomic nervous system, music has been shown to decrease sympathetic activity and enhance parasympathetic responses, leading to reductions in HR, SBP, DBP, and RR [4, 9, 12, 23]. In the present study, post-PCI findings indicated lower HR, RR, and SBP, higher oxygen saturation, and a lower rate of complications in the MG compared with the CG. These results align with previous research demonstrating that music contributes to the stabilisation of vital signs and the reduction of procedural complications [3, 4, 19, 45, 46]. The observed physiological benefits are consistent with outcomes reported in other clinical areas, including geriatric care [46], surgical settings [47], intensive care units [48], chronic disease

TABLE 2 | Intergroup comparison of vital signs, TAS, SAS, PSNCQQ, and PCS scores before and after PCI ($n = 210$) (median [25th−75th percentile]).

	MG	CG	*p* value[a]
Pre-PCI RR	14.00 (12.00−14.00)	14.00 (12.00−14.00)	**0.031**
Post-PCI RR	12.00 (12.00−14.00)	14.00 (12.00−14.00)	***p* < 0.001**
Pre-PCI HR	74.00 (70.00−78.00)	70.00 (64.00−72.00)	***p* < 0.001**
Post-PCI HR	68.00 (62.00−72.00)	72.00 (70.00−78.00)	***p* < 0.001**
Pre-PCI SBP	150.00 (140.00−160.00)	140.00 (130.00−146.50)	**0.039**
Post-PCI SBP	130.00 (120.00−140.00)	150.00 (130.00−160.00)	**0.002**
Pre-PCI DBP	90.00 (80.00−90.00)	80.00 (79.00−80.00)	***p* < 0.001**
Post-PCI DBP	77.00 (70.00−80.00)	80.00 (80.00−90.00)	***p* < 0.001**
Pre-PCI BT	36.60 (36.50−36.70)	36.60 (36.50−36.60)	0.190
Post-PCI BT	36.60 (36.50−36.60)	36.60 (36.50−36.60)	0.129
Pre-PCI O_2 saturation	96.00 (95.00−96.00)	96.00 (96.00−97.00)	**0.010**
Post-PCI O_2 saturation	96.00 (96.00−97.00)	96.00 (95.00−96.00)	**0.001**
Pre-PCI pain	0.00 (0.00−0.00)	0.00 (0.00−0.00)	0.170
Post-PCI pain	0.00 (0.00−1.00)	2.00 (0.00−5.00)	***p* < 0.001**
Pre-PCI SAS score	42.00 (39.00−44.00)	38.00 (36.00−40.00)	**0.004**
Post-PCI SAS score	36.00 (34.00−39.00)	40.00 (37.00−41.50)	***p* < 0.001**
Pre-PCI TAS score	44.00 (41.50−47.00)	43.00 (38.00−46.00)	**0.029**
Post-PCI TAS score	44.00 (41.00−47.00)	43.00 (38.50−46.00)	**0.038**
Post-PCI PCS score	128.00 (120.00−133.00)	126.00 (120.00−130.50)	**0.042**
Post-PCI PSNCQQ score	57.00 (56.00−76.00)	57.00 (43.50−60.50)	**0.001**
Post-PCI PSNCQQ General perception score	12.00 (11.00−15.00)	11.00 (9.00−14.00)	**0.001**

Abbreviations: BT, body temperature; CG, control group; DBP, diastolic blood pressure; HR, heart rate; MG, music group; PCI, percutaneous coronary intervention; PCS, Perianesthesia Comfort Scale; PSNCQQ, The Patient Satisfaction with Nursing Care Quality Questionnaire; RR, respiratory rate; SAS, state anxiety scale; SBP systolic blood pressure; TAS, trait anxiety scale.
[a]Mann−Whitney *U* test.
[b]Bold faced values are shown as $p < 0.05$.

management [49], and palliative care [50]. Thus, the findings support the view that the therapeutic effects of music are not confined to a specific patient population. Rather, music can be integrated safely and effectively into nursing practice as a universal, noninvasive intervention that fosters physiological stability, enhances recovery, and contributes to the principles of holistic, person-centred care.

4.2 | Music in Reducing Anxiety, Pain, and Analgesia Requirements: Psychological Healing

A well-established relationship exists between pre-procedural anxiety and the intensity of pain experienced following interventional procedures. Patients with higher levels of anxiety before a procedure are more likely to experience greater post-operative pain [11, 51], which subsequently increases the need for analgesic and anesthetic medication, contributes to hemodynamic instability, delays recovery, and reduces overall satisfaction [27, 52]. Music is increasingly recognised as a therapeutic intervention for managing stress, pain, and anxiety, as well as for enhancing comfort, mood, and emotional well-being. It represents an effective, non-pharmacological strategy that nurses can implement across a range of clinical settings to support patients in coping with anxiety and pain [25, 53]. Listening to music reduces pain perception by stimulating the release of neurochemicals such as endorphins, dopamine, and serotonin, which evoke pleasure and relaxation. Moreover, music modulates the hypothalamic–pituitary–adrenal (HPA) axis, decreasing cortisol secretion and mitigating the physiological effects of stress. From a neuropsychological perspective, music provides a distraction from painful stimuli and suppresses nociceptive transmission at the spinal level. Acting upon the limbic system (particularly the amygdala and hippocampus), music elicits emotional soothing, reduces fear and tension, and fosters positive affective associations, enabling individuals to reinterpret and better tolerate their experiences of pain and anxiety [9, 12]. In the present study, patients who listened to music exhibited significantly lower pain scores, reduced analgesic requirements, and lower state anxiety levels. Furthermore, patients' emotional evaluations of their PCI experiences were significantly more positive in the MG. These findings are consistent with prior research conducted in emergency, intensive care, oncology, invasive procedure, and surgical contexts [6, 8, 22, 54], confirming the analgesic, anxiolytic, and mood-enhancing benefits of music therapy in healthcare. Overall, the findings support the conceptualisation of music as a holistic, therapeutic, and person-centred nursing intervention that addresses physical, psychological, and emotional dimensions of patient care [1, 5, 7]. The holistic management of pain and anxiety through music may thus play a crucial role in enhancing healing, comfort, and satisfaction—core components of compassionate and humanised nursing practice.

TABLE 3 | Information about music on MG and nurses' perceptions about music *n* (%).

Information about music (*n* = 105)		***n***	**%**
Enjoying music in general	Yes	99	94.3
	No	6	5.7
	Total	105	100.0
Enjoying the music played before and after the procedure	Yes	94	89.5
	No	11	10.5
	Total	105	100.0
Request or suggestion about the music played	Yes	11	10.5
	No	94	89.5
	Total	105	100.0
Wishing to listen to music again	**Yes**	**101**	**96.2**
	Undecided	2	1.9
	No	2	1.9
	Total	105	100.0
The music to be selected in case of listening to music again?[a]	Folk music	6	5.9
	Hymn	10	9.9
	Sufi music	12	11.9
	Classic music	6	5.9
	Black sea music	10	9.9
	Turkish folk music	14	13.9
	Turkish art music	15	14.9
	Pop music	4	3.9
	Slow music	5	5.0
	Others	19	18.8
	Total	**101**	**100.0**
Nurses' perceptions on music (*n* = 10)		***n***	**%**
Music contributes to nursing care	Yes	**9**	**90.0**
	No	1	10.0
	Total	10	100.0
The contribution of music to nursing care	Relaxing	1	11.1
	Comforting	3	33.3
	Patient compliance	2	22.2
	Care-improving effect	1	11.1
	Stress reducing	1	11.1
	Calming	1	11.1
	Total	**9**	**100.0**
Playing music to the patient before	Yes	1	10.0
	No	**9**	**90.0**
	Total	10	100.0
Reason for not playing music to the patient before	Lack of application area	7	77.8
	Lack of opportunity	2	22.2
	Total	**9**	**100.0**
Considering playing music to patients	Yes	7	70.0
	Undecided	1	10.0
	No	2	20.0
	Total	10	100.0

Abbreviation: MG, music group.
[a]More than one answer was given; percentages were based on *n*.

4.3 | Music, Comfort, and Satisfaction: Humanised Care

Humanised nursing care represents a comprehensive, person-centred approach that seeks to address not only the physical but also the emotional, psychological, and spiritual needs of individuals throughout the healthcare process [16]. This approach is grounded in empathy, effective communication, and respect for patient dignity and autonomy [13, 16], and has increasingly become a defining element of high-quality healthcare delivery [13]. Music, as an aesthetic and humanising medium, is increasingly being integrated into nursing care to foster these dimensions [13, 15, 22]. Evidence from the literature indicates that the incorporation of music therapy in hospital wards and intensive care units helps reduce stress, supports treatment processes, and transforms the hospital experience into a warmer and more human-centred one [55]. Similarly, the integration of music therapy into multidisciplinary outpatient care for patients with hypertension has been shown to strengthen holistic and humanistic approaches by fostering an environment of listening, acceptance, and self-awareness, enabling patients to reflect on the habits that affect their health and quality of life [56]. In end-of-life care, music therapy reinforces patients' sense of identity, enhances patient–family–caregiver relationships, fosters spiritual meaning, and affirms the individual's dignity as a human being [57]. Studies conducted in intensive care contexts further highlight that music contributes to the humanisation of care by promoting well-being, facilitating emotional expression, and strengthening resilience and the nurse–patient relationship [4, 13, 15, 58]. In these studies, Saldaña-Ortiz et al. reported that music therapy administered in intensive care units reduced patient stress, facilitated emotional expression, and enhanced the nurse–patient relationship. Furthermore, research evaluating humanised nursing care has demonstrated that such care is positively associated with higher levels of patient satisfaction [20] and comfort [13]. In the present study, patients in the MG reported significantly greater overall satisfaction with the care, services, and nursing support they received during hospitalisation, as well as higher comfort levels following PCI. Additionally, the majority of patients indicated that they enjoyed the music selected according to their preferences and expressed a willingness to listen to music

again during future hospital visits. These findings support previous studies conducted across diverse clinical settings, which have shown that therapeutic music interventions increase both comfort and satisfaction, with notably higher scores observed in music-listening groups [13, 15, 51, 59–61]. Therefore, beyond its clinical benefits, the use of music in PCI care can be viewed as a means of strengthening the nurse–patient relationship through the creation of a therapeutic and emotionally supportive environment, reinforcing the principles of person-centred care and making a substantial contribution to the humanisation of nursing practice.

4.4 | Implications for Music, Nursing, and Interdisciplinary Practice

Nurses play a pivotal role in establishing therapeutic environments that promote comfort, trust, and healing [59]. Integrating music into nursing practice reinforces the holistic essence of the nursing profession [15, 23, 25] and provides nurses with an independent, person-centred, evidence-based, cost-effective, and culturally adaptable intervention strategy [4, 5, 21, 49]. Numerous studies in the literature have explored nurses' perceptions of the therapeutic benefits of music and its application in patient care [10, 22, 62]. However, to date, only one study has specifically examined nurses' direct experiences with music in patient care, their awareness of its role in symptom management, and its overall influence on nursing practice [21]. In a qualitative interpretive study conducted across surgical oncology, urology/gynecology, neurology, and orthopedic units, van den Berg et al. [21] explored nurses' experiences with participatory live music sessions. The study revealed that nurses gained deeper insight into patients' emotional states by observing their responses to music, thereby fostering empathy and compassion. This process enhanced mutual understanding, strengthened the informal connection between nurses and patients, and supported the principles of person-centred care. Moreover, exposure to live music was reported to enhance nurses' well-being, promote relaxation, and create an environment where compassion could be more openly expressed [21]. In the study conducted by Balcı Akpınar et al. [22], nurses reported that incorporating music into care was beneficial and served as an effective approach to reducing patients' pain, anxiety, and distress, facilitating their adaptation to care, and diverting their attention away from negative thoughts [22]. Similarly, the nurses in the present study indicated that music enhanced patients' adaptation to the clinical process, contributed positively to the nursing care process, and created a relaxing, soothing, and stress-reducing environment that also supported nurses' emotional well-being. The positive perceptions of nurses regarding the use of music in this study are consistent with previous research demonstrating that music provides reciprocal benefits for both patients and healthcare professionals [21, 63]. The findings align with those of van den Berg et al. [21], Balcı Akpınar et al. [22], and Baltacı Göktaş et al. [62], as well as with international literature emphasising that music positively influences the experiences of both patients and nurses. Specifically, it transforms the care environment into a calmer, more reassuring, and therapeutic space, strengthens the nurse–patient relationship, and promotes humanised, compassion-based care [4, 15, 21, 49]. Overall, the potential of music to enhance patient outcomes and increase healthcare professionals' satisfaction highlights the importance of integrating music-based interventions into routine clinical care.

5 | Limitations

This study has several limitations. First, the research was conducted in a single university hospital within a specific geographic region (Kocaeli, Turkey); therefore, the generalisability of the findings to other hospitals, cities, or cultural contexts may be limited. The participants were aged 18–65 years, and the effects on younger or older patient groups were not examined. Additionally, the study focused solely on patients undergoing PCI, and the impact of music interventions in other cardiovascular or surgical procedures was not investigated. Furthermore, patients' personal music preferences were limited to a pre-selected repertoire, and individual musical backgrounds or habits were not considered, which may have influenced the perceived effectiveness of the intervention. Patient responses were obtained via self-report, which may increase the risk of response bias. Finally, the long-term effects of the music intervention were not assessed; only short-term outcomes before and after PCI were evaluated. Future studies are recommended to examine the effects of music interventions across different age groups, cultural contexts, and with long-term follow-up to provide a more comprehensive understanding.

6 | Conclusion

This study demonstrated that music functions as a holistic nursing intervention that promotes both physiological and psychological recovery. Music reduced the incidence of post-procedural complications and supported physiological stability by lowering HR, blood pressure, and RR while increasing oxygen saturation levels. It also facilitated psychological recovery by reducing anxiety, pain, and the need for analgesics. Furthermore, music contributed to the humanisation of care by enhancing patient comfort and satisfaction and strengthening the nurse–patient relationship. These findings suggest that music can be considered an integral element of person-centred and humanised nursing care. As a cost-effective, non-invasive, and culturally adaptable intervention, music holds significant potential to improve patient outcomes and the overall quality of care across diverse clinical settings. Incorporating music into routine nursing practice may enhance holistic, person-centred approaches while simultaneously supporting nurse well-being and job satisfaction. Future studies are needed to explore the systematic integration of music-based interventions within frameworks of humanised, person-centred, and compassionate nursing care and to assess their long-term effects on both patients and healthcare professionals.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The authors have nothing to report.

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