

EMOTIONS IN MOTION: TUNTEET LIIKKEESSÄ (TULI)

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Abstract

Depression is a highly prevalent mood disorder which impairs a person's social skills and quality of life, and affects their ability to recognise and express emotions. Here, we describe the first study to investigate how depression affects expression of emotions perceived in music through spontaneous, expressive body movement. Central to this study is the use of a Dance Movement Therapy (DMT) intervention. Specifically, we investigate how depression and possible co-morbid anxiety affect a person's ability to express emotions perceived in music through spontaneous movement, regulate their emotions through music and music related movement, and whether DMT can improve these skills in depressed patients. We predict that the DMT intervention will increase the variety of movement characteristics exhibited, including movement dynamics, movement range, and movement-based interaction. Participants (aged 18-60 years), including 30 clinically depressed patients and 30 non-depressed controls, will be tested throughout Spring 2012. Depressed participants will receive 20 sessions of group DMT, and measurements, including psychometric questionnaires (depression, anxiety, alexithymia, emotion regulation, life satisfaction and mood) and motion capture/video data (solo movement improvisations with music, and movement interaction with music), will be taken before and after the intervention. For the controls, measurements will be taken only once. Here, we describe the project, and report on its current status.

Keywords: Dance movement therapy, Depression, Motion capture

1. Background and objectives

1.1. Music and emotion

Different emotional skills, such as the ability to perceive, express, or regulate emotions are central to many aspects of social functioning and mental well-being (e.g., Gohm, 2003; Mayer & Salovey, 1997). Music has proved to be useful in the study of emotional processes because of its presence and use in many facets of life. Emotion-related aspects of music have been extensively studied, and many tangible phenomena identified. For example, considerable research has examined the nature of music-related emotional experiences (e.g., Scherer & Zentner, 2008), the mechanisms underlying music-induced emotional experiences (e.g., Juslin & Västfjäll, 2008) and music-related mood-

regulation strategies (e.g., Saarikallio & Erkkilä, 2007). Broad relationships between particular musical features, such as tempo or tone colour, and emotional experience have also been determined (Eerola & Saarikallio, 2010). In addition, the debilitating effects of certain clinical disorders on music-related emotional functioning have been identified (Punkanen, Eerola & Erkkilä, 2010). One such disorder which has been shown to have a particular effect on emotional processing is clinical depression.

1.2. Clinical depression

Depression is a disabling medical illness characterised by persistent and all-encompassing feelings of sadness, loss of interest or pleasure in normally enjoyable

activities, and low self-esteem. Depressed patients have been shown to have difficulty in identifying, expressing, and regulating emotions, especially negative emotions, such as anger (Joormann & Gotlib, 2010). Indeed, recent research has shown that both current mood (Vuoskoski & Eerola, 2011) and long-term clinical depression (Punkanen, Eerola & Erkkilä, 2010) are implicated in people's ability to detect emotions expressed in music.

Medication, sometimes in combination with psychotherapy or counselling, is the predominant method of treatment for depression. There is, however, also evidence to suggest that movement-based interventions can improve depressed mood (Stewart, McMullen & Rubin, 1994).

1.2. Body movement

Body movement is fundamental to the perception and production of both emotion and music. Relationships between music, movement, and emotion have been studied using a variety of methodologies, including video analysis, motion capture, and, more recently, physiological methods such as electromyography (EMG), in addition to audio and MIDI recordings.

Such methods have been used to study phenomena including communication of emotion through body movement (e.g., Aronoff, Woike, & Hyman, 1992; Boone & Cunningham, 1998; De Meijer, 1989, 1991; Walk & Homan, 1984; Walk & Samuel, 1988), perception of musicians' (e.g., Davidson, 1993), conductors' (e.g., Luck, Toiviainen, & Thompson, in 2010), and dancers' (e.g., Dittrich, Troscianko, Lea, & Morgan, 1996) expressive movements, relationships between expressive dance movements and musical structure (e.g., Krumhansl & Schenk, 1997), and expression of emotional meaning in music through expressive body movement (e.g., Boone & Cunningham, 2001). Other recent work has identified relationships between both personality (e.g., Luck, Saarikallio, & Toiviainen, 2009; Luck, Saarikallio, Burger, Thompson & Toiviainen, 2010) and mood (Saarikallio, Luck, Burger, Thompson, Toiviainen, 2010) and characteristics of music-induced movement.

Despite this extensive research, little is known about how clinical depression is reflected in music-related movement, particularly via emotional expression and emotion regulation. In addition, although music therapy has been shown to significantly contribute to the rehabilitation of patients with depression, and improve their ability to detect emotions expressed by music (Punkanen, Eerola & Erkkilä, 2010), the effect of movement-related therapies on depressed individual's ability to express emotions through music-related movement is largely unknown.

1.4. Emotions in motion

Here, we investigate how depression affects an individual's ability to express emotions conveyed in music through spontaneous movement, regulate their emotions through music and music related movement, and whether music and movement-related therapy can improve these skills in depressed individuals. Central to this study is the implementation of a dance movement therapy (DMT) intervention. DMT involves the psychotherapeutic use of movement and dance for emotional, cognitive, social, behavioural and physical disorders, and is predicated on the basis that movement and emotion are directly related (Payne, 2006). Despite evidence that physical activity is beneficial to individuals suffering from mild depression (NICE Clinical Guideline 90), there is a lack of evidence concerning DMT specifically, in particular whether it offers significant benefits in terms of a depressed individuals' emotional functioning.

In an effort to provide such evidence, the present study examines the effects of DMT on two aspects of music and emotion-related functioning: 1) Expression of felt music-related emotions through movement, and 2) Emotional communication and interaction through music and movement. Our aim is to increase understanding of relationships between music and emotional expression and regulation, and how these are associated with depression and mental wellbeing. Moreover, this research will advance our understanding of mechanisms underlying effects of DMT, further clarify depression-related emotional skills, and highlight the potential of music as a welfare-improving

tool in everyday life. We predict that the DMT intervention will increase the variety of movement characteristics exhibited, including movement dynamics, movement range, and movement-based interaction, and improve identification of, and willingness to engage with, negative emotions such as anger and fear.

2. Methods

2.1. Design, materials & apparatus

Data is currently being collected from two groups of participants: An *experimental* group consisting of clinically depressed individuals, and a *control* group consisting of normal controls. The *experimental* group is comprised of individuals suffering from clinical depression (as diagnosed by a medical doctor), and lacking in suicidal tendencies and substance abuse. Following collection of baseline data concerning emotional functioning and music and emotion-related movement characteristics of both groups, the *experimental* group only will receive 20 sessions of group DMT (5-6 participants per group) over a period of 10 weeks. Upon completion of the therapy intervention, data from the *experimental* participants will be collected again in order to examine pre- to post-therapy changes.

Emotional functioning is determined via a range of psychometric measures designed to evaluate participants' level of depression (*Beck Depression Inventory: BDI*), anxiety (*Hospital Anxiety and Depression Scale: HADS*), alexithymia (*Toronto Alexithymia Scale: TAS-20*), emotion regulation (*Emotion Regulation Questionnaire: ERQ*), musical and emotional regulation (*Music in Mood Regulation scale: MMR*), satisfaction with life (*Satisfaction With Life index: SWL*), and current mood (*Positive and Negative Affect Scale: PANAS*). These instruments are commonly used internationally, and suitable for the target groups. In addition, all participants complete a questionnaire concerning their background in music, dance, and sports.

Music and emotion-related movement characteristic data collection is divided into two sections: 1) *Individual expression of perceived and felt musical emotions through*

movement, and 2) *emotional communication and interaction through music and movement*.

During the *individual* section, participants are presented with 15 short (60 s) excerpts of music representing five basic emotions (happiness, sadness, anger, fear, and tenderness). Participants are instructed to express the emotion conveyed in the music through their body movement. For each excerpt, participants also answer six questions: 1) Which emotion did the music express?, 2) How strongly did it express that emotion?, 3) How strongly did you feel that emotion?, 4) How much did you like the music?, 5) How familiar was the music?, and 6) How easy was it to move to the music? For question 1, participants can choose one of the five options. Responses to questions 2-6 are given on a 5-point Likert scale. Immediately after each excerpt, participants call out their responses, after which the next excerpt is presented.

During the *interaction* section, participants interact with the therapist through improvisational movement to music. Two separate songs are played, the first of which is calming, the second of which is energetic.

2.2. Participants

Data collection is well underway, and our aim is to collect data from 30 participants in each of the *experimental* and *control* groups (60 participants total). Thus far, we have collected data from 22 *experimental* participants (mean age = 39 years, SD of age = 12, 20 females), and 21 *controls* (mean age = 27 years, SD of age = 10, 15 female)

2.3. Stimuli

During the *individual* section, all participants are presented with short (60 s) excerpts taken from the following 15 pieces. Each excerpt represents one of five basic emotions (happiness, sadness, anger, fear, and tenderness):

HAPPINESS

- ABBA – *Dancing Queen*.
- Earth, Wind & Fire – *Boogie Wonderland*.
- Marvin Gaye – *Pride and Joy*.

SADNESS

- A Fine Frenzy – *Almost Lover*
- Glen Hansard & Marketa Irglova – *If You Want Me*.
- Jukka Leppilampi – *Black Iris*.

ANGER

- High Energy – *The Box*.
- Marilyn Mazur – *Unbound*.
- Rage Against the Machine – *Wake Up*.

FEAR

- David Julyan – *The Bone Dam*.
- Mussorgsky – *Night on a Bare Mountain*.
- Bernard Herrmann – *Theme from Psycho* (Prelude).

TENDERNESS

- Bobby McFerrin – *Common Threads*.
- Gabriel Anders – *Fire of Love*.
- Sade – *Is it a Crime?*

For the *interaction* section, two further pieces are presented in their entirety, during which the participant and therapist dance together. Here, the following pieces, representing calming and energetic music, respectively, are used:

- Bobby McFerrin – *Yes You*.
- Angélique Kidjo – *Batonga*.

2.5. Procedure

Data is collected from participants individually, and begins with completion of the psychometric measures and background questionnaire. Following this, the movement data is collected. For this, participants wear a tight-fitting motion capture suit equipped with 28 reflective markers, the locations of which are shown in **Figure 1**.

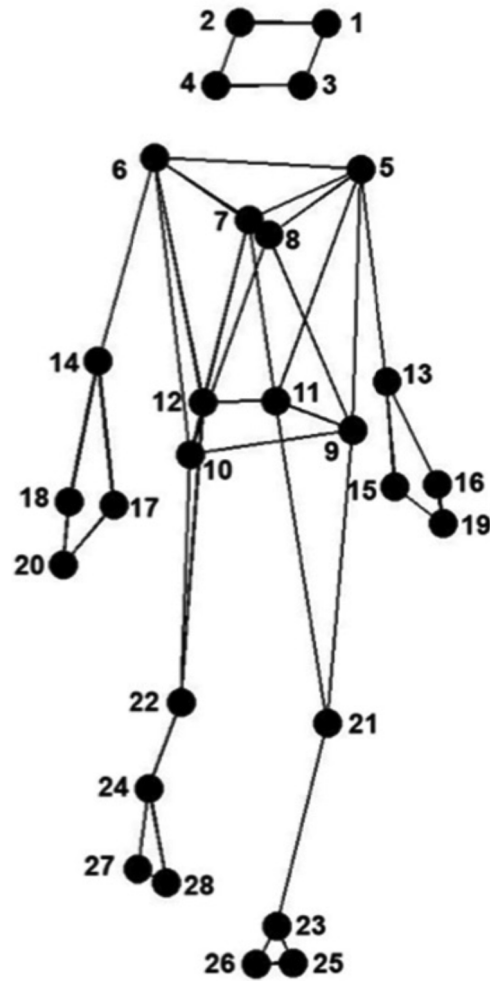


Figure 1. Location of markers on the motion capture suit.

The three-dimensional position of each marker is tracked by an eight-camera optical motion-capture system (Qualisys ProReflex) at 120 frames per second. Music stimuli are played back via a pair of Genelec 8030A loudspeakers, and the ambient room sound is recorded with two overhead microphones positioned at a height of 2.5 m. The microphone input, the direct audio signal of the playback, and the TTL1 pulse transmitted by the Qualisys cameras when recording, are recorded using Pro Tools software in order to facilitate synchronization of the motion capture data with the music stimuli. In addition to the motion capture system, sessions are recorded with three Sony video cameras.

Each session begins with a warm-up, during which the therapist offers movement possibilities to the participant, and explains the participant's task. Following this, the *individual* data is collected (see above). Finally,

the *interaction* data is collected. During collection of the interaction data, the therapist wears a motion capture suit with 28 reflective markers positioned identically to those on the participant, and both participant and therapist movement is recorded. Total length of data collection is approximately one hour and 45 minutes (45 minutes for the psychometric measures and questionnaire, and one hour for the music and movement recording).

3. Data processing & analysis

Once data collection is complete, a range of features will be computationally extracted from the movement data in order to examine aspects such as speed, acceleration, and smoothness of movement of individual body parts, use of space, posture, energy, and variation in movement. Relationships between these features and participants' clinical condition (depressed vs. not depressed), scores on the psychometric measures, and music, dance, and sports background questionnaire will be analysed in a series of statistical analyses. Video data will be analysed qualitatively.

4. Expected outcomes

We expect this study to provide valuable information about how emotional expression through music and movement is related to depression and broader emotional and psychological wellbeing. We further anticipate that the results will extend our knowledge concerning mechanisms underlying DMT interventions and possible health-effects of music. Finally, we predict that this study will provide crucial evidence that DMT is a valid therapeutic tool in the treatment of depression and emotional functioning.

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