



## Fifteen-minute music intervention reduces pre-radiotherapy anxiety in oncology patients



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### A B S T R A C T

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Anxiety  
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State-Trait Anxiety Inventory

**Purpose:** Oncology patients may respond to radiation treatment with anxiety expressed as stress, fear, depression, and frustration. This study aimed to investigate effects of music intervention on reducing pre-radiotherapy anxiety in oncology patients.

**Methods:** Quasi-experimental study with purposeful sampling was conducted in the Department of Radiation Oncology, at Far Eastern Memorial Hospital, Taipei, Taiwan. Subjects were assigned into a music group ( $n = 100$ ) receiving 15 min of music therapy prior to radiation and a control group ( $n = 100$ ) receiving 15 min rest prior to radiation. Both groups were evaluated for pre- and post-test anxiety using the State-Trait Anxiety Inventory. Physiological indicators of anxiety were measured pre- and post-test.

**Results:** Baseline State/Trait scores and vital signs were comparable between groups ( $P > 0.05$ ). Mean change in pre- and post-test State/Trait scores showed significant decreases from baseline to post-test in both groups (all  $P < 0.05$ ). A statistically significant difference was observed between music therapy and control groups in mean change of State anxiety scores (mean decreases 7.19 and 1.04, respectively;  $P < 0.001$ ) and Trait anxiety scores (mean decreases 2.77 and 1.13, respectively;  $P = 0.036$ ). In vital signs, both groups had significant decreases in pre- and post-test heart rate and respiration rate ( $P < 0.05$ ). A statistically significant difference in mean change of systolic pressure was found between music and control groups ( $-5.69 \pm 0.41$  mmHg vs.  $-0.67 \pm 1.29$  mmHg, respectively;  $P = 0.009$ ).

**Conclusions:** Music therapy decreased State anxiety levels, Trait anxiety levels and systolic blood pressure in oncology patients who received the intervention prior to radiotherapy.

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### Introduction

Oncology patients often respond to their cancer diagnosis and treatment, including chemotherapy (Lin et al., 2011) and radiation (Chaturvedi et al., 1996; Clark et al., 2006), with emotional symptoms such as anxiety, depression and stress, as well as fear, frustration, loneliness and feelings of loss of control (Magill, 2006).

Music therapy is an evidence-based complementary therapy commonly used in integrative oncology treatment programs (Magill, 2006; Hilliard, 2006). Music therapy has been applied successfully in various clinical settings to help reduce anxiety. Music has improved mood and decreased anxiety and pain associated with surgery, medical procedures, and chronic conditions, as

well as helping to improve quality of life during end-of-life care (Kemper and Danhauer, 2005). In integrative oncology, music therapy has been introduced to treat multiple symptoms such as pain, mood disturbances, and communication issues; besides ameliorating pain and anxiety symptoms, it specifically reduced effects of noxious stimuli and enhanced mood and overall feelings of comfort and sense of control (Magill, 2006). Music therapy has also effectively reduced chemotherapy-induced anxiety (Bulfone et al., 2009; Ferrer, 2007; Lin et al., 2011). Acknowledging the high level of fear and anxiety that may be present before and during radiation treatments, Smith et al. (2001) suggested that modifying the treatment environment is one way to address the psychological well-being of patients with cancer, and further suggested that music therapy was an effective therapeutic intervention to moderate treatment-related anxiety (Smith et al., 2001). Music therapy significantly reduced anxiety, current distress and weekly distress in response to radiotherapy (Clark et al., 2006). Introducing

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music therapy into a pediatric radiotherapy waiting area reduced patients' anxiety and stress as well as that of family members and staff involved in their healthcare program (O'Callaghan et al., 2007). In a mixed-methods analysis, measured effects of a computer-based music CD created by pediatric oncology patients undergoing initial radiotherapy revealed that 67% of children receiving standard care used social withdrawal as a coping mechanism for treatment-related distress but no children in the music therapy group withdrew socially (Barry et al., 2010).

Although both quantitative results (Smith et al., 2001; Clark et al., 2006) and qualitative outcomes (O'Callaghan et al., 2007) of music therapy were promising in terms of reducing anxiety and stress for patients receiving radiation treatments, the music therapy procedures described in these previous studies were diverse. The timing of receiving music therapy in relationship to radiation was also not consistent with the various methods in previous studies. O'Callaghan offered music therapy when the patients were waiting for medical consultations and radiotherapy treatments, Smith's group allowed the patients to listen to the music during their radiation therapy simulation appointment and also during their daily radiation treatments, and Clark's group directed the music therapist to instruct participants to listen to the music at any time during the course of therapy.

We hypothesized that music therapy received in the Radiology waiting room may be able to reduce anxiety and improve anxiety-related physiological parameters in oncology patients prior to undergoing radiotherapy. Therefore, we aimed to evaluate the physiological (e.g., blood pressure) and psychological effects (e.g., anxiety) of a single music intervention delivered to patients prior to a single radiation treatment.

## Patients and methods

### Design

A quasi-experimental study was conducted. Pre- and post-test data were collected from a purposeful sample between April 1, 2011 and October 31, 2011 at the Department of Radiation, Oncology, at Far Eastern Memorial Hospital, Taipei, Taiwan. The internal review board of the hospital reviewed the study protocol and approved the study.

### Participants

Patients who were scheduled to receive a treatment protocol of radiation therapy lasting about 5 weeks or more and who were at least 18 years old, were purposefully sampled by physicians from the Radiation Oncology Department of Far Eastern Memorial Hospital, Taipei, Taiwan, and were then referred to our research team and invited to participate in this study. Inclusion criteria were: patients with sufficient literacy to respond to a written questionnaire. Patients with prior diagnosis of anxiety or psychological disorder, those receiving anti-anxiety or anti-depressant medications, or those with hearing deficit were excluded. A total of 209 patients who met the inclusion criteria were enrolled. Nine of these patients withdrew at the early stage for reasons of severe clinical condition or personal reasons, and 200 patients were retained for analysis. No data were collected from the Radiation Oncology Department regarding chemotherapy or surgical treatment that patients may have received before radiotherapy. The 200 patients were randomly assigned by simple random sampling (every other patient) into two groups, a music therapy group ( $n = 100$ ) and a control group ( $n = 100$ ). After the study was explained thoroughly for each group (separately since instructions were different) by a research assistant, all included participants provided signed informed consent.

### Main outcome measures

#### Primary outcomes

Scores from the self-reported State-Trait Anxiety Inventory (Spielberger et al., 1983) were the primary outcome measures applied in the experimental and control groups.

#### Secondary outcomes

Blood pressure, heart rate, respiratory rate, and fingertip oxygen saturation (determined from peripheral circulation) were measured in experimental and control groups using a Philips SureSigns<sup>®</sup> VM6 patient monitor (Philips Medical Systems, Inc., Cleveland, OH, USA).

#### State-Trait Anxiety Inventory (STAI)

The State-Trait Anxiety Inventory (STAI) (Spielberger et al., 1983) is a self-reported questionnaire, Form Y, which is divided into two sections of 20 statements each based on two categories of anxiety: State anxiety (S-Anxiety) or Trait anxiety (T-Anxiety). State-Anxiety refers to the subjective and transitory feeling of tension, nervousness, and worry experienced at a given time. Trait-Anxiety refers to a relatively general experience of anxiety as the individual's tendency to perceive and respond to stressful situations with increased intensity (Spielberger et al., 1983). Form Y, which replaces the pre-1983 STAI Form X (Spielberger et al., 1970) clearly differentiates temporary State anxiety from the more general and long-standing Trait anxiety in measuring anxiety in adults. Each of the 40 statements has four possible responses: The STAI is language-appropriate for individuals with at least a sixth grade reading level. The median Cronbach's alpha reliability coefficients for the State and Trait scales (Form Y) are 0.92 and 0.90, respectively. Item remainder correlation coefficients for both scales (Form Y) have consistently been above 0.90 (Tluczek et al., 2009). A Chinese version of the STAI was developed and tested on junior high school students (Chung and Long, 1984). It had a test-retest reliability of 0.74 ( $n = 259$ ) and 0.76 ( $n = 256$ ) for STAI-state (S-anxiety) and STAI-trait (T-anxiety), respectively. In another validation study of the Chinese version of STAI among 737 and 725 junior high school students, Cronbach's alpha for S-Anxiety and T-Anxiety were 0.86 ( $n = 737$ ) and 0.90 ( $n = 725$ ), respectively.

#### Procedure of musical intervention

The intervention was conducted by two investigators from our research team, one a clinical practitioner and the other a psychological testing professional, who measured patients' physiological conditions (blood pressure, heart rate, respiratory rate, and blood oxygen concentration) and conducted the State-Trait Anxiety Inventory test, respectively. Patients decided individually on which day of their radiation treatment schedules their music intervention should be conducted. Patients were asked to fill out the personal information form (demographics) and the State-Trait Anxiety Inventory Form Y with two scales prior to receiving the first measurement of physiological conditions. Then patients were instructed to sit comfortably on a couch in the radiology waiting room and to wear headphones and listen to slow-paced, soft, melodic music at low volume with consistent tempo and dynamics and an average 60–80 beats per minute. Subjects chose their own favorite music tracks from a selection of old songs in Mandarin, Mandarin pop, traditional Taiwanese songs, Western music (country and western), and classical music (e.g., chamber music with string instruments). Patients were able to adjust the volume and then listen to 15 min of music. Researchers again measured patients' physiological conditions, and asked the patient to fill out the STAI anxiety scales once again. For the control group,

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